# Relationship between Selected Students' Background Characteristics and Academic Performance in Secondary School Biology in Nandi County, Kenya

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The study sought to investigate the relationship between selected students' background characteristics and academic performance in secondary school biology in Nandi County, Kenya. The study adopted descriptive survey research design. A sample of 12 principals and 296 students selected using purposive and proportionate stratified random sampling procedures participated in the study. Data was gathered using the Principal's InterviewSchedule (PIS) and Students' Background Characteristics Questionnaire (SBCQ). The Students' CharacteristicsQuestionnaire was pilot tested and its reliability was estimated using Cronbach's Alpha method. The instrument yielded a reliability coefficient of 0.82 and was deemed reliable. Data was analyzed with the aid of the Statistical Package for Social Sciences (SPSS). Qualitative data generated by open ended items and interviews were organized in themes pertinent to the study objectives and summarized using frequencies and percentages. The hypotheses of the study were tested at the 0.05 level of significance using the Chi-Square test for independence. The study revealed that students' parental socio-economic status and gender do not influence academic performance in biology. The findings of the study may be used by school administrators, teachers, parents, educationists and policy makers to improve the teaching-learning process and performance of students in biology, give teachers an insight of the link between learner background characteristics and performance and thirdly, it may also be used by school administrators and the Ministry of Education to formulate policies and develop practices that enhance students' achievement in biology.

**Key words**: Students' background characteristics, parental socio-economic status, gender, academic performance.

## Introduction

Science education has, and will continue to have, a significant influence on quality of life of mankind and sustainable development of the planet (United Nations International Children's Emergency Fund,[UNESCO], 2004). Science education is essential because it equips mankind with the knowledge and skills necessary to promote economic, scientific and technological development (Croxford, 2002). Science education also gives mankind knowledge and skills which enable him/her to make informed decisions on scientific and technological issues. The need for a scientifically literate populace is increasingly recognized as critical in many countries as they face the consequences of increasing population pressures, limited resources and environmental degradation (International Council for Science,[ICSU], 2006). Basic science literacy, coupled with scientific "ways of knowing" namely; drawing conclusions based on observation, experiments and analysis

provides citizens with tools needed for rational debate and sound decision-making based on scientific knowledge. Science education begins in pre-school as a diffuse, amorphous introduction of simple scientific concepts through informal but guided activities (Ochong, nd). At lower primary school level, the scientific concepts introduced during pre-school education are further explored in a less formal setting, organized and presented as units. The topics become more detailed in the upper primary and learners are given an indication of the discipline-based structure of the secondary school. In secondary schools, science education is structured as biology, chemistry and physics (Maina, 2015).

Biology is one of the science subjects offered in secondary and tertiary institutions. It is a natural science that deals with the living world: How the world is structured, its functions and what these functions are, how living things came into existence, and how they interact with one another and with their environment (Umar, 2011). Biology has many divisions that include; zoology, botany, ecology, genetics, morphology, anatomy, physiology, histology, microbiology, biochemistry and evolution among others (Ahmed, 2008).

Secondary school biology aims at equipping the learner with the knowledge, attitudes and skills necessary for controlling and preserving the environment (Kenya Institute of Education, [KIE], 2006). The subject enables the leaner to appreciate humans as part of the broader community of living organisms. Contemporary issues such as Human Immune Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS), Sexually Transmitted Infections (STIs), drug abuse and environmental pollution which have an impact on the learner's life have also been incorporated in the study. In accordance with secondary school science curriculum in Kenya, biology is compulsory in Forms one and two but it is an optional subject in Forms three and four.

Biology is an important science subject in such fields like medicine, pharmacy, nursing, biochemistry, genetics and agriculture among others (Aniaku, 2012). However, despite its importance, academic performance in secondary school biology in Kenya and in sub counties such as Nandi East has generally been unsatisfactory. For example, the Kenya Certificate of Secondary Education(KCSE) national mean scores for the years 2013 and 2014 were 32.20% and 33.60% respectively (Kenya National Examinations Council, [KNEC], 2015). Table 1 gives a summary of national; Nandi County and Nandi East sub county percentage mean scores for the years 2012 to 2018:

**Table 1**
**National, Nandi County and Nandi East Sub- County Biology Performance mean scores in percentage from 2012-2015**

| | Percentage Mean Scores | | |
|---|---|---|---|
| **Year** | **National** | **County** | **Sub County** |
| 2012 | 26.21 | 25.75 | 22.16 |
| 2013 | 32.20 | 30.14 | 20.41 |
| 2014 | 33.60 | 31.02 | 21.72 |
| 2015 | 34.76 | 33.34 | 21.63 |
| 2016 | 29.19 | 27.20 | 20.67 |
| 2017 | 18.93 | 16.22 | 14.30 |
| 2018 | 19.23 | 18.37 | 13.15 |

Source: KNEC, KCSE Annual Reports 2013, 2014, 2015, 2016, 2017, 2018 and 2019.

