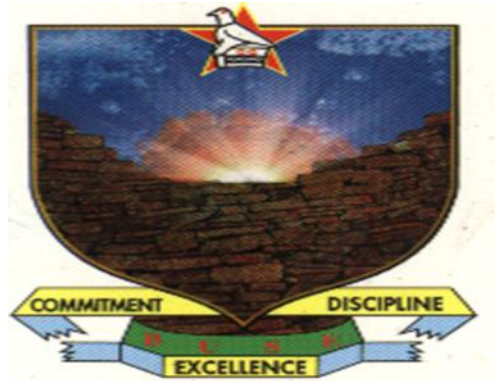


BINDURA UNIVERSITY OF SCIENCE EDUCATION

Faculty of Science Education.



**Investigating the relationship between socioeconomic status and
performance in biology.**

By

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B1026894

**A project submitted to Department of Science and Mathematics
Education in partial fulfillment of a requirements of Bachelor of
Science Honors Degree in Biology**

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DECLARATION

I **Chivambiro Manners** declare that this research project entitled " Investigating the relationship between socioeconomic status and performance in biology " is my own work and that all the sources that I have used or quoted in the study have been indicated and acknowledged by means of complete references.

Signed



Date:

17/07 2024

This research work was undertaken under the supervision of Dr Y Mudavanhu

Signed: 

Date: 08.08.2024

Dedication:

This research project is dedicated to all the learners from low-income families who have faced challenges in pursuing their education, especially in science subjects like biology. May this study contribute to creating a more inclusive and supportive learning environment, thus helping to bridge the gap and providing opportunities for all to disadvantaged learners to reach their full potential.

Acknowledgement:

I would like to express my sincere gratitude to my supervisor, Dr. Mudavanhu for guidance and support throughout this research journey and the participants who shared their experiences and insights, making this study possible. I would also like to thank my family and friends, whose encouragement and understanding enabled me to complete this research. This project would not have been possible without the collective efforts and support of all these individuals and institutions. Thank you.

ABSTRACT

This study investigated the relationship between socioeconomic status (SES) and performance in biology, and potential interventions to improve academic outcomes for low-income learners. A mixed-methods approach was employed. The study targeted form 3 biology students and their parents from public schools in rural areas, with a sample representing diverse backgrounds. Questionnaires were administered to a sample of 100 form 3 biology learners from diverse SES backgrounds, followed by interviews of 10 parents. The study gathered data on learners' motivation, parental support, and learning environments. Interviews with students and parents provided insight into their experiences and perceptions. Quantitative data were analyzed using descriptive statistics and while qualitative data were analyzed thematically. Results showed differences in learning environments, motivation, and parental support between low-income and wealthier learners. Despite facing challenges, learners from low-income families demonstrated motivation to learn biology. Parents from low SES supported their children's education but faced barriers. Interventions such as resource provision, targeted tutoring, parental education initiatives, and culturally responsive teaching practices can improve academic performance for low-income learners in biology. Educators and policymakers should address systemic inequalities and provide support systems to create a more equitable learning environment. This study highlights the need for targeted support to address the impact of SES on biology performance, ensuring equal opportunities for all learners to succeed.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

1.0 Introduction

This chapter presents the background to the study, purpose of the study, main research questions, sub research questions, delimitations, limitations and assumptions of the study. It also discusses organization of the study, definition of key terms as well as chapter summary focusing on achievement gap in biology for learners from diverse socioeconomic backgrounds

1.1 Background to the study

The study mainly focuses on the intricate dynamics between socioeconomic status (SES) and academic performance in the specific context of biology education. SES, which encompasses factors such as income, parental education, and occupation, has been widely acknowledged as a significant predictor of students' academic outcomes in various subjects (Sirin, 2005; Bradley & Corwyn, 2002). The existing body of literature has highlighted the disparities in academic achievement between students from different SES backgrounds (Reardon, 2011; Sirin, 2005). Learners from low-income households have been found to underperform due to a multitude of factors including limited access to quality educational resources, such as textbooks, technology, and laboratory equipment (Darling-Hammond, 2010) and reduced opportunities for hands-on learning experiences, such as science fairs, field trips, and extracurricular activities (Hmelo-Silver, 2004). However, the influence of SES on performance in biology, a subject that requires not only cognitive abilities but also access to resources and support, remains an area requiring focused exploration. Understanding the nature and extent of these performance gaps is essential for developing targeted interventions and support systems to promote educational equity and improve outcomes for all students. By investigating the relationship between SES and performance in biology, this study will contribute to the existing body of knowledge in educational research and provide valuable insights for educators, policymakers, and stakeholders in the field of science education. The findings of this study have the potential to inform evidence-based interventions aimed at reducing the impact of socioeconomic disparities on biology achievement and fostering an inclusive and supportive learning environment for all students.

1.2 Purpose of the study

The purpose of this study is to investigate the relationship between socioeconomic status (SES) and performance in biology education, with a specific focus on the learning environments, motivation, and parental involvement of learners from low-income families. This research aims to identify the key differences in learning environments, motivation levels, and parental support between learners from low-income and wealthier families, and explore potential interventions or support systems that can improve the academic performance of learners from low-income families in biology.

1.3 Statement of the problem

Despite the importance of biology education for future scientific literacy and career opportunities, students from low-income families consistently perform poorly in biology compared to their peers from higher-income families. This persistent achievement gap is a significant concern, as it can limit the academic and career prospects of learners from low-income families. Three critical factors that may contribute to this gap are learning environments, learner motivation and parental involvement. Learners from low-income families may face unique challenges that affect their motivation to succeed academically, and parental involvement and support may be limited due to various reasons such as lack of education, resources, or time. While socioeconomic status (SES) is a known factor influencing student performance, the specific ways in which learning environments differ for learners from low-income families compared to those from wealthier families remain understudied.

1.4 Main research question

- ❖ How does socioeconomic status affect learners' performance in Biology?

1.5 Sub research questions

- ❖ How do the learning environments of learners from low-income families differ from those of learners from wealthier families in the context of Biology education?
- ❖ Are learners from low income families motivated to learn Biology?
- ❖ Do parents from low socioeconomic status fully support their children's education?

- ❖ What are the potential interventions or support systems that can improve the academic performance of learners from low-income families in Biology?

