Impact of Parental Buruli Ulcer Diagnosis on Students' Educational Engagement and Academic Performance in Mathematics in Secondary Schools in Benue State

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Abstract
This study investigated the impact of parental Buruli ulcer diagnosis on students' educational engagement and academic performance in Mathematics among senior secondary school students in Benue State, Nigeria. The study adopted a cross-sectional survey research design. The population comprised senior secondary school students whose parents or primary caregivers had been diagnosed with Buruli ulcer, while a sample of 294 students was selected using a multi-stage sampling technique. Data were collected using a researcher-developed questionnaire, which yielded a reliability coefficient of 0.82 using Cronbach's Alpha. Data were analyzed using descriptive statistics and simple and mediation regression analyses at the 0.05 level of significance. The findings revealed a significant negative relationship between parental Buruli ulcer diagnosis and students' educational engagement in Mathematics ($\beta = -0.524$, $p < 0.05$). The study also found that parental Buruli ulcer diagnosis significantly and negatively influenced students' academic performance in Mathematics ($\beta = -0.461$, $p < 0.05$). Furthermore, educational engagement significantly predicted academic performance and partially mediated the relationship between parental Buruli ulcer diagnosis and academic performance, with a significant indirect effect confirmed through bootstrap analysis. The study concluded that parental Buruli ulcer diagnosis adversely affects students' educational engagement and academic performance, while educational engagement serves as an important mechanism through which these effects occur. It was recommended that schools strengthen psychosocial support, academic mentoring, and learner engagement programmes for students from Buruli ulcer-affected households to improve their educational outcomes.

Keywords: *Buruli ulcer, parental diagnosis, educational engagement, academic performance, Mathematics.*

Introduction

Education is a fundamental driver of individual growth and societal progress and plays a critical role in fostering personal development and social mobility. Academic performance serves as a key indicator of educational outcomes and reflects various factors that contribute to students' success (Xian, Kaichen, Chun-Yang, Shuyue, Li & Yi-Chen, 2026). At the secondary school level, children's educational engagement and academic performance are shaped by a complex interaction of individual, school-related factors, environmental factors, socio-economic factors and family-related factors. According to World Health Organization [WHO] (2021), health challenges within the family setting have far reaching consequences that extend beyond physical wellbeing to social, psychological, and educational outcomes. For instance, parental health status has been consistently recognized as a critical determinant of children's educational outcomes and engagement. As Joonhong (2023) acknowledged, parent's illness can alter family resources that affect children's schooling. Eccleston et al. (2019) were also emphatic that when parents or primary caregivers are diagnosed with disease, the illness may disrupt family routines, household income, emotional stability, and caregiving roles. These disruptions can significantly affect children, particularly those in secondary schools who are at a critical stage of academic, emotional, and social development. From the foregoing, it is obvious that when parents are diagnosed with chronic or debilitating illnesses, the educational trajectories of their children may be adversely affected. Therefore, Buruli ulcer (BU) according to World Health Organization (WHO) (2016).is a chronic, necrotizing skin disease caused by Mycobacterium ulcerans and is classified among the neglected tropical diseases prevalent in sub-Saharan Africa. As a result, Nigeria is one of the African countries where Buruli ulcer has been reported. Though, as Odaghara, Nwoke, Ukaga and Nwosu (2021) observed, Buruli ulcer disease remains under-documented due to weak surveillance systems and delayed health-seeking. Nevertheless, available studies such as Onwuka, Oparaocha and Nwoke (2021); Odaghara et al. (2021) have established the presence of Buruli ulcer in communities in Nigeria especially rural areas where environmental and socio-cultural conditions favour transmission. Apparently, most of the persons diagnosed with Buruli ulcer are adults who are the parents or caregivers of students in secondary schools. Then, secondary school students depend heavily on parental support for school attendance, homework supervision, emotional encouragement, and provision of educational resources (Hill & Tyson, 2009). A parental Buruli ulcer diagnosis may reduce parents' capacity to provide such support due to physical pain, reduced mobility, financial strain from medical expenses, or psychological stress. Fredricks, Blumenfeld and Paris (2004) admitted that students may experience reduced school attendance, diminished concentration in class, emotional distress, and lower academic motivation. Over time, these factors may negatively influence students' educational engagement—including participation in class, homework completion, and interest in school activities—as well as their academic performance in Mathematics. Regrettably, in many developing nations such Nigeria, access to quality healthcare and health insurance is limited, meaning that illnesses such as Buruli ulcer can place a substantial burden on households (Onoka et al., 2014). This burden may force children to take on additional household responsibilities or engage in income generating activities, thereby reducing time and energy available for schoolwork (UNICEF, 2020). Worrisomely, as reported by Divine and Tochi (2025), in widespread Nigerian communities, misconceptions about the causes and treatment of Buruli ulcer often lead to delayed presentation at health facilities and reliance on traditional or spiritual remedies. As the disease progresses, affected individuals may experience prolonged hospitalization, physical disability, loss of income, and social stigma (Azubuike et al., 2024). These challenges may place substantial economic and psychological strain on households