Data on Table 1 show that the national mean scores were in the range of 18.93 and 34.76 percent those of Nandi County ranged from 16.22 and 33.34 percent, while those of Nandi East Sub County were between 13.15 and 22.16 percent. It is evident that students' performance in biology as measured by the KCSE means scores was relatively low in the whole country. It is also evident that students' performance in the subject in Nandi county and Nandi East Sub County was very low.

Students' achievement in the subject has also been associated with students' background characteristics.Wabuke (2013) defines students' characteristics as personal attributes of the learner and/or circumstances in school, at home or his/her environment. According to Kithela (2016), students' characteristics include; type and location of school, gender, peers, school environment, physical, social and economic background. Students' characteristics have been associated with academic performance by several scholars. Ebele and Olofu (2017) established that there was significant relationship between students' study habits and their academic performance in biology**.** A study byOigara (2011) revealed that school location affected students' achievement. The study showed that schools located in urban areas tend to perform better than those in rural settings. The type of school has also been link with academic performance. Owino, Osman and Yungungu (2014) noted that students in national and extra county schools in Kenya always outperform their counterparts in county and sub county schools. Other students' characteristics that have been associated with academic performance include their attitudes, career preference, parental socio-economic status, and gender (Juma, 2016; Kashu, 2014; Nasr, 2011).

Research has shown that achievement in biology is a function of many interrelated variables which can be grouped as student factors, school factors and home factors (Langat, 2015). Socio-economic status of students' parents may be among students' characteristics that affect academic performance. According to Nadenge (2015), socio-economic status is a definite background variable that represents a feature of the social structure in society. Socio-economic status includes features like education, occupation, income, religion, gender, environment in which the child is brought up among others. Okemwa (2014) asserts that parents who are privileged educationally, socially and economically, promote a higher level of achievement in their offspring.This is in agreement with Zhang (2012) who examined students and their families' income in China. The study showed that children from low income families exhibited lower levels of cognitive-linguistic skills, lower verbal interactions and lower phonological awareness and generally lower academic performance than their counterparts from high and middle income families. Juma (2016) also demonstrated that there was a positive and statistically significant relationship between parental income, level of education and occupation and students' academic performance.

Gender has also been cited as one of the student factors that may affect their academic performance. Gender is defined as a range of physical, biological, mental and behavioural characteristics pertaining to, and differentiating between the feminine and masculine population (Filgona&Sababa, 2017). Meredith (2014) considers it as a socially constructed concept that is taught to mankind from the moment one is born. Studies conducted in the past which link gender and academic performance has generated mixed results unlike the other characteristics of learners (Eddy, Brownell &Wenderoth, 2014**;** Chukwunyeremunwa, 2013). Amedu (2015) examined the effect of gender on achievement of students in biology using the Jigsaw Method. The study showed that there was a significant difference between the mean scores in favour of the males. Kashu's (2014) study revealed that in most, if not all cases, the boys perform better than girls in KCSE, more so in Mathematics and Sciences. Dania (2014) demonstrated that gender (male/female) had no significant

effect on students' achievement in social studies. Kimamo and Muraya's (2104) study showed that gender had no significant influence on achievement in biology when cooperative learning approach is used.

Many factors have been cited to affect academic performance in the foregoing observations. It is possible that the poor performance in biology in Nandi East Sub County could have been due to students' background characteristics. This study investigated the relationship between selected students' background characteristics namely; students' parental socio-economic status and gender on academic performance in biology. Parental socio-economic status was examined because it positively influences academic achievement (Suman, 2011; Femi &Adewale, 2012). Akinsanya, Ajayi and Salomi (2014) assert that, parents' socio-economic status like education and occupation; have the most significant influence on the academic achievement of their children, because they have a lot of opportunities to study hard due to their access to internet, newspaper and television. They can also be taught extra lessons privately at home. Gender was the focus of the study because in most, if not all cases, boys performs better than girls, more so in mathematics and sciences (Eddy, Brownell &Wenderoth, 2014, Kashu, 2014).

**Purpose of the Study**

The purpose of this study was to investigate the relationship between students' parental socio-economic status and academic performance in biology. Effect of gender on biology performance was also investigated.