1.6 Significance of the study

By investigating the relationship between SES and performance in biology this study will contribute to the existing body of knowledge in educational research and provide valuable insights for educators , policymakers and stakeholders in the field of science education .The findings of this study have the potential to inform evidence based interventions aimed at reducing the impact of socioeconomic disparities on biology achievement and fostering an inclusive and supportive learning environment for all students. Understanding the challenges faced by learners from low-income households can provide insights into the educational disparities that exist within society. By uncovering the specific challenges faced by learners from low-income backgrounds, educators and policymakers can develop targeted interventions to support these learners and bridge the achievement gap. Secondly, it can help identify the various ways in which learner's background influences students' access to resources, such as quality education, nutritional support, and stable living conditions, all of which are essential for academic success. This understanding can inform the development of holistic support systems aimed at mitigating the negative effects of poverty on learners' academic performance. Additionally the findings of this research can inform the allocation of resources and funding within the education system. By quantifying the impact of poverty on academic performance, policymakers can make informed decisions about resource distribution, intervention programs, and policy reforms that aim to create a more equitable learning environment for all students. Moreover, studying the effects of poverty on learners' academic performance can contribute to the broader discourse on social justice and equity in education. It can highlight the systemic barriers that hinder the academic success of marginalized students and underscore the urgency of addressing these issues to ensure equal educational opportunities for all.

1.7 Delimitations of the study

- ❖ The study will focus on students in form 3 at one school in Buhera district which may not be representative of all academic levels in Zimbabwe

- ❖ The study will rely on self-reported data from students and teachers, which could introduce biases or inaccuracies in the data.
- ❖ The study will rely on a limited set of measures of SES, which may not fully capture the complexity of this construct.
- ❖ The study will not be able to control for other factors that may influence students' performance in biology such as previous academic experiences, or individual differences in learning styles.

1.8 Limitations of the study

The findings of this study may not be generalized to other contexts because the study is delimited only to one Secondary school in Buhera district which cannot be representative of all school in Buhera district. Moreover, the relationship between socioeconomic background and academic outcome is multifaceted hence the results may not fully capture the nuances of the relationship between poverty and educational outcome. The study relied on measuring academic achievements through quantitative measures which may not capture the full picture of the impacts of poverty on children. Controlling other factors that may influence academic achievements such as parenting style and culture is problematic. Additionally, due to limited resources, the study lacked a comprehensive approach hence it may be difficult to generalize the findings of this study.

1.9 Assumptions.

The following are the assumptions that will be made in this study:

- ❖ All students will have access to similar educational opportunities and resources.
- ❖ Learners from low-income families will be more likely to have faced challenges that negatively impact their academic performance.
- ❖ Measures used to assess academic performance will be valid and reliable.
- ❖ Students will be honest and accurate when reporting their family's socioeconomic status.

1.10 Definitions of key terms

Socioeconomic status refers to the social and economic circumstances of an individual or group, which can include factors such as income, education, occupation, and social class. These factors

are often interrelated, and they can have a significant impact on a person's opportunities and experiences in life.

Relationship: refers to the association between socioeconomic status (SES) and academic performance in the field of biology.

Performance: In the context of this research topic, performance refers to the level of achievement and success of students in their biology-related studies. This encompasses various aspects such as understanding of biological concepts, application of knowledge, performance in assessments, and overall proficiency in the subject.

1.11 Organization of the study.

Chapter 1: This section will introduce the topic of socioeconomic status (SES) and its potential relationship to academic performance in biology. It will provide background information on the problem, including prior research and theoretical frameworks. It will also outline the purpose and significance of the study.

Chapter 2: Literature Review

This section will review existing research on the relationship between SES and academic performance, with a particular focus on the field of biology. It will identify existing theories and gaps in knowledge that have been identified in prior research.

Chapter 3: Research Methodology

This section will describe the specific research methods used to investigate the relationship between SES and performance in biology. This could include a description of the sample and recruitment procedures, the measures used to assess SES and academic performance, and the data analysis techniques used to examine the relationship between these variables.

Chapter 4: Data presentation, Analysis and Discussion

This section will present the findings of the study, including descriptive statistics and visualizations of the data. It will also include a summary of the main results, highlighting any significant relationships between SES and performance in biology.

Discussion: This section will interpret the results of the study in light of the literature review and prior research, highlighting the implications and limitations of the findings. It may also discuss the theoretical and practical implications of the results, and suggest avenues for future research on the topic.

Chapter 5: Summary, Conclusions and Recommendations

This section will summarize the main findings of the study and their implications, highlighting the main contributions of the study to the existing literature on the topic.

References: This section will include a list of all the sources cited in the paper, formatted according to the appropriate citation style.

1.12 Chapter Summary

The chapter provides an overview of the issue of educational access and equity for learners from low-income families. The chapter begins by an introduction to the chapter and then went to provide an overview of the global and national context of the issue. It then explores the specific challenges faced by learners from low-income families, including poverty, lack of resources, poor nutrition, and lack of parental support and involvement. The chapter also outlines the scope and purpose of the study, which is to explore the challenges faced by learners and conclude by defining the terms low income families and wealth families.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature related to the research questions, providing a comprehensive overview of the current understanding of the relationship between socioeconomic status and performance in Biology. The literature review will explore the differences in learning environments, motivation and parental support among learners from low income and wealthier families as well as potential interventions to address the disparities.

2.1 Theoretical framework

This study is guided by Cultural Capital Theory (Bourdieu, 1986). This theory posits that socioeconomic status affects an individual's access to cultural capital, which includes cultural knowledge, social connections, and economic resources. Bioecological Model (Bronfenbrenner, 1992): suggests that learners' development and performance are influenced by multiple levels of environmental factors, including the microsystem, mesosystem, and ecosystem. Social Cognitive Theory (Bandura, 1986) states that motivation is influenced by personal factors, environmental factors, and behavioral factors. These frameworks suggest that socioeconomic status affects learners' performance in biology through their impacts on cultural capital, learning environments, and motivation. By exploring the differences in learning environments, motivation, and parental support between learners from low-income and wealthier families, this study aims to identify potential interventions or support systems that can improve the academic performance of learners from low-income families in biology.

2.2 How learning environments differs for learners from low-income families and those from wealthier families

Learners from wealthier families often have greater access to educational resources such as books, technology, and extracurricular activities, which can positively influence their learning environment. On the other hand, learners from low-income families may have limited access to

these resources, potentially leading to a less enriched learning environment for them. Mutindi (2001) postulated that schools in low-income areas may have fewer resources, lower-quality facilities, and higher teacher turnover rates, which can contribute to a less conducive learning environment for students from low-income families. However Mutindi's argument seems to leave much to be desired. He did not clearly clarify why in some instances we have some learners from poor backgrounds who perform better compared some from wealthier families. Burkham (2003) indicates that parental involvement in a child's education is often higher among wealthier families, leading to a more supportive learning environment at home. In contrast, parents from low-income families may face barriers such as long working hours or lack of education themselves, which can impact their ability to provide a supportive learning environment for their children. Peer environment differ significantly between low-income and wealthier families, with potential implications for learning .(Ajayi 2009) Learners from low-income families may face peer pressure related to negative behaviors, while learners from wealthier families may have access to more academically focused peer groups . Though the argument holds some water but there is need to investigate the reasons why in some cases we have learners from low income families performing better compared to those from affluent families, thus opposing literature.