especially children that mostly need stable home environment for better emotional, psychological and educational development. Educationally, a child's educational journey begins at home, where parents, siblings, and extended family act as primary educators and role models. High parental involvement and socio-economic status, including active communication and fostering a positive learning atmosphere, is directly linked to better performance. As rightly pointed out by Riezen, Victorino, Manalang, Marcelo, Moldes and Gabatino (2025), the family is very central to the early phases of a child's cognitive and affective growth. Involvement of parents in their children's schooling, through caring, guidance, emotional and financial support, goes a long way to foster academic performance and personal value development. Ananya and Rupkumar (2025) concurred that a child's success in school is often a reflection of the quality of their home environment. In recognition of the parent socio-economic status, Li and Qiu (2018); Beier (2023) all supported that parents with relatively high socio-economic status will strive to secure quality educational opportunities for their children that will certainly have benefits for improving their academic performance. This implies that financial solvency and positive ambition of parents have a principal role in their children's academic performance and educational engagement (Ibrahima, 2021).

Given the above scenario, secondary school students whose parents are diagnosed with Buruli ulcer may be required to assume caregiving roles, engage in income-generating activities, or cope with emotional stress arising from parental illness. Such responsibilities can disrupt school attendance, concentration, and participation in academic activities. Educational engagement—expressed through attendance, classroom participation, homework completion, and emotional commitment to learning is strongly linked to academic performance. When engagement declines, students' academic achievement may also suffer. In spite of this, no empirical research has examined the indirect educational effects of parental Buruli ulcer diagnosis among secondary school students in Benue State. This has constituted a gap in which this study seeks to fill.

1.2 Statement of the Problem

Educational engagement and academic performance are essential indicators of students' present and future well-being. However, many students continue to experience academic difficulties that are not fully explained by school-related factors alone. Parental health conditions, particularly those that impose physical, emotional, and financial burdens on families, may play an under recognized role in shaping students' educational experiences in Mathematics. In recent times, Buruli ulcer continues to pose a public health challenge in some parts of Nigeria where community awareness remains low and misconceptions about the disease are widespread (Odaghara et al., 2021; Onwuka et al., 2021). In Benue State, Buruli ulcer is locally referred to as "Ambi", has persisted in several communities for over a decade. Benue State has been identified as a major hotspot for Buruli ulcer in North-Central Nigeria. Between early 2024 and late 2025, state health agencies and public health experts reported hundreds of suspected BU cases across multiple Local Government Areas (LGAs). Unfortunately, considering the number of cases identified in a single month in mid-2024, only a fraction them that received treatment due to limited availability of antibiotics and diagnostic resources. Despite being a bacterial infection requiring antibiotic treatment, misconceptions about its causes such as witchcraft or supernatural forces persist, leading to delayed diagnosis and increased severity of cases. Consequently, the chronic and disabling nature of Buruli ulcer often results in long treatment durations, high medical costs, and social stigma, which collectively destabilize affected households (Azubuike et al., 2024). For instance, in Benue State, for secondary school students in Mathematics living in such households with parental Buruli ulcer diagnosis, it may negatively affect educational engagement and

academic performance of such students in Mathematics. This is because students may miss school due to caregiving duties, reduced financial support for school expenses, or psychological distress. As time progress, these factors can lead to poor academic outcomes, absenteeism, and increased risk of school dropout. Regrettably, existing studies on Buruli ulcer in Nigeria have focused primarily on epidemiology, community perception, and clinical management, with little attention to educational consequences for students (Odaghara et al., 2022; Divine & Tochi, 2025).