**Objectives of the Study**

The study was guided by the followingspecific objectives:

i) To determine the relationship between parental SES and students' academic performance in biology in Nandi East Sub County.
ii) To establish the relationship between gender and academic performance in biology in Nandi East Sub County.

**Research Hypotheses**

The study tested the following research hypotheses:

**$H_O1$:** There is no statistically significant relationship between parental SES and students' academic performance in biology in Nandi East Sub County.

**$H_O2$:** There is no statistically significant relationship between gender and academic performance in biology in Nandi East Sub County.

## RESEARCH METHODOLOGY

**Geographical location of the Study**

Nandi County in North Rift region of Kenyahas 5 administrative Sub-Counties: Nandi East, Nandi Central, Nandi North, Nandi South and Tinderet (KNBS, 2013). The study was conducted in Nandi East Sub County. The sub county has 22 public secondary schools, 6 county schools (3 boys' and 3 girls' schools) and 16 sub county mixed schools. The sub county was chosen for the study due to its continuous poor performance in KCSE biology examinations (KNEC, 2016).

**Location of Nandi County in Kenya**


*Source: KenyaNationalBureau ofStatistics, 2013*

**Research Design**

This study adopted a descriptive survey research design. According to Mugenda and Mugenda (2003), descriptive survey research design entails a systematic and empirical inquiry in which the researcher does not have a direct control of independent variables as their manifestation has already occurred. This design was used in this study mainly because it is useful in describing the characteristics of a large population and makes use of large samples, thus making theresults statistically significant even when analyzing multiple variables. Many questions can also be asked about a given topic giving considerable flexibility to the analysis. The design allows use of various

methods of data collection likequestionnaire and interview methods. It makes use of standardized questions where reliability of the items is determined (Orodho, 2005).Descriptive survey research design also allows the researcher to study how the independent variable affects the dependent variable.

**Target Population**

The target population consisted of 22 principals in public secondary schools and 1288 Form 4 secondary school biology students in the sub county. These two groups were considered to be in the best position to provide quality information on the selected factors under study and performance in biology. The target population of the study by school category is summarized in Table 2.

**Table 2**
**Accessible Population by School Category**

| School category | Principals | Students |
|---|---|---|
| County | 6 | 637 |
| Sub County | 16 | 651 |
| Total | 22 | 1288 |

**Sampling design**

The study used both probability and non-probability sampling techniques. Purposive sampling technique was used to choose 12 school principals from schools that had biology laboratories with most of the basic facilities for teaching–learning the subject. Biology being a practical subject, schools with laboratories would provide a more uniform and valid yardstick of students' ability and achievement. According to Kombo and Tromp (2006), the power of purposive sampling lies in its ability to help researchers select informants best placed to provide information central to issues being investigated.

The number of students who participated in the study was determined using Krejcie and Morgan (1970) formula for a finite population. The formula is:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2(1-P)}$$

Where:

$S$ = required sample size

$N$ = the given population size

$P$ = population proportion that for table construction has been assumed to be .050, as this magnitude yields maximum possible sample size required.

$d^2$ = the degree of accuracy as reflected by the amount of error that can be tolerated in the fluctuation of sample proportion p about the proportion P – the value of d being .05 in the calculations for entries in the table, a quantity equal to plus or minus 1.96 σp.

$X^2$ = table value of chi square for one degree of freedom relative to the desired level of confidence, which is 3.841 for the .95.

Substituting these values in the equation, estimated sample size (S) will be:

$$S = \frac{3.841 \times 1288 \times 0.50(1-P)}{(0.05^2)(1288-1) + 3.841 \times 0.5(1-0.5)}$$
$$S = 296$$

The sample size of the students was 296 given that their accessible population was 1288.
The schools were organized by school category (County and Sub County) to ensure that all of them were included in the study then proportionate stratified random sampling techniques were used to determine the number of students from each school category. At school level, Form 4 biology students were randomly selected. Table 3 show the sample size of the target population studied; the County and Sub- County number of public secondary schools, principals and biology students by school category.

**Table 3**
**Distribution of the Study Sample by School Category**

| School category | Principals | Students |
|---|---|---|
| County | 4 | 121 |
| Sub County | 8 | 175 |
| Total | 12 | 296 |

**Data Collection**
Prior to the commencement of data collection, the researchers obtained all the necessary documents, including a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) through the Board of Postgraduate Studies, Egerton University. Audience with the respective schools was also sought through the Sub-County Director of Education, Nandi East Sub-County to clarify the purpose of thestudy. Upon getting an appointment, the researcher in person administered thequestionnaire to the students. Assistance from the school administration wassought by the researcher. This was for the purpose of enhancing full cooperation and coordination among the respondents and the researcher. During the distribution of the instruments, the purpose of the research was explained. The researcher then interviewed the concerned school principal.