2.3. Are learners for low income families not motivated to learn Biology?

The relationship between socioeconomic status (SES) and academic performance has been extensively researched, with a growing body of literature highlighting the disparities in educational outcomes between learners from low-income and wealthier families (Hampton, 2006; Letzel, 2002). One critical factor that may contribute to this achievement gap is learner motivation. Research has shown that motivation plays a crucial role in academic success, with motivated learners exhibiting higher levels of engagement, persistence, and academic achievement (Wigfield, 2000).

Studies have consistently shown that learners from low-income families tend to have lower levels of motivation and academic engagement compared to their peers from wealthier families (Hansen, 2005; National Science Foundation, 2019). A study conducted by Hampton (2006) found that students from low-income families reported lower levels of motivation and interest in science subjects, including biology. Similarly, Letzel (2002) found that learners from low-

income families were less likely to engage in science-related activities and had lower aspirations for science careers.

Several factors may contribute to the lower motivation levels among learners from low-income families. One factor is the limited access to quality educational resources, including textbooks, technology, and laboratory equipment (Darling-Hammond, 2010). Additionally, learners from low-income families may face more challenges in their home environment, such as poverty, hunger, and poor health, which can negatively impact their motivation and academic performance (Adler, 2013). In the context of biology education, motivation is critical for learners to develop a deep understanding of complex biological concepts and processes. However, learners from low-income families may face additional challenges in biology education, including limited access to quality educational resources and lack of parental support (Hmelo-Silver, 2004).

In conclusion, the literature suggests that learners from low-income families tend to have lower levels of motivation and academic engagement compared to their peers from wealthier families. Factors such as limited access to quality educational resources, parental involvement, and home environment challenges may contribute to this disparity. To address this issue, educators and policymakers must develop targeted interventions and support systems that can enhance motivation and academic achievement among learners from low-income families in biology education.

Research has shown that parental involvement is a crucial factor in academic success, with learners from wealthier families tending to receive more support and resources from their parents (Henderson, 2010). Studies have consistently shown that learners from low-income families tend to receive less parental involvement and support compared to their peers from wealthier families (Eccles, 2017; National Science Foundation, 2019). A study by Eccles (2017) found that parents from low-income families were less likely to engage in activities such as reading with their children, helping with homework, and attending parent-teacher conferences. Similarly, a study by National Science Foundation (2019) found that learners from low-income families were less likely to have access to resources such as computers and internet at home, which can limit their ability to complete homework and engage in science-related activities.

Literature suggests that learners from low-income families may face unique challenges that affect their ability to receive parental involvement and support. For example, a study by Adler (2013) found that parents from low-income families were more likely to experience stress and anxiety related to their home environment, which can negatively impact their ability to provide support and resources for their children. Additionally, learners from low-income families may have limited access to quality educational resources, including textbooks, technology, and laboratory equipment (Darling-Hammond, 2010). In the context of biology education, parental involvement and support are critical for learners to develop a deep understanding of complex biological concepts and processes. However, learners from low-income families may face additional challenges in biology education, including limited access to quality educational resources and lack of parental support (Hmelo-Silver, 2004).

In conclusion, the literature suggests that learners from low-income families tend to receive less parental involvement and support compared to their peers from wealthier families. Factors such as limited access to quality educational resources, parental stress and anxiety, and lack of resources at home may contribute to this disparity. To address this issue, educators and policymakers must develop targeted interventions and support systems that can enhance parental involvement and support for learners from low-income families in biology education.

2.4 Support systems that can help learners from low-income families to improve in biology

In Zimbabwe, the government has implemented a number of initiatives to assist learners from poor backgrounds. One such initiative is the Basic Education Assistance Module (BEAM), which provides financial assistance to children from poor families to enable them to attend school. Machipisa (2010) said BEAM program has shown to improve learners' performance. The program covers the costs of school fees, textbooks, uniforms, and stationery. Another initiative is the National School Feeding Program, which provides nutritious meals to children in schools. This program has been shown to improve school enrollment and attendance, as well as improve the health and nutrition of children. In addition to these initiatives, the government of Zimbabwe has also implemented a number of policies to improve access to education for learners from poor backgrounds. These policies include, providing free textbooks for all school students, reducing school fees for secondary school students, providing a bursary scheme to

assist poor students with the costs of higher education. These policies have helped to increase access to education for learners from poor backgrounds.

Zimbabwe Education Trust (ZET) has been instrumental in providing scholarships, mentorship and educational resources to learners from low-income backgrounds. According to Chetsanga (2017) educational reforms and initiatives are important to support underprivileged learners to realize their full academic potential. Schools can take a number of steps to assist learners from low-income families to improve academically. School staff should educate learners to avoid discrimination and stigmatization of learners from low income families. Azzam (2007) points out that discrimination and stigmatization are the major barriers to effective learning in schools. Manyeruke C (2015) pointed out a number of support systems that schools should adopt to assist learners from low income families to improve academically. These include providing scholarships or fee waivers for students who cannot afford to pay school fees, setting up school feeding programs to provide nutritious meals to students and making school uniforms and other supplies available at low or no cost. Schools can also work with local organizations and NGOs to provide additional support to learners from low-income families. These organizations may be able to provide additional resources, such as textbooks or school supplies.

2.5 Research Gap

While there is a significant body of research investigating the relationship between socioeconomic status (SES) and academic performance, there is a need for more research specifically focused on the context of biology education. Previous studies have explored the impact of SES on academic achievement in general, but few have examined the specific challenges and opportunities related to biology education. Additionally, there is a lack of research exploring the learning environments of learners from low-income families in the context of biology education. Most studies have focused on the general academic experiences of learners from low-income families, without considering the unique challenges and opportunities of biology education. Furthermore, there is limited research investigating the motivation levels of learners from low-income families in biology education. Most studies have explored motivation in general, without considering the specific subject area of biology. Moreover, there is a need for more research examining the role of parents from low socioeconomic status in supporting their

children's education in biology. Most studies have explored parental involvement in general, without considering the specific challenges and opportunities related to biology education.

Therefore, this study aims to address these research gaps by investigating the relationship between socioeconomic status and performance in biology, with a specific focus on the learning environments, motivation, parental support, and potential interventions for learners from low-income families.

