The Relationship Between Parental Involvement and Academic Performance in Biology in Public Secondary Schools in Kilifi County, Kenya

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ABSTRACT

Knowledge of Biology is important, not only for understanding our lives, but also for pursuing further studies in related disciplines like medicine and agriculture. Performance in the subject in Kenya public secondary schools has been low over the years and this has prompted studies into some of the predicting factors for this biology performance. The aim of this research was to determine the relationship between parental involvement and academic performance in biology in public secondary schools in Kilifi County, Kenya. Cognitive Theory of Development by Jean Piaget (1936) and the Framework of Parental involvement by Norman Epstein (2002) were used to inform the study. Descriptive and correlational designs were used where a sample of 322 participants were selected from a population of 1535 students and teachers. Stratified random, simple random, Purposive sampling was used to select Biology teachers, form three class as well as the 10 public secondary schools. A sample of 306 form three students and 16 Biology teachers was then selected from the target population. Data was collected from students and teachers using the parental involvement tool and a teacher questionnaire. The study incorporated content validity which was established through expert opinion. Instrument reliability was achieved using split half method where a Cronbach's alpha reliability coefficient of 0.7 was realized. Data from students Biology performance were obtained through document analysis. The Statistical Package for Social Sciences (SPSS) version 26.0 was used. Descriptive statistics of frequencies, mean and standard deviation were used and inferential statistics of Pearson moment correlation analysis were used for data analysis. Parental involvement was found to be significantly correlated with academic performance in biology. There was need to maintain parental support to enhance student performance. Studies using other designs, contexts and general learner performance may shed more light into the subject.

Keywords: Parental Involvement, Academic performance, Biology Subject

INTRODUCTION

Biology, together with Physics and Chemistry, are the three secondary school science subjects. Like the other science subjects, it involves practical activities which nurture student's problem- solving skills (William, 2019). Biology is a required in order to pursue careers for example pharmacy, nursing as well as agriculture. It also inculcates knowledge and attitudes which form the basis of environmental conservation. In 2017, student performance in the Kenya Certificate of Secondary Education (KCSE) biology subject was quite low and this led to very few of them making to the university to pursue biology related courses. Very few students (18%) scored over C+ grade in the subject which is the requisite for undertaking biology-related courses in the university as reported by KNEC (2018). The low grades in the subject are not only a local scenario, a report by Trends in International Mathematics and Study (TIMSS, 2011) shows that many

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African countries face the same challenge. This is demonstrated by biology results of KCSE for the years 2014 and 2015 where students realized low averages of 31.83% and 34.8% respectively as observed by KNEC (2015, 2016). This underachievement may be explained by unsuitable instructional strategies, the abstract nature of the sciences, and lack of qualified teachers for the subjects as well as inadequate teaching and learning resources as offered by Keraro et al. (2013).

The instructional strategies utilized in the current times may not help students to respond to questions raised from different angles in the curriculum as explained by KNEC (2018). In spite of the advantages realized in studying biology, Most Kenyan schools have persisted in poor performance especially in the KCSE examinations as noted by Republic of Kenya (RoK, 2012b). It is also important to note that , examinations have been used as a crucial aspect of the education over the years. Examination results have been used as the main aspect for employment, advancement in education as well as for the assessment of the ability of students. Thousands of students sit for Kenya Certificate of Secondary Education after every four years (Stephanie, 2022). Over the years, Biology performance in Kilifi County schools has been consistently lower than performance at the national level and in the other coastal counties of Kwale, Mombasa, and Taita Taveta. In comparison to student performance in other science subjects at the national level, biology performance has been consistently poorer. Appendix K shows the trend of the poor performance in Biology, and justify continued investigation of variables which may shed light on low performance.

According to the Kenya National Examination Council (KNEC, 219), the national scores for biology were 37.85-69.59 while those of Kilifi County ranged between 20.64- 58.24. In the year 2020 the worst performance was evident in all schools at the national and county level where students obtained a percentage mean score below the average of 50% out of 100%. Kilifi County had the lowest mean of 37.85 (KNEC, 2020). Several researches have outlined as to why there is generally poor performance in sciences. The researched explanations include; teaching methodology, teacher attitude and school environment (Dinah, 2021). Psychosocial home environment is hardly mentioned as factors that affects students' academic performance. Research carried out indicates that students performing poorly in biology is as a result of their poor knowledge in Biology (Akintola, 2018) as well as psychosocial home environment and school characteristics (Jane, 2018) and school factors (Dinah, 2021).