**Data Analysis**
Data analysis is a process of summarizing the information gathered so as to give meaning to such data. The collected data was analyzed using both quantitative and qualitative data analysis approaches. The data analysis started by checking for completeness, cleaning of errors and missing data, then coding of the information obtained from the participants. This resulted in the fluctuations in the sample sizes of the results. The responses in thequestionnaires were assigned numerical values.The data obtained from the questionnaires for quantitative analysis was combined into themes and then summarized into frequencies and percentages. Data was then put in tabular forms for analysis by using Statistical Package for SocialSciences (SPSS). Descriptive statistics consisted of tabulation of frequencies, percentages and chi-square.

The qualitative analysis on the other hand was used in this study to analyze the data obtained from the interview guide. The data was categorized in themes in accordance with research objectives and reported in narrative form along with quantitative presentation. The qualitative data was used to reinforce the quantitative data. The two hypotheses were tested at the 0.05 level using the chi-square test for independence. The test was chosen because the independent variables (parental socio-economic status and gender) were measured at nominal scale while the dependent variable,

(achievement in biology) was at ordinal scale. Field (2013) recommends use of the test when determining the relationship between constructs measured at nominal, ordinal or a combination of the two.

## RESULTS AND DISCUSSION

### Relationship between Students' Parental Socio-Economic Status and Academic Performance in Biology

Objective one sought to determine the relationship between students' parental socio-economic status and academic performance in biology. Parental socio-economic status was measured in terms of indicators such as level of education, residence, occupation, family structure and possessions. The variable was measured using a set of 11 items in the students' questionnaire. A number of scales (3, 4, 5, 8, and 10) were used to rate responses to the items that were used to measure it. The responses to the items were summed and transformed into socio-economic status index (Table 4).

**Table 4**
**Parental Socio-Economic Status Index**

| Socio-economic status indicators | N | Mean | SD |
|---|---|---|---|
| House you reside in (family owned, rental, 3 rooms maximum = 4) | 288 | 3.09 | 0.80 |
| Parents have house helps to assist with domestic chores (maximum = 4) | 284 | 0.94 | 1.39 |
| How often my parents purchase for me biology materials (maximum= 4) | 292 | 1.10 | 1.04 |
| Average expenditure on biology materials per year (maximum = 5) | 293 | 1.40 | 1.46 |
| Family possessions (Radio, TV, car (maximum = 10) | 294 | 2.80 | 2.39 |
| Fathers highest level of education (maximum = 8) | 285 | 4.04 | 1.88 |
| Mothers highest level of education (maximum = 8) | 290 | 3.72 | 1.75 |
| Parents assists with my homework (maximum = 3) | 291 | 1.03 | 1.16 |
| Parents employment status (maximum = 5) | 288 | 3.26 | 1.41 |
| Family structure (both parents, single parent , orphan maximum = 4) | 275 | 3.62 | 0.69 |
| Family size (maximum = 6) | 289 | 1.92 | 1.57 |
| **Socio-Economic Status Index (maximum = 61)** | **295** | **26.21** | **8.16** |

The results in Table 4 show that the residence (M = 3.09, SD = 0.80) of the respondents were average while family structure (M = 3.62, SD = 0.69) of the students were good (had both parents) as indicated by the mean scores. Table 4 also shows that father's level of education (M = 4.04, SD = 1.88) and mother's level of education (M = 3.72, SD = 1.75) and parents' employment (M = 3.26, SD = 1.41) were rated average as they were measured out of 8 and 5 respectively. The table indicates that parents in the social classes rarely purchase biology materials (M = 1.10, SD 1.04) for their children. This is confirmed by the low rating of average expenditure on biology materials per year (M = 1.40, SD = 1.46). The results further indicate that parents rarely assist their children with their homework (M = 1.03, SD = 1.16). The parental socio-economic status index (M = 26.21, SD = 8.16 was rated average given that it was out 61.

The socio-economic status of the parents was determined by transforming the indices into levels using the scale; Low (0 – 20.33), Middle (20.34 – 40.66) and Upper (40.67 – 61.00). The status of the parents was then summarized using frequencies and percentages as shown in Table 5.