2.6 Chapter Summary

A review of the existing literature on socioeconomic factors and academic performance in biology suggests that there are a number of socioeconomic factors that can influence the academic performance of learners from different socioeconomic backgrounds. These factors include family income, parental education level, school environment, and access to resources. The literature also suggests that there are a number of ways in which these socioeconomic factors can affect academic performance, including through their influence on motivation, self-efficacy, and stress levels. There is a need for further research to fully understand the complex relationship between socioeconomic factors and academic performance. The study aims to equip teachers with effective teaching and learning strategies that can mitigate the impact of socioeconomic factors on academic performance in biology. This could involve exploring innovative teaching methods, personalized learning approaches, and mentorship programs. This research could ultimately help to ensure that all students, regardless of their socioeconomic background, have the opportunity to reach their full potential

CHAPTER THREE: RESERCH METHODOLOGY

3.0 Introduction

This chapter intends to discuss the research methodology. According to Leedy (2000) research methodology is an operation framework within which facts are placed so that their meaning may be more clearly understood. One can say methodology is a body of knowledge and ideas which provide an understanding of how, when and why we use different methods for carrying out researches. Tuckman (2011) advanced that, methodology is a piece of information which shows detailed research methods through which data is collected and the more general philosophy upon which the collection and analysis is based. The type of research design will be given. The approach in data collection using questionnaires and interviews will be highlighted. The merits and demerits of the research instruments used will also be outlined.

3.1 Research design

3.1.1 Research paradigm

A research design is a strategic plan for a research project or program, setting out the outline and key features of the work to be undertaken, including the method of data collection and analysis to be employed and showing how the research strategy addresses the specific aims and objectives of the study (Marshall, 2008). Basing on this authority one can say that a research design is something which works as a systematic plan outlining the study, the researchers' methods of compilation, details on how the study will arrive at its conclusions and the limitations of the research. It can be suggested that research design is not limited to a particular type of research and may incorporate the mixed method approach. This paradigm combines the strengths of both qualitative and quantitative research methods to provide a comprehensive understanding of the research topic. This paradigm is suitable for this study because the study aims to explore the relationship between socioeconomic status and performance in biology, which requires an in-depth understanding of the phenomenon. MMR allows for an exploratory approach, using qualitative methods to gain insights into the experiences and perspectives of learners and parents. Secondly the study aims to investigate various factors, including learning environments, motivation, and parental support, which require different research methods. MMR enables the use of both qualitative and quantitative methods to collect and analyze data on these factors.

Thirdly this study aims to understand the complex relationships between socioeconomic status, learning environments, motivation, and performance in biology. MMR allows for the integration of both qualitative and quantitative data to provide a comprehensive understanding of these relationships and lastly the aims to identify potential interventions or support systems to improve the academic performance of learners from low-income families in biology. MMR provides a pragmatic approach, enabling the collection of both qualitative and quantitative data to inform practical solutions. By using the MMR paradigm, this study can provide a nuanced understanding of the complex relationships between socioeconomic status and performance in biology, ultimately informing effective interventions and support systems to improve academic outcomes for learners from low-income families.

3.1.2 Research Approach

A Mixed Method Research (MMR) approach was used in this study. This study adopted a Sequential Explanatory mixed approach, integrating both quantitative and qualitative Methodologies to comprehensively explore the multifaceted influence of socioeconomic factors on academic performance in biology. In phase 1 quantitative data on learners' socioeconomic status, motivation, and performance in biology was collected using questionnaires. The data was analyzed to identify correlations and relationships between variables. In phase 2 qualitative data was collected using face to face interviews with learners and parents to gather insights into their experiences and perspectives on learning environments, motivation, and parental support. Focus groups with teachers were also conducted to explore their perceptions of the learning environments and support systems. In phase 3 quantitative and qualitative data was integrated to provide a comprehensive understanding of the relationships between socioeconomic status, learning environments, motivation, and performance in biology. The data was analyzed to identify patterns, themes, and relationships that can inform potential interventions or support systems.

This approach was considered most appropriate because it allows for the collection of both quantitative and qualitative data, providing a comprehensive understanding of the research topic. It also enables the identification of correlations and relationships between variables, as well as the exploration of experiences and perspectives. Moreover, the approach provides a sequential approach, where the qualitative data can help explain the findings from the quantitative data. By

using the Sequential Explanatory approach, this study provided a detailed understanding of the complex relationships between socioeconomic status and performance in biology, thus informing effective interventions and support systems to improve academic outcomes for learners from low-income families.

3.1.3 Research strategy (Sequential Explanatory)

Given the complexity and depth of the research questions, sequential Explanatory strategy was adopted. This research strategy involves three phase approach that is quantitative phase, qualitative phases and explanatory phases. Initially questionnaires were administered to learners from diverse backgrounds to gather data on their socioeconomic status, learning environments, and motivation to learn Biology. Secondly in-depth interviews and focus groups were conducted with the parents from diverse backgrounds to collect qualitative data on learners' experiences and challenges in learning Biology, differences in learning environments among learners from diverse backgrounds, motivation and interest to learn Biology. Lastly during the Explanatory phase, quantitative and qualitative data was integrated in order to explain how socioeconomic status affects learning environments and motivation. This strategy was considered best because it allows for a comprehensive understanding of the relationship between socioeconomic and performance in biology, providing both quantitative and qualitative insights to inform interventions and support systems.

3.2 Population and Sample

3.2.1 Population

Mbwesa (2009) defines population as the entire group of people, events or things of interest which the researcher want to investigate. It is the group to which the researcher would like to generalize the results of the study. The population for this study constitutes all secondary schools in Buhera district offering biology at O' level. Buhera district has 75 secondary schools of which 50 of them are offering Biology at O' level.

3.2.2 Sample

Tuckman (2015) define a sample as a portion of the population being studied, the findings of which are generalized to the entire population. This means sampling is choosing few individuals

to represent a large population. In light of this study the researcher sampled 100 biology learners, 20 teachers and 10 parents to participate in the study.

3.3 Data Collection Instruments

Palton (2016) defines a research instrument as a device for systematic collection of data such as tests, questionnaires and interviews. For this study the researcher conducted a face to face interview with 20 teachers from school X so as to have in depth insights into the topic. A focus group of 10 parents from different socioeconomic backgrounds were also recruited to give their inputs to the topic under study. Questionnaires were also distributed to 100 form 3 biology learners from diverse backgrounds at school X to express their views on effects of socioeconomic status on learner's achievement in biology. In addition to the above instruments, researcher administers a biology test for 100 form 3 learners from school X in order to assess their performance. Progress records and class registers for the learners were also analyzed in order to get a deeper understanding on how learner's backgrounds affect their learning.

3.3.1 Interview guide

Cohen and Manion (2015) defined an interview as a two way communication used by the researcher for the purpose of obtaining relevant data. Interviews are important as they enable social interaction to obtain firsthand information and they do not include a lot of paperwork compared to questionnaires. The researcher noticed that interviews were suitable for the teachers since they save time and provide firsthand information. Data from the interview was generally regarded as more reliable since the researcher has an opportunity to probe further. The wording for the questions was the same for all the teachers. Teachers were interviewed on social economic factors and how they affect academic performance in biology for learners from diverse backgrounds. The responses from teachers were recorded by the researcher on a paper as a way of gathering data.