Psychosocial home environment and school environment is a very crucial informal learning area and how a learner performs depends on their home environment to a greater extent. Everyday parental involvement manifests in psychosocial home environment. When a parent is interested in education and encourages the student, the attitude, self-esteem, motivation and class room conduct of the student is changed. Parental encouragement can reduce school dropout (Laura, 2020), hence helps students to improve self-discipline and performance (Usher et al., 2019). According to Mwenda (2017) parental involvement takes different forms, including assisting a learner with homework, communicating with teachers, volunteering to participate in school activities and general educational encouragement. Such parental involvement results in better academic performance, less absenteeism, timely homework completion, fewer remedial classes, and more positive school attitude. Children development is affected by parents who participate in student's education at school through activities such as: volunteering in school activities, assisting in homework, communication with school, participating in activities of the school like availing to parent-teacher meeting or conference as well as encouraging the children to learn (Sabrina et al. 2022)

Performance in Biology as one of the STEM subjects in critical for individuals, community and nation. However, in Kenya despite efforts made by the government to enhance learning by providing learning materials and availing teachers in schools, students' performance in Biology has remained poor in Kilifi County compared to other counties. Consequently, this might result in secondary school leavers from Kilifi County to be seen as being unsuitable to undertake further education especially in the science related courses that require Biology results. Different studies have been carried out across the world and they reveal

that parental involvement to be correlated with student's academic performance (Keshav, 2020; Muller et al., 2018; Yongtao et al. 2019). A few have assessed how parental involvement may relate with the academic performance of students in biology with some indicating a positive correlation. There was need to determine how parental involvement correlated with academic performance in Kenya especially in Kilifi County which persistently registered dismal performance in the subject.

Statement of the Problem

In Kenya the government provides learning materials and avail teachers in schools, but students' performance in Biology has remained poor in Kilifi County compared to other counties. Consequently, this might result in secondary school leavers from Kilifi County to be seen as being unsuitable to undertake further education especially in the science related courses that require Biology results. In the Kenyan context many variables such as lack of resources, high learner-teacher ratio, inadequate teacher training and home environment have taken a center stage. However, in Kilifi County, performance in Biology has been a great concern yet despite the significance of the psychosocial home and school factors studies were difficult to come by. It is against this background it was imperative to investigate two variables in Kilifi in order to assist in getting further explanations for the poor performance, and suggesting strategies for improving Biology performance in the County.

Objectives of the Study

The study objective was as follows:

To establish the correlation between parental involvement and students' performance in Biology.

Research Hypothesis

The following was the hypotheses of the study:

H_{o1}: There is no significant correlation between parental involvement and students' performance in Biology.

LITERATURE REVIEW

Empirical Review

Parents are the initial teachers of a child and the first classroom is their home. Parental involvement refers to the support given to the student by the parents. Faquia, et al. (2019) in Karach researched on parental involvement effects on results of students. Mixed explanatory method design was applied in the research. Quota sampling was used. Questionnaire served as the tool for data collection Descriptive statistics as well as ANOVA was used in the study. More parent's student time is highly recommended by the study and hence parents should be able to discuss their children performance at home. There may be need to find out if similar findings exist in Kenya precisely in Kilifi County and focusing on student performance in biology.

Dorcas (2018) In Nigeria studied parental participation. Study population was 11745 participants. 400 students served as the sample size which was obtained by Stratified Sampling. Data analysis was carried out using mean Pearson correlation moment coefficient. The researcher found out that student's performed below average in integrated science, English and Mathematics in the junior Secondary School. The researcher also established determinants within the school that affected learner's achievement in school include purchase of recommended books and the subject teacher. Performance in English may differ from biology hence the need to carry out the current study especially in a different context.

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Laura (2020) established that parents have a crucial duty in determining the learner's performance. 41 learners from seventh grade and parent participant took part in the survey.

Person moment correlation was employed in the research. In the findings parental involvement was not significantly correlated to learner performance. The study used a relatively smaller sample compared to the current study and so there was need to further explore how both variables interact in a Kenyan sample.