**Table 5**
**Parental Socio-economic Status (N = 295)**

| Status | Frequency | Percent |
|---|---|---|
| Low class | 58 | 19.66 |
| Middle class | 220 | 74.58 |
| Upper class | 17 | 5.76 |

The results in Table 5 reveal that nearly three quarters (74.58%) of the students indicated that middle class was the socio-economic status of their parents while below a quarter (19.66%) were of the view that their parents were in the low class. Table 5 also shows that only a few (5.76%) students considered upper class as the economic status of their parents. These findings are in harmony with those of Nandege (2015) who noted that majority of the students from urban informal settlements in Westlands Division, Nairobi County were from not well to do families. Nandi- East Sub -County and Nairobi County however, are not the same in terms of socio-economic development. The findings are in agreement with those of a study conducted in Kiamokama Division Kisii County, Kenya by Okemwa (2014). The study noted that most of the pupils in the division were from humble backgrounds as most of their parents were not well endowed in terms of education, employment and possessions. The results are also in agreement with those of Juma (2016) in Tana River County, Kenya who observed that parents with low socio-economic status rarely assisted students with their assignment/homework impacting negatively on their performance.

Further analysis was done on students' academic performance in biology by examining it with respect to parental socio-economic status. Table 6 presents the distribution of students' achievement in the subject by parental socio-economic status.

**Table 6**
**Students' Performance in Biology by Parental Socio-Economic Status (N = 295)**

| Marks | Low Class n = 58 | | Middle Class n = 220 | | Upper Class n = 17 | |
|---|---|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| 19% and below | 1 | 1.72 | 3 | 1.36 | 0 | 0.00 |
| 20 - 39% | 16 | 27.59 | 46 | 20.91 | 1 | 5.88 |
| 40 - 59% | 28 | 48.28 | 111 | 50.45 | 10 | 58.82 |
| 60 - 79% | 12 | 20.69 | 56 | 25.45 | 6 | 35.29 |
| 80% and above | 1 | 1.72 | 4 | 1.82 | 0 | 0.00 |

The results in Table 6 reveal that nearly all students (94.11%) from upper class families obtained a mean of 40% and above while more than three quarters (77.72%) of students from middle and over two thirds (70.69%) of students from low class families obtained the same range of scores. An examination of the findings show that academic performance increases with parental socio-economic status. The findings are in harmony with the observations of Sheldon (2003) who noted that learners from families with low socio-economic status obtain low grades because they often lack the financial, social, and educational support that enhance academic performance These results support those of Onyancha, Njoroge and Mukolwe (2015) who established that the lower a parent's socio-economic status, the lower a student's average grade.

Chi-Square was used to determine the influence of parental socio-economic status on students' academic performance in biology. The parental socio-economic status was cross tabulated with students' mean scores in biology evaluation test as shown in Table 7.

**Table 7**
**Cross Tabulation between Parental Socio-economic Status and Students' Academic Performance Biology (N= 295)**

| Performance | Low Class n = 58 | Middle Class n = 220 | Upper Class n = 17 | |
|---|---|---|---|---|
| | Frequency | Frequency | Frequency | Total |
| Very poor | 1 | 3 | 0 | 4 |
| Poor | 16 | 46 | 1 | 63 |
| Average | 28 | 111 | 10 | 159 |
| Good | 12 | 56 | 6 | 74 |
| Very good | 1 | 2 | 0 | 5 |
| Total | 58 | 220 | 17 | 295 |

Table 7 reveals that majority of students (111) from the middle class recorded an average academic performance, 28 students from low class and 10 from upper class registered a similar average score. The results are in agreement with those of Pedrosa, Norberto, Rafael, Maia, Andrade,and Carvalho (2006). Their study in Brazil on social and educational background pointed out that, students from deprived socio-economic and educational backgrounds performed relatively well or even better than others coming from higher socio-economic backgrounds. The test of significance was then carried out and the results were summarized in Table 8.

**Table 8**
**Test of Significance of Students' Parental Socio-Economic Status and their Academic Performance (N= 295)**

| Scale | Value | df | p-value |
|---|---|---|---|
| Pearson Chi-Square | 8.343 | 8 | .401 |
| N of Valid Cases | 295 | | |

*Significant at .05

The results of the Chi-Square test in Table 8 indicate that socio-economic status had no statistically significant relationship with academic performance in biology at 0.05. This means that parents' socio-economic status does not influence academic performance in biology. The results support the first hypothesis which states that socio-economic status does not influence students' academic performance in biology. The hypothesis was thus accepted.