3.3.2 Questionnaires

For the purpose of a comprehensive study the researcher distributed questionnaires to 100 form 3 biology learners. According to Cohen and Manion (2015) a questionnaire is a data gathering instrument through which respondents answer to given statements in writing. The questionnaires helped the researcher to collect quantitative data. The researcher employed both closed and

open questions. The types of questions asked enable the respondents to express themselves freely without fear or bias. Questionnaires were used because of their capability to produce constant and standardized data from which validity and reliability will be assured on social economic factors that affect performance in biology for learners from low income families and their peers from affluent families.

3.3.3 Focus Group Discussion

As part of the research, study investigating the relationship between socioeconomic status and performance in biology, a focus group with parents was conducted as a data gathering instrument. Parents of learners from low-income and wealthier families were recruited for the focus group. A sample of 10 parents was recruited for a focus group discussion for a period of period of 30 minutes. The researcher himself led the discussion. Open-ended questions were asked to encourage discussion and gather detailed responses. Audio recordings were transcribed verbatim. Data was analyzed using a constant comparative method to identify patterns and relationships. The focus group aimed to gather qualitative data from parents of learners from low-income and wealthier families to gain a deeper understanding of their experiences, perceptions, and opinions related to the research questions. The purpose of the focus group was to explore parents' perspectives on how socioeconomic status affects their children's performance in biology and also identify differences in learning environments and resources available to learners from low-income and wealthier families. The other reason was to fully understand parents' motivations and support for their children's education and gather suggestions for potential interventions or support systems to improve academic performance in biology.

3.3.4. Document Analysis

Cohen and Manion (2015) define a document as a record of an event or process. Documentary analysis is the systematic use of printed or written materials to get information (Kasomo 2007). Therefore, from the above definitions document analysis is organized information that is stored for later use. The researcher used class registers, progress record books, end of term schedules and biology test exercise books to compare class performance for learners from diverse backgrounds. These records provided rich information on social backgrounds, frequency of absenteeism, fees payment and academic performance in biology.

Harber (2004) says that document analysis provides evidence of interactions between rival interests, private individuals and the state relating to education. Registers were useful to the researcher to access information on type of family and absenteeism. The progress record enabled the researcher to trace the history of the learners' performance. These documents gave the researcher rich information that was important for the study.

3.4 Data Analysis methods

Data analysis is the process of inspecting, cleaning, transforming and modeling data with the goal of highlighting useful information, suggesting conclusions and supporting decision making (Musingafi and Hlatywayo, 2013). For this research topic, a mixed-methods approach was employed, combining both quantitative and qualitative data analysis methods.

3.4.1 Descriptive statistics

Descriptive statistics: Means, standard deviations, and frequencies were used to describe the demographic characteristics of the participants and their performance in biology.² Inferential statistics: t-tests was be used to compare the mean performance of learners from low-income and wealthier families in biology.

3.4.2 Qualitative data analysis

Qualitative Data Analysis: Storytelling and narrative analysis was used to examine the experiences and perspectives of learners and parents from low-income and wealthier families.

3.4.3 Triangulation:

Quantitative and qualitative data was triangulated to validate and confirm findings.³ Data transformation: Quantitative data was transformed into qualitative data and vice versa to facilitate comparison and integration.

3.5 Reliability and validity

Kegan (2006) alludes that validity is the extent to which an instrument measures what it is supposed to measure according to researcher's subjective assessment. It can be said validity is concerned with the degree to which an empirical measure or several measures of a concept accurately represent the concept. Kombo and Tromp (2006] postulate that reliability is a

measure of degree to which research instruments will yield constant results after repeated trials. One can say that reliability of an instrument is its consistence in producing similar results over a period of repeated trials. To Ensure Validity and Reliability established and validated instruments to measure socioeconomic status and performance in biology were used and a multiple data sources and methods were used (triangulation) to increase validity. A representative sample of learners from low-income and wealthier families was recruited to increase external validity. Established and validated data analysis techniques and software were also used to ensure accuracy and consistency. Member checking and peer debriefing was done to ensure accuracy and credibility of findings. By implementing these strategies, validity and reliability were ensured, increasing the confidence in the findings and conclusions drawn from the research.

3.6 Ethical considerations

In this research study, fundamental ethical principals were applied. Punch (2005), in Musingafi and Hlatywayo (2013), defines research ethics as moral obligations and principles that researchers should adhere to in carrying out and reporting their studies Creswell (2003) defines ethics as observations of what is good and bad. Welfel (1998) in Makore-Rukuni (2001), stresses that research ethics are important in that they enable the researcher to develop meaningfully acceptable research protocols that are worth the participants' time and have a reasonable chance of yielding meaningful findings, protects the rights of participants' and report results fairly and accurately. In this research study respondents were not forced to complete questionnaires or respond to interviews. Consent was sought first before respondents participated. In this research study respondents were told that their responses were confidential and they were not required to identify themselves. They were also told that results of the study were not to be communicated to anyone except to those in line of supervision from the institution. Respondents were also treated with respect and dignity.

3.7 Chapter Summary

This chapter focused on the research design and methodology. It had highlighted the strategic framework which acts as the bridge between the research questions and their implementation of the research design. Data collection and presentation procedure that were used in the research

were also highlighted. The chapter also looked at questionnaires, focus groups, document analysis, interview guide, reliability, validity and the ethical considerations which were made during the research.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

Chapter four presents the results of this study in line with the study's research questions. Section 4.1 is about biography of participants. Section 4.2 is about how learning environments for learners from low income families differs from those from wealthier families. Section 4.3 focuses on motivation of learners from low income families to learn Biology. Section 4.4 focuses on parental support for learners from low income families. Section 4.5 talks about the interventions and support systems that can be put in place to assist learners from low income families to succeed in Biology. Section 4.6 is a discussion of the findings of the study. Lastly section 4.7 is a chapter summary.

4.1 Biography of participants

4.1.1 Learners (Group A)

Consist of 50 form 3 biology learners. 30 of them were boys and 20 were girls. All learners from this group came from low-income families. Their parents have a yearly income of less than US\$ 1000. Their families relied on government assistance programs to make ends meet. Their parents were substance farmers who supplement their earnings with part time jobs and none of their parents had an ordinary level certificate. 45 out of 50 of the learners were not motivated to learn biology and parents could not provide them with basic educational needs.