In addition, Thuba (2019) conducted research in Igembe subcounty in the county of Meru on Parental involvement as a factor that affects education quality in secondary learning institutions. Significant correlation was established between education quality and Parental Involvement. Quantitative data as well as qualitative data was collected. 32 parents,352 learners and 8 principals were randomly selected. Interviews, coupled with focus group discussion were used during data collection. While the study sheds light into interaction between parental involvement and education quality, the current study focused on learner performance in a specific subject.

Sabrina et al. (2022) found no correlation between home based parental involvement and performance of students. The research involved 254 parents who took part in the study. Questionnaires formed the data collection too. The participants for the current study will be students and not parents.

RESEARCH METHODOLOGY

The study used correlational research design to determine the relationship between parental involvement and performance of public secondary school students in biology in Kilifi County of Kenya. A correlational design allows for the study of the interaction between variables and to determine the strength and direction of the relationship hence its suitability for the current study.

Study Location

Kilifi County was the location of this study, precisely in Kaloleni Subcounty. Appendix G shows the map location of Kaloleni Sub-County. The sub-county is mostly occupied by Mijikendas who did not embrace education during the colonial period (Ojwang, 2021). This location was considered ideal for the study as a result of low academic achievement that has been experienced in Biology. Kaloleni sub-county has posted low academic achievement in the K.C.S.E national examination (KNEC, 2017).

Target Population

The total target population in the Sub County will include 54 biology teachers in the 30 secondary schools and 1481 students in form three (Kaloleni Sub-county Education office 2022). In this study, the main source of information was Form 3 Biology Students and Biology Teachers. Form 3 Biology students were chosen because the researcher believed that they had adequately settled down in the respective schools. Furthermore, compared to form one and two, they were considered to be mature in Secondary school education and had covered most of the syllabus in Biology which made them suitable for the study (Wahito, 2017)

Sampling Methods

The current study utilized different methods including stratified random, simple random and purposive sampling. The schools were divided into three strata: mixed day/ boarding schools, mixed day and single gender (girls and boys) school. In selecting the schools, simple random sampling was used. Next, a purposive sample of 16 teachers was also selected because of their knowledge in Biology. The form three

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students were selected were selected using simple random sampling method. Public schools were purposively sampled because of the dwindling achievement of students in the subject of biology within the preceding 5 years as reported by KNEC (2019)

Sample Size

The researcher determined the sample size using Krejcie and Morgan (1970) formula as shown in Appendix J. From the Sub County 306 form three learners out of 1481 students as well as 16 teachers from the 54 targeted teachers constituted the sample.

Research Instrument

The researcher used questionnaires for students (Appendix C) and teacher's (Appendix D) to collect data. Apart from the demographic data, the other parts of the questionnaires contained items based on the core variables of the research. The researcher sought permission to adapt, modify and translate the questions to fit to the research.

Students' Questionnaire

Parental involvement in student Biology academic performance was measured using Epstein Framework (Epstein et al., 2009) which describes parental involvement into six categories. In this study, the questionnaire had Section A with three questions that included demographic factors of the participants. Section B contained 25 questions on the five dimensions of parental involvement, with each dimension (participation in school activities, communication, assisting in homework, volunteering and encouragement of children to study) containing five questions which measured using 5-point Likert scale that ranged between strongly disagree (1) and strongly agree (5). The student's questionnaire is attached as Appendix C. The highest score indicated the more parental involvement and vice versa.

Teachers' questionnaire

School factors were measured using the teacher's questionnaire. The questionnaire contained 15 questions related to the research objectives. Section A contained four questions which assessed the teacher demographic characteristics including age, gender, teaching experience and teacher qualification. Section B contained 15 questions out of which 5 measured school environment factors, the other 5 teaching learning resources and the remaining 5 questions measured teaching and learning resources. The scoring on a 5-point Likert scale ranging between strongly disagree (1) and strongly agree (5).

Document Analysis

In this study data from Biology end of term exams scores for the Biology students was analyzed. The researcher requested for the student's academic score sheets from class-teacher in the selected public secondary schools. The performance in the end term examination was considered for each student for the previous term, that is, term 1 2023. Each school's examination was different and raw. The researcher therefore transformed them into Z and then T scores for standardization and hence comparison of the students Biology performance (Barbara,2019).

Pilot Study

The questionnaires were tested before administration to the respondents in order to test for the reliability and appropriateness. Piloting helps to identify any deficiencies in the questionnaire (Kothari, 2004). Piloting of the tool was done in two selected schools that bore similar characteristics like the study sample. The two schools eventually were not involved in the final data collection. Accordingly, 31 students and 2 teachers

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were selected for the pilot study representing a 10 percent portion of the study sample.

