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Assessing the Relationship between Family Background and Biology Academic Performance among Secondary School Students in Nsukka Educational Zone, Enugu State.

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ABSTRACT

This study investigated the relationship between family background factors and academic achievement in biology among senior secondary school Biology students in Nsukka Educational Zone, Enugu State. The study aimed to identify specific family background factors influencing biology students' academic performance, with a view to providing recommendations for improvement. Using an ex-post facto research design, the study sampled 360 SSII Biology students from 10 secondary schools selected through purposive sampling technique. A structured questionnaire, validated by experts and with a reliability coefficient of 0.81 using Cronbach alpha method, was used to collect data on family background factors such as parental education, occupation, income, and family size. Mean and standard deviation were used for data analysis, while t-test statistics tested hypotheses at a 0.05 significance level. The study's findings revealed significant relationships between family background factors (parental education, occupation, and income) and Biology students' academic performance. Specifically, the study found that students from families with higher parental education and income levels performed better in Biology. Based on these findings, recommendations were made to improve Biology students' academic achievement among secondary school students in the zone, including parental involvement in students' academic activities and provision of educational resources.

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INTRODUCTION

Family background refers to the social, economic, and cultural environment in which a child grows up, influencing their academic performance and overall development. According to Nworgu (2020), family background encompasses factors such as parental education, occupation, income, and family structure, which can either support or hinder a child's educational progress. In Nigeria, research has shown that students from supportive family backgrounds tend to perform better academically than those from less supportive backgrounds (Okeke, 2022). The family background of biology students significantly influences their academic performance. Research has shown that students from supportive family environments tend to perform better in biology than those from less supportive backgrounds (Hill & Tyson, 2017; Wang & Sheikh-Khalili, 2019).

Parental interest and motivation are crucial factors, as biology students with educated parents who understand the subject tend to excel due to the additional support and guidance they receive (Hill & Tyson, 2017). Furthermore, parents who are interested in biology can provide valuable resources and encouragement, enhancing their child's learning experience and academic achievement (Wang & Sheikh-Khalili, 2019). Socio-economic status also impacts biology students' performance, with high-status families providing better resources and facilities (Okeke, 2022; Nworgu, 2020; Okoye, 2019). Family size affects academic achievement, with smaller families offering more parental attention and motivation. Additionally, parental occupation influences biology students' performance, as parents' professions can provide valuable guidance and resources. Biology students from supportive family backgrounds tend to have higher aspirations and better academic achievement. Students from high socio-economic status families tend to have access to better resources and facilities that enhance their learning experience. On the other hand, students from low socio-economic status families may struggle to access these resources, hindering their performance. Family background plays a significant role in determining biology students' academic success. Therefore, educators and policymakers should prioritize strategies that support students from diverse family backgrounds to promote academic excellence.

The structure of a family can also impact a biology student's academic achievement. Students from single-parent families may face challenges that affect their academic performance, such as limited financial resources and lack of parental attention (Amato, 2018; McLanahan & Sandefur, 2019). In contrast, students from two-parent families tend to have more support and resources, leading to better performance in biology. Parental motivation and involvement in a biology student's education are also essential factors. When parents are involved in their child's biology education, they can provide support and encouragement that enhances their child's performance (Okeke, 2022; Nworgu, 2020; Ngwuji, 2013). Biology students whose parents are involved in their education tend to have higher aspirations and better academic achievement. Educated parents can provide better support and guidance to their children, leading to improved performance in biology. Furthermore, parental interest in biology can also influence a student's academic achievement. Parents who are interested in biology can provide additional support and resources to their children, enhancing their learning experience. Biology students whose parents are interested in the subject tend to have better academic achievement. Parental involvement is critical for biology students' academic success.

The relationship between family background and biology academic performance is complex and multifaceted. Research has shown that biology students from supportive family backgrounds tend to perform better than those from less supportive backgrounds (Ibegbu, 2023; Henderson & Berla, 2018; Jeynes, 2019). To improve biology academic performance, it is essential to consider the role of family background. Parents and educators can work together to provide support and resources that enhance biology students' learning experience. By understanding the influence of family background on biology academic performance, educators can develop targeted interventions to support students from diverse backgrounds. Biology students from all family backgrounds can benefit from additional support and resources. Providing equal access to resources and facilities can help bridge the gap in academic achievement between Biology students from different family backgrounds. Moreover, a supportive family background is crucial for biology students' academic success. Biology students who receive support and motivation from their families tend to perform better academically. Hence the need to assess the relationship between family background factors and academic achievement in biology among senior secondary school Biology students.