4.1.1 Learners (Group B)

This group consisted of 50 form 3 biology learners from wealthier backgrounds. 30 of them were boys and 20 were girls. These learners have enough digital tools at home and age appropriate biology textbooks at home. Their parents were providing them with basic educational needs and could hire tutors when need arise.

4.1.2 Parents

Ten parents from diverse backgrounds participated in this study. Five of them were from low socioeconomic status and the other five were from wealthier families. 50% of them were males

and the other 50% were females. Those from low socioeconomic status could not provide their children with basic educational needs where as those from wealthier families provide their children with all educational needs

4.2 Comparing learning environments for learners from low income families and their counter parts from wealthier families.

4.2.1 Problems faced by learners at school

Participants were asked "What problems do you face at school that affects your performance in biology." The findings were recorded on the table below

FIG 4. Problems faced by learners at school which affect their performance in biology (n = 100)

PROBLEMS	Percentage of learners from high socioeconomic status (%)	Percentage of learners from socioeconomic status.(%)
No complete uniforms	20	80
Shortage of basic educational needs including pens ,exercise books ,ruler etc	20	80
Lack of confidence to confront teachers for remedial and extension work	30	70
Lack of confidence to participate in Biology lessons.	25	75
Hunger at school	10	90
Shortage of age appropriate textbooks	10	65

Learners from low-income families reported lack of basic educational materials in class such as textbooks, pen, pencils, exercise books etc. They also reported that they lacked confidence to

confront teachers for remedial and extension work due to their tattered uniforms. Focus groups discussion with participants (parents) also revealed a similar pattern as above with parents from low socioeconomic status failing to provide educational materials for their children. 80% of interviewed participants (teachers) reported that learners from low-income families do not do school work due to shortage of resource and absenteeism.

4.2.2 Problems faced by learners at which affect their performance in Biology

Participants were asked “what problems do you face at home that affects your performance in biology. Their responses were recorded and tabulated below on FIG 4.1

FIG 4.2 Problems faced by learners at home which affects their performance in biology

Response	% of learners from wealthier families	% of learners from low-income households
Do not have computer or tablet at home for studies	10	90
No designated study space at home.	15	85
No Internet access at home	20	80
No online tutors at home	20	80
Did not get assistance from parents to do homework.	15	85
Do not have age appropriate biology textbooks at home	10	90

These results suggest that learners from low-income families face significant barriers to quality education, including inadequate learning environments, limited resources at home which can impact their ability to learn and succeed in biology, compared to their peers from wealthier families. This means social inequality is reproduced through education where learners from the dominant classes have more access to cultural capital and are better equipped to succeed academically and professionally as proposed by the cultural capital theory

4.3 Motivation of learners from low-income income families to learn Biology

Participants were asked whether they were motivated to learn biology and to give reasons for their answer. Learners from low-income families reported lower levels of motivation to learn biology, citing reasons such as: Lack of relevance to their everyday lives , limited career opportunities in biology, difficulty understanding complex concepts and limited access to resources and support. In contrast, learners from wealthier families reported higher levels of motivation to learn biology, citing reasons such as: Interest in science and medicine, desire to pursue careers in biology-related fields, access to resources and support, encouragement from parents and teachers

Descriptive Statistics revealed a relationship between socioeconomic status and motivation to learn biology with 60% of learners from low-income families reporting feeling overwhelmed by biology coursework, 55% reported lacking confidence in their biology abilities and 50% reported seeing no value in learning biology. In contrast 10% of learners from wealthier families reported feeling overwhelmed by biology coursework, 15% reported lacking confidence in their biology abilities and 10% reported seeing no value in learning biology. These results suggest that learners from low-income families face significant motivational barriers to learning biology, including a lack of relevance, limited career opportunities, and difficulty understanding complex concepts. In contrast, learners from wealthier families are more likely to be motivated to learn biology due to access to resources, encouragement, and career aspirations.

4.4 Parental support

Participants were asked whether they fully support their children's biology education and probed to explain how and why they so do. 70% of parents from low socioeconomic status reported having limited knowledge of biology themselves. 60% reported feeling uncomfortable helping their children with biology homework. 50% reported having limited time to support their children's education due to work and other responsibilities. 40% reported having limited access to resources and materials to support their children's learning. 50% reported feeling that their child will not pursue a career in biology or science .In contrast parents from wealthier families reported that they support their children's biology education. 60% reported having a strong background in biology or science and they feel confident helping their children with biology homework. 70% reported having ample time to support their children's education. 70% reported feeling that biology is not a priority for their child's education

These results suggest that parents from low socioeconomic status face significant barriers to supporting their children's education in biology, including limited knowledge, comfort, and

resources. In contrast, parents from wealthier families are more likely to have the knowledge, comfort, and resources to support their children's learning in biology. This highlights the need for interventions that target parental support and involvement in biology education for learners.

4.5 Potential Interventions and support systems to assist learners from low-income families to improve in Biology

Participants were asked “What support systems do you think must be put in place to assist learners from low-income families to improve in Biology?” The following interventions were reported to be effective in improving academic performance for biology learners from low-income families: Provision of digital resources and online learning platforms to supplement traditional teaching methods. It was reported that providing digital resources to learners from low-income status may increase their academic performance in Biology. After school tutoring led by biology experts and peers was also reported to be an effective intervention to support learners from low-income families to in biology. Parent-teacher associations and workshops to engage parents in biology education and collaborations with local science centers and museums for hands-on learning experiences was also suggested as an effective support system to assist the disadvantaged learners to improve in Biology. Teacher professional development programs to enhance biology content, knowledge and pedagogy was another factor reported crucial in helping learners from low-income families to improve academically. These results suggest that targeted interventions can improve the academic performance and motivation of learners from low-income families in biology, and enhance parental support and teacher effectiveness.

4.6 Discussion of Findings:

4.6.1 Learning environment

The findings of this study reveal significant differences in the learning environments of learners from low-income families compared to those from wealthier families in the context of biology education. Learners from low-income families reported limited access to resources such as age appropriate textbooks, technology, and laboratory equipment, which hindered their ability to engage with biology concepts effectively. In contrast, learners from wealthier families had greater access to these resources, creating a more conducive learning environment. These results align with existing literature, which suggests that socioeconomic status (SES) plays a critical role in shaping learners' access to quality education (Bourdieu, 1986; Coleman, 1988). The notion of "cultural capital" (Bourdieu, 1986) highlights how learners from wealthier families

possess advantages, such as access to resources and social networks, that enhance their educational experiences. Conversely, learners from low-income families often lack these resources, resulting in a disadvantageous learning environment.