Validity of the Instrument

Validity is the precision of measurement of an instrument hence measuring that which it intends to measure (Mohajan, 2017). The supervisor and peers helped in reviewing the items in both questionnaires to ensure that the contents are appropriate. The feedback received was used to review the instrument and comments integrated in the final instrument.

Reliability of the Research Instrument

Reliability is the production of consistent results following several trials as explained by Mugenda and Mugenda (2003). The questionnaire's reliability adopted as the original tool was 0.7. A highly reliable instrument is one which has a reliability coefficient of 0.7 or greater (Mugenda & Mugenda, 2003).

Data Collection Techniques

Structured questionnaires were the main data collection tool. By introducing herself and the current study's purpose to the school administrators, the researcher was granted permission to collect data. She then produced a copy of introduction letters and permits to the administrators in order to acquire permission for the research exercise in each school. Once the permission was granted, made herself known to the participants, explained the study purpose and instructed them on how to fill the study instrument. The researcher distributed the questionnaires personally and immediately collected them after they were filled. This helped in ensuring that the respondents did not discuss the answers they provided. Using this method allowed the researcher to not only save time but also gather a lot of information. This method was also appropriate for a large population and made it easy for collection of data (Kombo et al., 2006).

Data Analysis

Data was analysed using mean, standard deviation and Pearson moment correlation coefficient for the ordinal data.

RESULTS

This study sampled 322 participants to whom questionnaires were distributed. All the participants responded to the questionnaires realizing a 100% response rate. This was high above the suggested lowest threshold of 50% as offered by Mugenda and Mugenda (2003). Table 4.1 indicates the response rate

Table 4.1: Response Rate

S.NO	Subject	Number sampled	Number completed	Return rate (%)
1.	Teachers	16	16	100
2.	Students	306	306	100

Students and biology teachers provided data for this research. This section presents the demographic characteristics of teachers and students. Tables 4.2 and 4.3 show the demographic characteristics of the respondents.

Table 4.2 Demographic Data of Students

	Frequency	Percent
Students' Gender		
Male	153	50.0

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Female	153	50.0
Age of the Students		
16 Years and Below	32	10.5
17 Years	109	35.6
18 Years	94	30.7
Above 18 Years	71	23.2
Students' Academic Support		
Mother	97	31.7
Father	131	42.8
Father and Mother	62	20.3
Grand parents	5	1.6
Well wishers	6	2.0
Others	5	1.6
Marital status of the students' parents		
Married	261	85.3
Separated	14	4.6
Divorced	3	1.0
Widowed	26	8.5
Orphaned	2	.7
Family Type		
Single Parent	78	25
Nuclear	191	62.4
Polygamous	28	9.2
Others	9	2.9
Total	**306**	**100**

The Table 4.2 shows that both genders were equally presented by half (50%). Over a third (35.6%) were 17 years old while the least (10.5%) were aged 16 years and below. 42.8% received academic support while 1.6% received support from grandparents and others. Over three quarters (85.3%) had married parents while only 0.7% were orphaned. Close to two thirds (62.4%) came from nuclear families and 2.9% belonged to the category of others.

Other demographic information was collected from teachers and it is presented in table 4.3.

Table 4.3 Demographic Data of the Teachers

	Frequency	**Percent**
Gender of the Teacher Respondents		
Male	9	56.3
Female	7	43.8
Age of Teachers		
25-30 Years	6	37.5
31-35 Years	7	43.8

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36-40 Years	1	6.3
51-55 Years	2	12.5
Level of Education		
Diploma	4	25.0
Degree	11	68.8
Masters	1	6.3
Duration of Teaching		
1-5 Years	5	31.3
6-10 Years	7	43.8
11-15 Years	2	12.5
Above 15 Years	2	12.5
Total	**16**	**100**

Table 4.3 shows the demographic characteristics of teacher respondents. Over half of the respondents (56.3%) were male and less than half (43%) were female. Teachers aged between 31-35 years formed 43.8% of the particpants while those aged 36-40 years of age were the least at 6.3%. Over two thirds (68.8%) held a degree while 6.3% were Master degree holders. Those who had taught for 6-10 years formed the large part of the group (43.8%) compared to the 12.5% who had for 11-15 years and 15 years and above.