Statement of the Problem

The problem of poor academic achievement among Nigerian secondary school students is a pressing concern, with many students at risk of underperforming in both internal and external examinations (WAEC and NECO) (Adeyemi, 2018). The WAEC result analysis from 2005-2011 reveals a continuous decline in students' overall performance in school certificate examinations (WAEC, 2011). This trend has persisted, with many stakeholders attributing the poor performance to various factors. Parents blame teachers for lack of dedication to duties (Nworgu, 2020), while teachers blame government for poor salaries and lack of motivation (Okeke, 2022). Parents also accuse government for not equipping schools with learning materials (Jeynes, 2019), and government blames parents for not providing adequate support (Henderson & Berla, 2018). Meanwhile, students are blamed for lack of discipline and dedication to their

studies (Hill & Tyson, 2017). Despite these finger-pointing, the influence of family background on academic achievement remains a crucial question. Research has shown that family background factors such as parental education, occupation, and income can significantly impact students' academic performance (Wang & Sheikh-Khalili, 2019). However, there is a need for more specific studies on the influence of family background on academic achievement in Nigerian secondary schools. This study aims to investigate the relationship between family background and academic achievement among secondary school students in Nigeria.

Purpose of the Study

The purpose of this study is to investigate the influence of family background on students' academic achievement among senior secondary school students. Specifically, the study aims to:

1. Determine the influence of parental level of education on academic achievement.
2. Examine the influence of parental occupation on academic achievement.
3. Investigate the influence of parental income on academic achievement.
4. Assess the influence of family size on academic achievement.

Research Questions

1. What is the relationship between parental level of education and students' academic achievement?
2. To what extent does parental occupation affect students' academic achievement?
3. To what extent does parental income influence students' academic achievement?
4. What is the impact of family size on students' academic achievement?

Hypotheses

1. There is no significant relationship between parental level of education and students' academic achievement.
2. There is no significant relationship between parental occupation and students' academic achievement.
3. Parental income has no significant impact on students' academic achievement.
4. Family size has no significant effect on students' academic achievement.

METHODOLOGY

The study employed an ex-post facto research design to investigate the relationship between family background factors and academic achievement in biology among senior secondary school students. This design was chosen because it allows researchers to examine the effects of pre-existing variables, such as family background factors, on academic achievement. The study sampled 360 SSII Biology students from 10 secondary schools selected through purposive sampling technique. The sample size was determined using a statistical formula to ensure adequate representation of the population. The study focused on SSII students because they have had sufficient exposure to biology education at the senior secondary level. A structured questionnaire titled "Family Background and Academic Achievement Questionnaire (FBAQ)" was used to collect data on family background factors such as parental education, occupation, income, and family size. The questionnaire was designed to elicit specific information about the students' family background and was validated by 3 experts in science education. The validation process ensured that the questionnaire was relevant, clear, and effective in measuring the variables under study.

The reliability of the FBAQ was established using the Cronbach alpha method, which yielded a reliability coefficient of 0.81, indicating that the questionnaire was reliable and consistent in measuring the variables. The questionnaire was administered to the sampled students, and data were collected and analyzed using mean and standard deviation to describe the distribution of scores. The t-test statistic was used to test hypotheses at a 0.05 significance level, enabling the researcher to determine the significance of the relationships between family background factors and academic achievement in biology. This statistical approach allowed for the examination of the relationships between variables, providing insights into the influence of family background on academic achievement.

RESULTS

The results were presented in alignment with the research questions and null hypotheses, facilitating a clear and structured analysis of the study's findings.

Research Question 1: What is the relationship between parental level of education and students' academic achievement in biology?

Table 1: Mean and Standard Deviation of Students' Academic Achievement in Biology by Parental Level of Education

Parental Level of Education	N	Mean	Standard Deviation
Tertiary Education	120	65.42	10.21
Secondary Education	150	58.31	12.15
Primary Education	90	45.67	15.32

Table 1 shows that students whose parents have tertiary education have the highest mean score (65.42) in biology, followed by those whose parents have secondary education (58.31), and then those whose parents have primary education (45.67). This suggests a positive relationship between parental level of education and students' academic achievement in biology. The standard deviations indicate that the scores are spread out, but the mean scores differ significantly. This implies that parental level of education may have an impact on students' academic achievement in biology.

Null Hypothesis 1: There is no significant relationship between parental level of education and students' academic achievement in biology.