Furthermore, the findings support the idea that SES influences the "opportunity to learn" (OTL) (Letzel, 2002), which refers to the availability of educational resources and opportunities. Learners from low-income families face barriers in accessing quality biology education, which limits their OTL and subsequently affects their performance. The results also resonate with the concept of "funds of knowledge" (Moll et al., 1992), which emphasizes the importance of considering learners' home environments and community resources in understanding their educational experiences. Learners from low-income families may have limited access to resources and support at home, exacerbating the disparities in their learning environments.

4.6.2 Motivation and interest to learn biology

Findings of this study reveal that learners from low-income families are not equally motivated to learn biology as their wealthier counterparts due to numerous challenges, including limited access to resources and support. They demonstrated no desire to learn and succeed in biology. This result aligns with the common assumption that learners from low-income families lack motivation or interest in science subjects. Moreover, these findings align with literature that highlights the importance of intrinsic motivation in learning (Deci & Ryan, 2000). Intrinsic motivation refers to the genuine interest and enjoyment of learning, rather than external factors like grades or rewards. The results suggest that learners from low-income families are not driven by intrinsic motivation, which results in poor academic performance.

However, the findings do support the concept of "resilience" (Werner, 1993), which describes the ability of individuals to overcome obstacles and thrive in challenging environments. Learners from low-income families demonstrated no resilience by failing to maintain their motivation to learn biology despite the numerous barriers they face. The results highlight the need to address the systemic inequalities that hinder learners from low-income families.

4.6.3 Parental support

The findings of this study reveal that parents from low socioeconomic status (SES) do support their children's education, but face significant barriers in doing so. Despite their best efforts, these parents often lack the resources, knowledge, and social capital to provide adequate support for their children's biology education. These results align with literature that highlights the challenges faced by parents from low SES in supporting their children's education (Henderson & Mapp, 2002). Research has shown that parents from low SES often have limited access to information, resources, and social networks that can help them support their children's learning (Bourdieu, 1986). However, the findings also contradict the common assumption that parents from low SES are uninterested or uninvolved in their children's education (Lareau, 2000). Instead, the results suggest that these parents are deeply invested in their children's success, but require support and resources to effectively fulfill their roles. The results also support the concept of "parental capital" (Lareau, 2000), which refers to the resources, knowledge, and social connections that parents can draw upon to support their children's education. Parents from low SES often lack parental capital, which can limit their ability to support their children's biology education.

4.6.4 Potential interventions and support systems

Findings of this study suggest that potential interventions or support systems can improve the academic performance of learners from low-income families in biology. These include: Access to quality resources and technology, targeted tutoring and mentoring programs, parental involvement and education initiatives and culturally responsive teaching practices. These results align with literature that highlights the importance of addressing the "opportunity gap" (Carter & Welner, 2013) in education. Providing learners from low-income families with access to quality resources and support can help level the playing field and improve their academic performance. The findings also support the concept of "scaffolding" (Vygotsky, 1978), which involves providing temporary support and guidance to learners as they develop new skills and knowledge. Targeted tutoring and mentoring programs can serve as scaffolding mechanisms to help learners from low-income families overcome challenges and achieve success in biology. Moreover, the results emphasize the importance of parental involvement in education

(Henderson & Mapp, 2002). Initiatives that educate and empower parents from low socioeconomic status can help create a supportive learning environment that extends beyond the classroom.

In summary, the findings of this study suggest that a range of interventions and support systems can improve the academic performance of learners from low-income families in biology. These results are linked to literature that emphasizes the importance of addressing systemic inequalities, providing scaffolding support, fostering parental involvement, and promoting culturally responsive teaching practices. By implementing these strategies, educators and policymakers can help create a more equitable learning environment that supports the success of all learners.

4.4 Chapter summary

This chapter summarizes the key findings of the study, reiterates the research questions, and provides recommendations for future research and practice.

Chapter five: Summery, Conclusion and Recommendations

5.1 Introduction

This chapter dwells on the summary of the whole research process, focusing on major highlights of the chapter one to Chapter four. It gives a general overview of the research problem and review of the related literature on investigating the relationship between socioeconomic status and performance in Biology. The chapter also gives highlights of the research design that was employed and key findings of the study. Therefore, conclusions based on the discussion of the findings presented in chapter 4 are provided .The chapter also proffers a presentation of research recommendations in relation to discussion and findings in chapter.

5.2 Summary

Chapter one focused on the problem, its setting and also outlining the research questions of the study which sought to be answered. The aim of the study was to investigate the relationship between socioeconomic status and performance in Biology and come up with support systems that can be put in place to assist learners from low-income households to improve in Biology. Literature related to the study was explored thereby serving as a pedestal for the research findings discussed in Chapter 4.The same chapter also gave an overview of the concept of difference in learning environments among learners from diverse backgrounds. It also looked on issues of parental Involvement and motivation of learners from diverse backgrounds. Chapter 3 of the study focused on the research design which was a mixed research design incorporating both qualitative and quantitative designs. Face to face interviews, questionnaires and focus group discussions were used as research instruments. In chapter 4 of the study, a presentation and discussion of research findings was done .The chapter presented the research findings in the form of emerging themes? Findings were discussed, linked to some literature that was reviewed in Chapter 2 and at the same time supported by other studies on the relationship between socioeconomic status and performance in Biology

5.3 Constraints

The study was successfully done but the researcher faced financial constraints for photocopying questionnaires which were used as data collecting instruments. There were also incessant power cuts which became a disadvantage in the processing of the research project.

5.4 Conclusion

The following conclusions were made from this study:

- ❖ Learning environments of learners from low-income families differ significantly from those of learners from wealthier families in terms of access to resources, technology, and qualified teachers, hindering their ability to effectively learn biology.
- ❖ Learners from low-income families are equally motivated to learn biology as their wealthier counterparts, debunking the myth that they lack motivation or interest in science subjects.
- ❖ Parents from low socioeconomic status face significant barriers in fully supporting their children's education, including limited access to information, resources, and social capital, but are deeply invested in their children's success.
- ❖ Potential interventions and support systems that can improve academic performance of learners from low-income families in biology include: Providing access to quality resources and technology, targeted tutoring and mentoring programs parental education initiatives and support and culturally responsive teaching practices

5.5 Recommendations

- ❖ Schools serving low-income populations should receive additional funding to improve learning environments, access to technology, and resources for biology education.
- ❖ Tutoring and mentoring programs, after-school science clubs, and summer bridge programs can help learners from low-income families succeed in biology.

- ❖ Schools should engage parents from low socioeconomic backgrounds through education workshops, volunteer opportunities, and regular progress updates to foster support for their children's education.
- ❖ Develop inclusive curriculum materials that reflect diverse backgrounds and experiences, promoting relevance and interest in biology among learners from low-income families.
- ❖ Provide training for teachers to understand the needs and challenges of learners from low-income families, and strategies to support them in biology education.
- ❖ Collaborate with local organizations, museums, and science centers to provide real-world learning experiences and career exploration opportunities for learners from low-income families.
- ❖ Advocate for policies addressing systemic inequalities in education, such as resource allocation, teacher training, and parental support, to ensure equal opportunities for learners from all socioeconomic backgrounds.