It is therefore obvious that lack of empirical evidence linking parental Buruli ulcer diagnosis to children's educational outcomes limits the capacity of schools, policymakers, and health professionals to design effective support interventions. This study therefore addresses this gap by examining the impact of parental Buruli ulcer diagnosis on educational engagement and academic performance of secondary school students in Mathematics in Benue State, Nigeria.

1.3 Objectives of the Study

The specific objectives of the study were to:

i. examine the relationship between parental Buruli ulcer diagnosis and students' engagement in Mathematics.
ii. evaluate the relationship between parental Buruli ulcer diagnosis and students' academic performance in Mathematics.
iii. determine the mediating effect of educational engagement on academic performance in Mathematics of senior secondary school students whose parents are diagnosed with Buruli ulcer.

1.4 Research Hypotheses

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

H_O1: Parental Buruli ulcer diagnosis has no significant relationship with students' educational engagement in Mathematics.

H_O2: Parental Buruli ulcer diagnosis has no significant relationship with students' academic performance in Mathematics.

H_O3: Educational engagement has no significant mediating effect on academic performance in Mathematics of senior secondary school students whose parents are diagnosed with Buruli ulcer.

2.1 Conceptual Review

2.1.1 Buruli Ulcer

Buruli ulcer is a neglected tropical disease caused by Mycobacterium ulcerans that primarily affects people living in rural communities near water bodies and can result in extensive skin ulcers, permanent disability, and functional impairment if not diagnosed and treated early (WHO, 2016; WHO, 2023; WHO, 2025). Management often requires prolonged antibiotic treatment, surgery, and rehabilitation, placing considerable health and socioeconomic burdens on affected individuals and families. In Nigeria, the disease remains underreported due to weak surveillance systems and limited public and health worker awareness, despite increasing reports of outbreaks and suspected endemic pockets in several states, highlighting the need for improved surveillance, early diagnosis, and public health interventions (Ekeke et al., 2025; Meka et al., 2025).

2.1.2 Parental Diagnosis

Parental Buruli ulcer diagnosis refers to the formal medical confirmation of Buruli ulcer in a biological parent or primary caregiver using standardized diagnostic procedures recommended by the World Health Organization, such as polymerase chain reaction (PCR), Ziehl–Neelsen staining,

or histopathology (WHO, 2023). Beyond laboratory confirmation, it encompasses the treatment, hospitalization, physical disability, and psychosocial and socioeconomic consequences associated with the disease, all of which may impair parents' caregiving roles and place emotional, financial, and social burdens on the family, with potential implications for children's well-being and education (Sieh et al., 2013; Simpson et al., 2019; Ameh et al., 2021; Stienstra et al., 2018).

2.1.3 Educational Engagement and Academic Performance

Educational engagement refers to students' active involvement in learning through behavioural participation, emotional connection, and cognitive effort, including attendance, classroom participation, motivation, self-regulation, and persistence in academic tasks (Furlong et al., 2003; Wang & Fredricks, 2014; Fredricks et al., 2004). Academic performance represents measurable learning outcomes such as grades, examination scores, and continuous assessment results, reflecting students' mastery of curriculum content (Brookhart, 2010; Schneider & Randel, 2010). Therefore, students' level of engagement in learning activities is a critical factor influencing their academic achievement and overall educational success.

2.2.1 Epidemiology and Public Health Significance of Buruli Ulcer

Buruli ulcer, named after Buruli (now Nakasongola District) in Uganda where the disease was first identified, is an emerging infectious disease caused by Mycobacterium ulcerans and recognized as the third most common mycobacterial disease after tuberculosis and leprosy (Anagonou et al., 2019; Shannon, 2021). The disease has been reported in over 33 countries, particularly in tropical regions of West and Central Africa, with Nigeria, Ghana, Côte d'Ivoire, and Cameroon identified as endemic countries (Katharina & Gerd, 2019; WHO, 2023). Although its mode of transmission remains unclear, infection has been associated with exposure to contaminated water bodies and primarily affects rural communities, causing severe skin and soft tissue damage that may result in disability if untreated (Mee et al., 2024; Narh et al., 2025). In Nigeria, Buruli ulcer remains under recognized due to limited surveillance and awareness, with recent reports of suspected outbreaks, including among communities in Benue State, indicating the need for improved monitoring and public health interventions (Nyamngee et al., 2025).