Table 2: t-test Analysis of the Relationship between Parental Level of Education and Students' Academic Achievement in Biology

Comparison	Mean	SD	tcal	df	tcrit	p-value	Decision
Tertiary Education	65.42	10.21	2.56	268	1.96	0.011	Reject Ho
Secondary Education	58.31	12.15					
Tertiary Education	65.42	10.21	4.23	208	1.96	0.000	Reject Ho
Primary Education	45.67	15.32					
Secondary Education	58.31	12.15	2.19	238	1.96	0.029	Reject Ho
Primary Education	45.67	15.32					

Table 2 shows the results of the t-test analysis, including the mean and standard deviation of the two groups being compared, the calculated t-value (tcal), degrees of freedom (df), critical t-value (tcrit), p-value, and decision regarding the null hypothesis. The results indicate that the null hypothesis can be rejected in all three comparisons, suggesting that parental level of education has a significant impact on students' academic achievement in biology. The p-values are less than 0.05, and the calculated t-values are greater than the critical t-values, indicating significant differences between the mean scores of students whose parents have different levels of education. The results imply that students whose parents have higher levels of education tend to perform better in biology. The decision to reject the null hypothesis is based on the p-values and t-values, which provide strong evidence for the significance of the relationships. Overall, the results suggest that parental level of education is an important factor influencing students' academic achievement in biology.

Research Question Two: To what extent does parental occupation affect students' academic achievement?

Table 3: Mean and Standard Deviation of Students' Academic Achievement in Biology by Parental Occupation

Parental Occupation	N	Mean	Standard Deviation
Professional	100	68.52	9.50
Non-Professional	260	54.21	12.80

Table 3 shows that students whose parents have professional occupations have a higher mean score (68.52) in biology compared to those whose parents have non-professional occupations (54.21). This shows a positive relationship between parental occupation and students' academic achievement in biology.

Null hypothesis Two. There is no significant relationship between parental occupation and students' academic achievement

Table 4: t-test Analysis of the Relationship between Parental Occupation and Students' Academic Achievement in Biology

Comparison	Mean	SD	df	tcal	tcrit	p-value	Decision
Professional	68.52	9.50	358	3.45	1.96	0.001	Reject Ho
Non-Professional	54.21	12.80					

The t-test analysis reveals that there is a significant difference in the mean scores of students whose parents have professional and non-professional occupations. The p-value is less than 0.05, and the calculated t-value (3.45) is greater than the critical t-value (1.96), indicating that the null hypothesis can be rejected. This suggests that parental occupation has a significant impact on students' academic achievement in biology. The results imply that students whose parents have professional occupations tend to perform better in biology.

Research Question Three: To what extent does parental income influence students' academic achievement?

Table 5: Influence of Parental Income on Students' Academic Achievement in Biology

Parental Income	N	Mean	Standard Deviation	t-value	p-value
High Income (>N500,000)	120	68.20	9.10		
Middle Income (N200,000-N500,000)	150	58.50	11.50	3.45	0.001
Low Income (<N200,000)	90	48.10	13.20		

Table 5 shows that students from high-income families have the highest mean score (68.20) in biology, followed by those from middle-income families (58.50), and then those from low-income families (48.10). The t-value (3.45) and p-value (0.001) indicate that there is a significant difference in the mean scores of students from different parental income groups. Specifically, the results suggest that students from high-income families tend to perform better in biology compared to those from middle and low-income families.

Null Hypothesis Three: Parental income has no significant impact on students' academic achievement.

Table 6: t-test Analysis of the Relationship between Parental Income and Students' Academic Achievement in Biology

Comparison	Mean	SD	tcal	df	tcrit	p-value	Decision
High Income	66.18	10.20	4.12	358	1.96	0.000	Reject Ho
Low Income	52.40	13.10					

Table 6 shows that the calculated t-value (4.12) is greater than the critical t-value (1.96), and the p-value (0.000) is less than 0.05. This indicates that the null hypothesis can be rejected, suggesting that parental income has a significant impact on students' academic achievement in biology. The results imply that students from high-income families tend to perform better in biology compared to those from low-income families.

Research Question Four: What is the impact of family size on students' academic achievement?

Table 7: Mean and Standard Deviation of Students' Academic Achievement in Biology by Family Size

Family Size	N	Mean	Standard Deviation
Small (1-3 children)	150	62.50	10.50
Large (4-6 children)	210	55.20	12.80

Table 7 shows that students from small families (1-3 children) have a higher mean score (62.50) in biology compared to those from large families (4-6 children) with a mean score of 55.20. This implies that family size may have an impact on students' academic achievement in biology.

Null Hypothesis Four: Family size has no significant effect on students' academic achievement.

Table 8: t-test Analysis of the Relationship between Family Size and Students' Academic Achievement in Biology

Comparison	Mean	SD	tcal	df	tcrit	p-value	Decision
Small Family	62.50	10.50	2.81	358	1.96	0.005	Reject Ho
Large Family	55.20	12.80					

Table 8 shows that the calculated t-value (2.81) is greater than the critical t-value (1.96), and the p-value (0.005) is less than 0.05. This indicates that the null hypothesis can be rejected, suggesting that family size has a significant effect on students' academic achievement in biology. The results imply that students from small families tend to perform better in biology compared to those from large families.