The results in Table 8 reveal that parental socio-economic status does not significantly influence students' academic performance in biology. This was evident from the results that indicated students from high, middle and low class showed no significant differences in their performances. However, it also emerged that parental SES could not determine the marks that students scored and that middle or low SES may have motivated some students to work extra hard to liberate themselves from their statuses. The results are in agreement with those of a study by Jamila (2009) which

revealed that socio-economic status of parents has no significant effect on the educational achievement of students. The results are also in line with those of Ebenuwa-Okon (2010) in Nigeria who found out that socio-economic indicators like family financial status do not significantly influence academic performance. Ebenuwa-Okon was of the view that academic achievement depends on personal determination of the student. These results however, contradict those of Saifi and Mehmood's (2011) study in Gujarat District in India on the effect of socio-economic status of parents on students' achievement. Their study revealed that parental education, occupation and facilities at home affect the student's achievement. These results also contradict those of Abdu-Raheem (2015) who confirmed that there was a significant relationship between parents' socio-economic status and academic performance of secondary school students in Ekiti state, Nigeria. The difference however, is noted in the study area because the study focused on academic achievement in a single subject, biology.

Bala (2011) explored the influence of parental education, parental occupation and family size on science achievement of secondary school students in western Uttar Pradesh in India. The findings indicated that family variables including parental education had significant relationship with the achievement of their children. The result do not agree with those of a study conducted by Mogaka (2012) in Keumbu Division Kisii County which found out that the level of parental income and number of siblings were very vital in determining pupil's academic achievement. The study found out that pupils from families with many children, and uneducated parents scored poorly when compared to pupils from families with few children whose parents were educated. Onyancha, Njoroge and Mukolwe(2015) study concur with Mogaka's as they established that socio-economic status play a significant role in influencing students' academic performance. They noted that the lower the parents socio-economic status, the lower the students average grade and the higher the parents socio-economic status, the higher the academic performance of the students.

Additional information on parental socio-economic status was gathered using the principals' interview schedule. The interview involved 12 principals and it focused on the link between parental socio-economic status and students' academic performance. Data gathered by the instrument was organized thematically in areas pertinent to the study, and summarized using frequencies and percentages. The principals were first asked whether parents level of education influences students' performance in biology. Their responses are summarized in Table 9.

**Table 9**

**Reasons advanced by Principals why Parents' level of Education Influence Students' Academic Performance (N = 18)**

| Reason | Frequency | Percentage |
|---|---|---|
| Parents with high levels of education are keen that their children are provided with quality education | 3 | 16.67 |
| Avails learning materials as they are aware of the importance of providing their children with facilities | 3 | 16.67 |
| Are able to make informed decisions with regards to their children's education | 2 | 11.11 |

| | | |
|---|---|---|
| Educated parents tend to support their children (encourage, provide facilities) leading to good/better performance | 4 | 22.22 |
| Advises their children to concentrate on science related subjects to enable them to be admitted to quality courses | 4 | 22.22 |
| Have a better understanding of biology and are able to guide their children | 2 | 11.11 |

The results in Table 9 reveal that the major reasons advanced by principals why parents level of education influence academic performance of students in biology were; Advising their children to concentrate on science related subjects to enable them be admitted to quality courses (22.22%) and; Educated parents tend to support their children leading to good/better performance (22.22%). These results are in harmony with those of Mallam (2009) and Ngorosho (2010. Mallam noted that parents' level of education is important to schooling as they tend to have confidence in their children, advice and motivate them to do well at school. Ngorosho identified four key variables as significant indicators of home environment that is conducive for learning in rural eastern Tanzania. These variables are: Father's and mother's education, source of light, house hold materials and the academic materials like books for school subjects in homes. Ngorosho concluded that these variables play a pivotal role in children's education.

The principals were also asked whether parents' occupation affect students' academic performance. The principals gave several reasons why they thought it did as indicated in Table 10.

**Table 10**
**Reasons why Parents' Occupation affect Students' Academic Performance (N = 10)**

| Reason | Frequency | Percentage |
|---|---|---|
| Those in occupations related to biology act as role models | 3 | 30.00 |
| Influence attitudes and what their children intend to do as a career | 3 | 30.00 |
| Those in stable occupations can provide for academic needs for their children leading to good performance | 2 | 20.00 |
| Parents in busy occupations have no time for their children leading to poor performance | 2 | 20.00 |

Table 10 reveals that the main reasons why the principals were of the view that reasons why parents' occupation affect students' academic performance were; Those in occupations related to biology are role models to their children (30.00%); parent's occupation influence attitudes and what their children intend to do as a career (30.00%); Those in stable occupations can provide for academic needs of their children leading to good performance (20.00%) and Parents in busy

occupations have no time for their children leading to poor performance (20.00%). The reasons advanced by the principals are in line with the findings of a study conducted in Malaysia by Mudassir and Abubakar (2015) among secondary school students. The findings showed that students from parents with formal occupation perform well than those from parents with informal occupation.

The principals were further asked the reasons why they thought that parents' economic status affect performance of students. Table 11 gives a summary of their reasons.