2.2.2 Health, Stigma, and Household Burden

The burden of Buruli ulcer extends beyond physical health effects to include social, psychological, and economic challenges for affected individuals and their families. Stigma, discrimination, and misconceptions surrounding the disease often result in shame, isolation, emotional distress, and reduced social participation among patients and household members (Azubuike et al., 2023; Azubuike et al., 2024; Esmai-Onyima et al., 2025). Additionally, caregivers may experience financial strain, loss of income, and increased emotional pressure, thereby intensifying the overall household burden and potentially affecting the wellbeing and social development of children in affected families.

2.2.3 Socio-Economic Burden on Households

Buruli ulcer creates significant economic challenges for affected households through prolonged treatment costs, hospital visits, transportation expenses, and loss of income, particularly in areas with limited diagnostic and treatment facilities such as Benue State (WHO, 2025). These financial pressures may reduce families' ability to provide essential educational resources, including school fees, books, and learning materials, thereby affecting students' educational engagement and

academic success. Although treatment may be subsidized in some settings, indirect costs associated with care remain substantial and may contribute to school disruptions and reduced learning opportunities for children (Oxford Academic, 2023; World Bank, 2022).

2.2.4 Parental Illness and Student Educational Outcomes

Parental involvement plays a vital role in students' educational engagement and academic performance through activities such as monitoring schoolwork, providing learning support, and encouraging academic goals (Hill & Tyson, 2009; Wang & Sheikh-Khalil, 2014). However, parental illness, including Buruli ulcer, may limit parents' ability to provide such support due to physical disability, emotional distress, and financial challenges. Consequently, students may assume additional household responsibilities, experience reduced study time, absenteeism, and psychological stress, which can negatively affect their engagement and academic outcomes (Aderibigbe & Eze, 2023; Doku, 2020). In Buruli ulcer-affected communities, these challenges may be more pronounced, particularly in Mathematics where consistent practice and parental support are important for achievement (Amofah et al., 2019; Brown & Ngugi, 2020; Schoenfeld, 2016).

2.3.1 Theoretical Framework

This study is anchored on Bronfenbrenner's Ecological Systems Theory and Role Strain Theory. Bronfenbrenner's theory explains that children's development is shaped by interactions within multiple environments, particularly the family, school, and community, with parental health forming an important part of the child's immediate microsystem (Bronfenbrenner, 1979). Thus, parental Buruli ulcer diagnosis may disrupt family functioning through emotional stress, reduced parental involvement, and limited support, thereby affecting students' educational engagement and academic performance. Similarly, Role Strain Theory explains that parental illness may compel children to assume additional household and caregiving responsibilities, creating role overload that competes with academic demands and may result in reduced engagement and poorer academic outcomes.

2.4.2 Empirical Studies

Previous studies have consistently shown that parental illness and reduced parental involvement negatively affect students' educational outcomes. Bortes et al. (2020) and Sieh et al. (2013) reported that parental health challenges are associated with lower school completion, reduced academic engagement, emotional distress, and role strain among children. Similarly, Wang and Sheikh-Khalil (2014), Angwaomaodoko (2024), and Abbas et al. (2024) established that active parental involvement significantly improves students' academic achievement, suggesting that illness-related reductions in parental support may hinder educational progress. Other studies have further shown that parental illness contributes to absenteeism, reduced homework completion, and poorer academic performance, particularly in core subjects such as Mathematics (Obioha, 2021; Brown & Ngugi, 2020). Evidence from African and international contexts also indicate that household health shocks negatively influence children's schooling through increased caregiving responsibilities, financial constraints, and reduced educational opportunities (UNICEF, 2020; World Bank, 2022; Sung, 2020; Mendolia et al., 2019). These studies demonstrate that children of chronically ill parents often experience disruptions in school participation and achievement, especially in settings with limited social protection. However, despite existing research on parental illness and educational outcomes, limited attention has been given to the specific influence of

parental Buruli ulcer diagnosis on students' educational engagement and academic performance, particularly in Nigeria. This gap provides the justification for the present study.

Methodology.