These recommendations aim to address the disparities identified in the study, promoting a more equitable and supportive biology education for learners from low-income families.

5.6 Recommendations for future studies

Researcher recommends future researchers to conduct a longitudinal study to investigate the long-term effects of socioeconomic status on learners' performance in biology, tracking learners from low-income families through their educational journey and also to investigate other contextual factors, such as teacher experience, school resources, and community support, to better understand their influence on the relationship between socioeconomic status and biology performance. He also recommends future researchers to conduct a comparative study across different regions or countries to explore how socioeconomic status affects biology performance in various educational contexts and adopt an intersectionality perspective to examine how socioeconomic status intersects with other factors, such as race, gender, and language, to impact biology performance. It is also important that future researchers investigate the impact of technology integration on biology performance among learners from

low-income families, exploring potential digital divides and opportunities for growth and evaluate the effectiveness of existing policies aimed at reducing educational inequalities and provide recommendations for policy improvements.

These recommendations offer potential avenues for future research, allowing for a deeper understanding of the complex relationship between socioeconomic status and biology performance, and informing evidence-based strategies to support learners from low-income families.

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Appendices

Appendix 1 Questionnaires

Introduction

Thank you for participating in this survey! The purpose of this questionnaire is to understand your experiences and perceptions related to learning biology in school. We want to know about your learning environment, motivation, and support systems to better understand how socioeconomic status affects biology performance. Your responses will help us identify

potential areas of improvement to support learners from all backgrounds in achieving their full potential in biology. Please answer the questions honestly, and feel free to ask for clarification if needed. The survey is anonymous and confidential, and your participation will contribute to a better understanding of how we can create a more inclusive and supportive learning environment for all.

Thank you for your time and input

Section 1: Demographic Information

1 Age: (Years)

2 Gender: male/ female (tick the appropriate)

3 Socioeconomic status (SES):

A Low-income family

B - Middle-income family

C Wealthier family

(Tick the appropriate)

Section B Research question 1: Learning environments versus performance in Biology. (Tick most appropriate)

4How often do you have access to Biology textbooks at home?

A Daily

B Weekly

C Rarely

D Never

5 How often do you have Internet for biology research at home?

- A Daily
- B Weekly
- C Rarely
- D Never

6 How frequent do you have access to Science labs and equipment at school?

- A Daily
- B Weekly
- C Rarely
- D Never

7 How often do you participate in Science fairs and competitions?

- A Often
- B Sometimes
- C Rarely
- D Never

8 How often do you participate in Biology clubs or extracurricular activities?

- A Often
- B Sometimes
- C Rarely
- D Never

Section C: Research question 2: Motivation and Interest

9 How interested are you in biology?

- A Very interested
- B Somewhat interested
- C Not very interested
- D Not at all interested

10 How confident do you feel in your ability to succeed in biology?

- A Very confident
- B Somewhat confident
- C Not very confident

Section D Research question 3: Support Systems

11 How often do your parents/guardians help you with biology homework?

- A Often
- B Sometimes
- C Rarely
- D Never

12 How often do your parents or guardians encourage you to pursue science-related activities?

- A Often
- B Sometimes
- C Rarely

D Never

13 Do you have a quiet and dedicated space for studying at home?

Yes/No

Section E Research question 4

14 How often do your biology teachers provide additional support or tutoring?

A Often

B Sometimes

C Rarely

D Never

15 How often does your Biology teacher encourage you to ask questions and explore biology concepts?

A Often

B Sometimes

C Rarely

F Never

16 Do you feel comfortable asking your biology teachers for help?

Yes/No

17 What support systems are there at your school to assist you to improve your performance in biology?

Appendix2: Interview guide

Introduction

Thank you for participating in this interview. Your insights as a biology teacher will help us understand the relationship between socioeconomic status and performance in biology. Please feel free to share your experiences and opinions.

Research question 1: Learning Environments

1. How do you think the learning environment for biology education differs for learners from low-income families compared to those from wealthier families?
2. What resources and materials do you have available for teaching biology, and are they equally accessible to all learners?
3. How do you adapt your teaching methods to meet the needs of learners from diverse socioeconomic backgrounds?

Research question 2: Learner Motivation

4. Have you observed any differences in motivation levels among learners from low-income families compared to those from wealthier families in biology classes?
5. How do you encourage and motivate learners from low-income families to engage with biology content?
6. What strategies do you use to support learners who may be struggling with biology concepts?

Research question 3: Parental Support

7. How do you engage with parents from low socioeconomic status to support their children's biology education?
8. Do you notice any differences in parental involvement and support between low-income and wealthier families?
9. How do you encourage parents to support their children's biology learning at home?

Research question 4: Interventions and Support Systems

10. What interventions or support systems have you found effective in improving the academic performance of learners from low-income families in biology?

11 How do you identify learners who need extra support in biology, and what strategies do you use to provide that support?

12 What resources or professional development opportunities would you need to better support learners from low-income families in biology?

Conclusion:

Thank you for sharing your valuable insights and experiences. Your input will help us better understand the relationship between socioeconomic status and performance in biology and inform strategies to support learners from low-income families.

Appendix 3 Focus group discussion guide

Introduction:

Thank you for participating in this focus group. Your insights as parents will help us understand the relationship between socioeconomic status and performance in biology. Please feel free to share your experiences and opinions.

Research question 1: Learning Environments

1. What do you think are the most important factors that affect your child's learning environment in biology education?

2. How do you think your child's learning environment in biology education compares to that of learners from wealthier families?

3. What resources or support systems do you think are missing in your child's biology education?

Research question 2: Learner Motivation

4. How do you encourage and motivate your child to engage with biology content?
5. Have you noticed any differences in motivation levels among learners from low-income families compared to those from wealthier families?
6. What strategies do you use to support your child's motivation in biology?

Research question 3: Parental Support

- 7 How do you support your child's biology education at home?
- 8 Do you feel that you have the necessary resources and knowledge to support your child's biology learning?
- 9 How do you think parents from low socioeconomic status can be better supported to help their children succeed in biology?

Research question 4: Interventions and Support Systems

- 10 What interventions or support systems do you think would be most effective in improving the academic performance of learners from low-income families in biology?
- 11 How do you think schools and teachers can better support learners from low-income families in biology?
12. What resources or services do you think are needed to support learners from low-income families in biology?

Conclusion:

Thank you for sharing your valuable insights and experiences. Your input will help us better understand the relationship between socioeconomic status and performance in biology and inform strategies to support learners from low-income families.