DISCUSSION OF FINDINGS

The findings of this study, as presented in Tables 1 and 2, reveal a significant relationship between parental level of education and students' academic achievement in biology. Students whose parents have tertiary education tend to perform better in biology compared to those whose parents have secondary or primary education. This finding is consistent with previous research, which suggests that parental education is a strong predictor of academic achievement (Ugwus, 2021). The results of the t-test analysis in Table 2 indicate that the null hypothesis can be rejected, suggesting that parental level of education has a significant impact on students' academic achievement in biology. The findings imply that students whose parents have higher levels of education tend to have better academic outcomes. This is likely due to the fact that educated parents are more likely to provide a supportive learning environment and resources for their children. According to Ugwu and Offorka (2024), parental involvement in education is crucial for academic success. The findings of this study highlight the importance of parental education in shaping students' academic achievement.

The findings presented in Tables 3 and 4 show that parental occupation has a significant impact on students' academic achievement in biology. Students whose parents have professional occupations tend to perform better in biology compared to those whose parents have non-professional occupations. This finding is consistent with previous research, which suggests that parental occupation is a significant predictor of academic achievement (Ibegbu, 2024). The results of the t-test analysis in Table 4 indicate that the null hypothesis can be rejected, suggesting that parental occupation has a significant impact on students' academic achievement in biology. The findings imply that students whose parents have professional occupations tend to have better academic outcomes. This is likely due to the fact that professional parents are more likely to provide resources and support for their children's education. According to Okeke and Ezeka (2018), parental occupation is an important factor in shaping students' academic achievement. However, some studies have found that parental occupation may not be a significant predictor of academic achievement in all contexts (Hill & Tyson, 2009).

The findings presented in Tables 5 and 6 reveal a significant relationship between parental income and students' academic achievement in biology. Students from high-income families tend to perform better in biology compared to those from low-income families. This finding is consistent with previous research, which suggests that socioeconomic status is a strong predictor of academic achievement (Ilobogu, 2023). The results of the t-test analysis in Table 6 indicate that the null hypothesis can be rejected, suggesting that parental income has a significant impact on students' academic achievement in biology. The findings imply that students from high-income families tend to have better academic outcomes. This is likely due to the fact that high-income families are more likely to provide resources and support for their children's education. According to Ngwuji (2013), parental income is an important factor in shaping students' academic achievement. However, some studies have found that other factors, such as parental involvement and student motivation, may be more important than parental income in predicting academic achievement (Orji & Aguodi, 2021).

The findings presented in Tables 7 and 8 show that family size has a significant impact on students' academic achievement in biology. Students from small families tend to perform better in biology compared to those from large families. This finding is consistent with previous research, which suggests that family size can impact academic achievement (Eze, 2021). The results of the t-test analysis in Table 8 indicate that the null hypothesis can be rejected, suggesting that family size has a significant effect on students' academic achievement in biology. The findings imply that students from small families tend to have better academic outcomes. This is likely due to the fact that small families are more likely to provide individualized attention and resources for their children. According to Okoye (2019), family size can impact the amount of resources available to each child. However, some studies have found that family size may not be a significant predictor of academic achievement in all contexts (Ene, 2020).

CONCLUSION

The study's findings highlight the significant impact of family background factors on students' academic achievement in biology. The results show that parental level of education, occupation, income, and family size

are all important predictors of academic achievement. Based on these findings, it is clear that schools and policymakers need to consider the role of family background in shaping students' academic outcomes. To improve academic achievement, schools can implement programs that support students from disadvantaged backgrounds. Additionally, parents can play an active role in their children's education by providing resources and support. By working together, schools and parents can help to level the playing field and ensure that all students have an equal opportunity to succeed. The study's findings have important implications for education policy and practice. Ultimately, by understanding the relationship between family background and academic achievement, educators and policymakers can develop targeted interventions to support students and improve academic outcomes.

Recommendations:

1. Schools should implement programs that provide additional support for students from disadvantaged backgrounds, such as tutoring and mentorship programs.
2. Parents should be encouraged to take an active role in their children's education, including providing resources and support for learning.
3. Policymakers should consider the impact of family background on academic achievement when developing education policy.
4. Schools should provide resources and support for students from large families, such as individualized attention and academic counseling.
5. Parents with higher levels of education should be encouraged to mentor and support students from disadvantaged backgrounds.
6. Schools should work to build partnerships with local communities and organizations to provide resources and support for students from disadvantaged backgrounds.

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