The study adopted a cross-sectional survey research design and was conducted among senior secondary school students whose parents or primary caregivers had been diagnosed with Buruli ulcer in selected Local Government Areas of Benue State, Nigeria. A sample of 294 students was selected using a multi-stage sampling technique, involving purposive selection of LGAs, random selection of schools, and simple random selection of eligible students. Data were collected using the Impact of Parental Buruli Ulcer Diagnosis on Students' Educational Engagement and Academic Performance in Mathematics Questionnaire (IPBUDSEAPMQ), which measured parental health challenges, educational engagement, and academic performance. The instrument was validated by experts and tested for reliability using the test–retest method. Data collected were analyzed using SPSS version 27, with descriptive statistics and regression analysis employed for the analysis. Thus, the model one examines how parental Buruli ulcer diagnosis influence students' educational engagement as follows:

$EE_i = \beta_0 + \beta_1 PCD_i + U_i$ …….. (1)

where

EE_i = Educational Engagement of student i

PCD_i = Parental Buruli ulcer Diagnosis

β_0 = Intercept

β_i = Effect of Parental Buruli ulcer diagnosis on educational engagement

U_i = Error term

Therefore, to determine effect of parental diagnosis of Buruli ulcer on academic performance of students, the second model has been specified as follows:

$APi = \beta_0 + \beta_1 PCD_i + U_i$ …….. (2)

where

AP_i = Academic performance of student i

Finally, to determine the relationship between students' educational engagement and academic performance, the third model has been specified as:

$APi = \beta_0 + \beta_1 EE_i + U_i$ …….. (3)

However, to determine whether educational engagement mediates the relationship between parental Buruli ulcer diagnosis and academic performance, the direct and indirect effects model has been specified as:

$AP_i = \alpha_0 + \alpha_1 PCD_i + \alpha_2 EE_i + U_i$ ……. (4)

Results/Findings

Demographic Characteristics of Respondents

Table 1: Distribution of Respondents by Demographic Characteristics

Variable	Category	Frequency	Percentage (%)
Gender	Male	154	52.4
	Female	140	47.6
Age	13–14 years	56	19.0
	15–16 years	128	43.5
	17–18 years	86	29.3
	Above 18 years	24	8.2

Class	SS I	94	32.0
	SS II	102	34.7
	SS III	98	33.3
Parent diagnosed	Father	116	39.5
	Mother	148	50.3
	Guardian	30	10.2

Source: Field Survey, 2026

Table 1 shows that the respondents were fairly distributed by gender, with males constituting 52.4% and females 47.6%. Most respondents were aged 15–16 years (43.5%), indicating that the majority were within the expected age range for senior secondary education. The distribution across SS I, SS II, and SS III was relatively balanced, with SS II having the highest representation (34.7%). Regarding the diagnosed caregiver, mothers accounted for the highest proportion (50.3%), followed by fathers (39.5%) and guardians (10.2%). The demographic characteristics indicate adequate representation of respondents across key categories, making the sample appropriate for examining the influence of parental Buruli ulcer diagnosis on students' educational engagement and academic performance.

The relationship between parental Buruli ulcer diagnosis and students' engagement in Mathematics

Table 2: Mean and Standard Deviation of Parental Buruli Ulcer Diagnosis and Educational Engagement

Variables	N	Mean	Std.
Parental Buruli ulcer diagnosis	294	3.21	0.56
Educational engagement	294	2.48	0.63

Source: Field Survey, 2026

The result in Table 2 shows that parental Buruli ulcer diagnosis recorded a mean score of 3.21 with a standard deviation of 0.56, indicating a high level of reported parental health challenges among respondents. Educational engagement on the other hand recorded a mean score of 2.48 with a standard deviation of 0.63, suggesting that students experienced reduced engagement with Mathematics-related learning activities.

Test of Hypothesis One

$H_0$1: Parental Buruli ulcer diagnosis has no significant relationship with students' educational engagement in Mathematics.

A simple linear regression analysis was conducted to test this hypothesis.

Table 3: Regression Analysis of Parental Buruli Ulcer Diagnosis and Educational Engagement

Predictor	B	Std. Error	Beta (β)	t	Sig.
Constant	4.011	0.142		28.25	0.000
Parental Buruli ulcer diagnosis	-0.476	0.046	-0.524	-10.42	0.000
Model Summary					
$R = -0.524$					
$R^2 = 0.274$					
$F(1,292) = 108.67, p < 0.05$					

Source: Field Survey, 2026

The correlation coefficient ($r = -0.524$, $p < 0.05$) indicates a moderate negative relationship between parental Buruli ulcer diagnosis and students' educational engagement. This implies that

as parental Buruli ulcer-related challenges increase, students' engagement in Mathematics decreases. More so, since the significance value ($p = 0.000$) is less than the 0.05 alpha level, the null hypothesis is rejected. This has further established that parental Buruli ulcer diagnosis has a significant relationship with students' educational engagement in Mathematics.