**Table 11**
**Principals' reasons why parents' Socio-Economic Status affect Academic Performance of Students (N = 12)**

| Reason | Frequency | Percentage |
|---|---|---|
| Children of parents who are economically well off tend to do better since they are in school all the times as their parents pay fees on time . | 4 | 33.33 |
| Children from well to do families perform better since their parents are able to cater for the required learning materials | 8 | 66.67 |

The results in Table 11 reveals that two thirds (66.67%) of the principals were of the view that parents' economic status affects academic performance of students because their parents are able to cater for the required learning materials. The results support those of (Eamon2005; Hochschild 2003) who examined the influence of family income on African-American students' academic achievements. They found that children from high and middle socio-economic families were exposed to a better learning environment at home due to availability of extra learning facilities like computers, televisions, radios, different types of reading materials among others. They noted that students in low socio-economic status families were not exposed to these learning facilities and this negatively affects their academic performance. Nadenge, Ngesu, Muasya, Maonga and Mukhungulu (2016) noted that parental economic status matters as it affects their ability to pay school fees on time to avoid disruption of students' learning.

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Lastly, the principals were asked to provide reason why family structure affects students' academic performance. The principals gave several reasons why they were of the opinion that it affects students' academic performance which is indicated in Table 12.

**Table 12**
**Reasons Advanced by Principals why Family Structure affects Academic Performance of Students (N = 11)**

| Reason | Frequency | Percentage |
|---|---|---|
| Single parents tend to have social problems which negatively affects their children's performance | 4 | 36.36 |
| Complete (mother and father) stable families enhance performance as home environment is conducive to learning | 5 | 45.45 |
| Students from unstable families do poorly as their parents rarely attend to their needs | 2 | 18.18 |

Table 12 indicates that two main reasons; Complete (mother and father) stable families enhance performance as home environment is conducive to learning (45.45%) and; Single parents tend to have social problems which negatively affects their children's performance (36.36%) were advanced by the principals. The reasons advanced by the principals are in harmony with the observations of Asikhia (2010) who observed that the family structure plays a pivotal role in the learning process of a child as it is the first, smallest and the most important unit of a child's social organization. Asikhia noted that the structure of family such as the child's position influences his/her performance. Eamon (2005) and Jeynes (2002) confirmed that family type, size and parental socio-economic status play important role in children's educational attainment and social integration

Additional qualitative data was sought from the principals by requesting them to suggest what could be done to address parental factors that affect students' academic performance. Their suggestions are summarized in Table 13.

**Table 13**
**How to Address Parental Factors that affect Students' Academic Performance (N = 14)**

| Suggestion | Frequency | Percentage |
|---|---|---|
| Counsel the parents | 4 | 28.57 |
| Involve parents in their children's academic matters | 3 | 21.43 |
| Provide affected students with guidance and counseling services | 5 | 35.71 |
| Government should provide support to learners from families faced with financial challenges | 2 | 14.29 |

Table 13 shows that slightly more than a third (35.71%) of principals suggested that students affected by parental factors be provided with guidance and counseling services. More than a quarter (28.57%) of principals suggested that parents whose characteristics negatively affect their children's performance in biology need counseling. Slightly more than a fifth (21.43%) recommended that parents be involved in their children's academic matters.

**Relationship between Students' Gender and Academic Performance in Biology**

The second objective sought to establish the relationship between students' gender and academic performance in biology. Data on the students' gender was collected using evaluation test records. The data was summarized using frequencies and percentages as shown in Table 14.

**Table 14**
**Gender Distribution of the Study Sample (N = 295)**

| Gender | Frequency | Percent |
|---|---|---|
| Male | 160 | 54.24 |
| Female | 135 | 45.76 |

Gender has been associated with academic performance by several scholars. Dania's (2014) study showed that gender has a significant effect on students' academic performance in Social Studies. Kashu (2014) also noted that gender affects students' academic performance especially in science subjects. Table 13 shows that more than half (54.24%) of the sample were boys while the girls (45.76%) were slightly less than the boys. The results imply that biology attracts more male than female students. This is line with the finding of Eddy, Brownell and Wenderoth's (2014)study which showed that science subjects like physics, chemistry and biology attract more male learners. Amedu (2015) attributed this to socio-cultural background which brands science subjects and mathematics as masculine, while others like home economics and secretarial studies are branded as feminine.

Further analysis was conducted using the data on gender by examining academic performance with respect to it. Table 15 gives a summary of achievement in the subject by gender.