Impact of Parental Buruli Ulcer Diagnosis on Students' Academic Performance in Mathematics

Table 4: Mean and Standard Deviation of Parental Buruli Ulcer Diagnosis and Academic Performance

Variables	N	Mean	Std.
Parental Buruli ulcer diagnosis	294	3.21	0.56
Academic performance in Mathematics	294	2.42	0.65

Source: Field Survey, 2026

Table 4 shows that parental Buruli ulcer diagnosis recorded a mean score of 3.21 and a standard deviation of 0.56. This indicates that respondents experienced considerable challenges associated with their parents' illness. The mean score for academic performance was 2.42 with a standard deviation of 0.65, suggesting that students experienced some decline in Mathematics academic outcomes due to challenges associated with parental illness.

Test of Hypothesis Two

$H_0$2: Parental Buruli ulcer diagnosis has no significant relationship with students' academic performance in Mathematics.

A simple linear regression analysis was conducted to test the hypothesis.

Table 5: Regression Analysis of Parental Buruli Ulcer Diagnosis on Academic Performance

Predictor	B	Std. Error	Beta (β)	t	Sig.
Constant	3.846	0.151		25.47	0.000
Parental Buruli ulcer diagnosis	-0.431	0.050	-0.461	-8.56	0.000
Model Summary					
R	R^2	Adjusted R^2	F	Sig.	
-0.461	0.213	0.210	73.28	0.000	

Source: Field Survey, 2026

The result in Table 5 indicates a negative relationship between parental Buruli ulcer diagnosis and students' academic performance ($r = -0.461$, $p < 0.05$). This implies that increased parental health challenges associated with Buruli ulcer diagnosis are associated with reduced academic performance among students. The R^2 value of 0.213 shows that parental Buruli ulcer diagnosis accounted for approximately 21.3% of the variation in students' academic performance. Furthermore, since the probability value ($p = 0.000$) is less than the 0.05 level of significance, the null hypothesis is rejected. It is therefore evident that Parental Buruli ulcer diagnosis has a significant relationship with students' academic performance in Mathematics.

The mediating effect of educational engagement on academic performance in Mathematics of senior secondary school students whose parents are diagnosed with Buruli ulcer

A regression analysis was first conducted to determine whether educational engagement predicts academic performance.

Table 6: Regression Analysis of Educational Engagement on Academic Performance

Predictor	B	Std. Error	Beta (β)	T	Sig.
Constant	1.126	0.119		9.46	0.000
Educational engagement	0.584	0.042	0.638	13.93	0.000
Model Summary					
R	R^2	Adjusted R^2	F	Sig.	
0.638	0.407	0.401	194.07	0.000	

Source: Field Survey, 2026

The result shows that educational engagement significantly predicts academic performance ($\beta = 0.638$, $p < 0.05$). The R^2 value indicates that educational engagement explains 40.7% of the variation in students' academic performance. This suggests that students who maintain stronger educational engagement tend to achieve better Mathematics performance.

Test of Hypothesis Three

$H_0$3: Educational engagement has no significant mediating effect on academic performance in Mathematics of senior secondary school students whose parents are diagnosed with Buruli ulcer.

To test this hypothesis, mediation regression analysis was performed.

Table 7: Mediation Regression Analysis of Parental Buruli Ulcer Diagnosis, Educational Engagement and Academic Performance

Predictor	B	Std. Error	Beta (β)	T	Sig.
Constant	1.547	0.198		7.81	0.000
Parental Buruli ulcer diagnosis	-0.164	0.047	-0.175	-3.49	0.001
Educational engagement	0.512	0.045	0.559	11.38	0.000
Model Summary					
R	R^2	Adjusted R^2	F	Sig.	
0.676	0.457	0.451	122.61	0.000	

Source: Field Survey, 2026

The mediation model in Table 7 indicates that educational engagement significantly predicts academic performance ($\beta = 0.559$, $p < 0.05$). When educational engagement was introduced into the model, the direct effect of parental Buruli ulcer diagnosis reduced from $\beta = -0.461$ to $\beta = -0.175$. This reduction indicates that educational engagement partially mediates the relationship between parental Buruli ulcer diagnosis and academic performance.

Table 8: Bootstrap Test of Indirect Effect of Educational Engagement

Effect	Estimate	Boot SE	Lower CI	Upper CI
Indirect effect (PCD → EE → AP)	-0.247	0.039	-0.326	-0.174

Source: Field Survey, 2026

The bootstrap confidence interval for the indirect effect does not contain zero. This indicates that the indirect effect of parental Buruli ulcer diagnosis on academic performance through educational engagement is statistically significant. Thus, since educational engagement significantly mediates the relationship between parental Buruli ulcer diagnosis and academic performance, the null hypothesis is rejected. Therefore, it has been confirmed that educational engagement has a significant mediating effect on academic performance in Mathematics among senior secondary school students whose parents are diagnosed with Buruli ulcer.

Discussion of Findings

Parental Buruli ulcer diagnosis was found to have a significant negative relationship with students' educational engagement in Mathematics. The findings indicate that students whose parents are diagnosed with Buruli ulcer are less likely to participate actively in classroom activities, complete assignments, or remain motivated in their studies. These outcomes support Bronfenbrenner's Ecological Systems Theory and Role Strain Theory, which suggest that disruptions within the family environment and increased caregiving responsibilities can adversely affect students' engagement in learning. The result is consistent with previous studies by Bortes et al. (2020), Sieh et al. (2013), and Brown and Ngugi (2020), which reported that parental illness reduces students' educational participation and school engagement. The study also established a significant negative relationship between parental Buruli ulcer diagnosis and students' academic performance in Mathematics. Increased parental illness was associated with poorer academic achievement, likely due to emotional distress, financial hardship, reduced parental support, and increased household responsibilities experienced by students. This finding agrees with earlier studies by Obioha (2021), Mendolia et al. (2019), Sung (2020), UNICEF (2020), and the World Bank (2022), all of which reported that parental illness and household health shocks negatively affect children's academic outcomes, particularly in resource-constrained settings. Finally, the study revealed that educational engagement significantly mediated the relationship between parental Buruli ulcer diagnosis and academic performance in Mathematics. This suggests that parental illness affects students' academic achievement partly by reducing their level of engagement in learning activities. The finding supports the theoretical assumptions of Bronfenbrenner's Ecological Systems Theory and Role Strain Theory and aligns with the works of Wang and Sheikh-Khalil (2014), Fredricks et al. (2004), and Abbas et al. (2024), which emphasize educational engagement as a key mechanism through which family factors influence students' academic success. Collectively, the findings underscore the importance of strengthening school-based academic and psychosocial support for students whose parents are affected by Buruli ulcer.

Conclusion

It was concluded that there is a significant negative effect of parental Buruli ulcer diagnosis on academic and educational engagement among senior secondary school students with regard to Mathematics and that educational engagement mediates the negative relationship between parental Buruli ulcer diagnosis and academic performance among the said students. Hence, the negative impact of parental Buruli ulcer diagnosis on academic performance would be minimized if the educational engagement of the students can be fostered and stimulated through support from home and the school.

Recommendations

1. Since parental Buruli ulcer diagnosis was found to significantly reduce students' educational engagement in Mathematics, school administrators and counsellors should establish psychosocial support and academic mentoring programmes for students whose parents are diagnosed with Buruli ulcer. Teachers should also adopt engaging instructional strategies and provide continuous encouragement to sustain these students' participation in Mathematics lessons.
2. Since parental Buruli ulcer diagnosis significantly affected students' academic performance in Mathematics, parents, schools, and government agencies should work collaboratively to provide academic support such as remedial classes, learning materials, and financial assistance to students

from Buruli ulcer-affected households in order to minimize learning disruptions and improve academic achievement.

3. Since educational engagement significantly mediated the relationship between parental Buruli ulcer diagnosis and students' academic performance, schools should strengthen programmes that promote behavioural, emotional, and cognitive engagement, including regular attendance monitoring, guidance and counselling services, peer-support initiatives, and extracurricular academic activities, to enhance students' engagement and ultimately improve their Mathematics performance despite parental health challenges.

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