**Table 15**
**Academic Performance by Gender (N = 295)**

| | **Male n= 160** | | **Female n = 135** | |
|---|---|---|---|---|
| **Marks** | **Frequency** | **Percentage** | **Frequency** | **Percentage** |
| 19% and below | 3 | 1.88 | 1 | 0.74 |
| 20 - 39% | 34 | 21.25 | 29 | 21.48 |
| 40 - 59% | 79 | 49.38 | 70 | 51.85 |
| 60 - 79% | 42 | 26.25 | 32 | 23.70 |
| 80% and above | 2 | 1.25 | 3 | 2.22 |

Table 15 shows that slightly more than a half (51.85%) of the female students obtained mean scores ranging between 40 – 59% while slightly less than a half (49.38%) of the male students had similar scores. Table 15 also shows that over a quarter of the male (27.50%) and female (25.92%) students had mean scores of 60% and above. These findings indicate that the academic performance in biology of the female students was comparable to that of their male counterparts. The findings are in harmony with those of a study conducted in Delta State Nigeria by Dania (2014) which revealed that: gender (male/female) had no significant effect on students' achievement in social studies. The results also support those of a study by Kashu (2014) which compared the academic performance between boys and girls in the Kenya Certificate of Secondary Education (KCSE) across a period of five years (2007-2011). The results showed that there was no significant difference in overall performance between boys and girls in private schools.

The influence of gender on academic performance in biology was determined using the chi-square test of independence. The gender of the students who participated in the study was cross tabulated with their mean scores in the achievement test. The results of the cross tabulation is given in Table 16.

**Table 16**
**Cross Tabulation between Students' Gender and their Academic Performance in Biology (N= 295)**

| | Male n= 160 | Female n = 135 | |
|---|---|---|---|
| **Performance** | **Frequency** | **Frequency** | **Total** |
| Very poor | 3 | 1 | 4 |
| Poor | 34 | 29 | 64 |
| Average | 79 | 70 | 149 |
| Good | 42 | 32 | 74 |
| Very good | 2 | 3 | 5 |
| Total | 160 | 135 | 295 |

Table 16 reveals that the frequency of male and female students at different levels of performance is comparable. For example, slightly above a quarter of male (44) and female (35) students were rated good and very good in their performance while those who were rated poor and very poor in male (37) and female (30) were slightly below a quarter. The test of significance was then carried out and the results were summarized in Table 17.

**Table 17**
**Chi-square test results between Students' Gender and Academic Performance in Biology (N= 295)**

| Scale | Value | df | p-value |
|---|---|---|---|
| Pearson Chi-Square | 1.383 | 4 | .847 |
| N of Valid Cases | 295 | | |

The results of the Chi-Square test in Table 17 indicate that gender was not statistically related to academic performance in biology at the .05. This is an indication that gender does not influence academic performance in biology. The results support the second hypothesis which states that gender does not influence students' academic performance in biology. The hypothesis was thus accepted.

The results are in agreement with those of Owoeye and Agbaje (2016) who observed that the relationship between students' gender and academic performance in biology was not statistically significant. The results are also in agreement with those of Chukwunyeremunwa (2013) which showed that the interaction between both genders on students mean scores in biology was not statistically significant. The results are in line with those of Muraya and Kimamo's (2011) study conducted in Machakos District, Kenya which revealed that gender had no significant influence on achievement in biology.The present study contradict those of Eddy, Brownell and Wenderoth (2014) who established that females consistently underperform in introductory biology examinations compared to their male counterparts. The results also contradict those of Amedu (2015) who examined the effect of gender on the achievement of students in biology using jigsaw method and established that there was a significant difference between the mean scores in favour of

the males. The effect of culture may need to be investigated on the achievement of girls. If girls go to school with the cultural image that boys are superior to them, it may affect their zeal to learn.

**Conclusions and Recommendations**

The results of the study revealed that parental socio-economic status and students' gender were not significantly related to academic performance in biology.On the basis of these results, the following conclusions were made:

i. Parental socio-economic status does not influence academic performance in biology. However, it emerged that parental socio-economic status could not determine the marks that students scored and that middle or low socio-economic status may have motivated some students to work extra hard to liberate themselves from their statuses.
ii. Gender does not influence students' performance in biology. Therefore, all learners should be given equal opportunity and the same level of encouragement irrespective of their gender.

The study established that parental socio-economic status and gender does not affect performance in the subject. Based on the findings, the following recommendations were made:

i. The Ministry of Education, school administrators and the local authorities need to come up with frequent community based forums that are specifically structured towards enhancing parental participation in their children's education.
ii. There is also need for policy formulation and implementation that encourage all learners to be treated equally irrespective of gender and other factors that enhance performance in biology to be strengthened to improve their achievement in the subject.

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