Parental Involvement and Students' Performance in Biology

Objective one sought to determine the correlation between parental involvement and students' performance in biology. Parental involvement was measured in terms of mean and standard deviation of parent's participation in school activities, assisting in home work, volunteering in school activities and encouraging children in their studies. The findings for parental engagement are shown in Table 4.4.

Table 4.4 Parental Involvement

Variable	**N**	**Mean**	**SD**
Participation in school activities	306	3.20	.64
Communication with school	306	3.39	.76
Assisting in homework	306	3.29	.88
Volunteering in School Activities	306	3.24	.84
Encouraging students in their studies	306	4.36	.65
Aggregate Score		**3.50**	**.75**

Table 4.4 indicates that the participants had an aggregate score of (M = 3.50, SD = .75). This implies that a greater number of respondents were either undecided or they agreed to the statements on each of the category. This could mean that either learners did not understand the level to which their caregivers/parents were involved in their school experience, or they understood to some level how parents engaged with them in their school life. It may therefore be implied that parental involvement is moderate among secondary school students in Kilifi County.

The researcher proceeded to calculate the performance of form three students at the end of term one examination. Performance was determined using mean score and standard deviation of the end of term one examination results. Table 4.5 presents the findings for this objective.

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Table 4.5 Performance of Form Three Students in Biology Exam

	N	Mean	Standard Deviation
Performance	306	4.18	2.83
Valid (listwise)	306		

Table 4.5 indicates the average score of the learners in the biology test was (*M* = 4.18, *SD* = 2.83). A score of 4.18 is D+ which means that majority of the students performed below average in this end of semester examination. This could mean that the overall performance in biology was poor and that students needed more support not only from their teachers but also their parents to aid in bettering the performance.

The next step was to measure how parental involvement correlates with students' performance in biology examination. The relationship was measured using Pearson correlation analysis whose findings are indicated in Table 4.6.

Table 4.6 Relationship between Parental Involvement and Performance of Students

		Academic Performance
Parental Involvement	Pearson Correlation	.680**

Table 4.6 indicates that parental involvement was positively and significantly correlated to student performance in biology examinations (r [306] = .680, p = .00). a two tailed curve was considered suitable since it permitted the testing of the null hypothesis which was stated as:

Ho1: There is no significant correlation between parental involvement and performance of students in biology examinations among students in Kilifi County.

The null hypothesis was thus discarded and the alternative hypothesis adopted as follows:

Ha1: There is a statistically significant positive relationship between parental involvement and performance of students in biology examination among form three students in Kilifi County.

By rejecting the null hypothesis for the alternative, it meant that student performance in biology would go up every time parents were involved in their learning. This is to mean that high levels of parental involvement may trigger high performance in biology. Accordingly, we may argue that parental participation, communication, assisting in school assigned tasks, volunteering in school related activities and encouraging learners consistently may yield an overall improvement in performance. As such, learners may be motivated with any positive change in parental involvement and that the reverse is true; low parental involvement may negatively affect performance of learners.

From the first objective it is therefore noted that the level of parental involvement was moderate (*M* = 3.50, *SD* = .75) which meant that some parents participated actively in students' life. The student performance on the other hand was found to be averagely low (*M* = 4.18, *SD*= 2.83) meaning that majority scored a D+ which is below average. A statistically significant positive relationship was realized between involvement of parents and form three student performance in biology examinations in Kilifi County.

The findings for this objective agree with Dorcas (2018) who found that Nigerian learners' performance was low and it reflected the low levels of parental involvement. The findings are also in agreement with Thuba (2019) who found a significant correlation between education quality and parental involvement. Increased parental involvement coincided with enhancement in the education quality. This study, however, contradicts

Sabrina et al. (2022) who did not find any significant relationship between parental involvement of home-schooled students and their performance. Although the current study focused on learner performance in biology, it differs with Laura (2020) who found parental involvement not to significantly correlate with students' academic performance in the U.S. This could mean that parental involvement may influence learning according to contexts.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

From the descriptive analysis it was noted in the first objective that the level of parental involvement was moderate (M = 3.50, SD = .75) which meant that some parents participated actively in students' life. The student performance on the other hand was found to be averagely low (M = 4.18, SD= 2.83) meaning that majority scored a D+ which is below average. Correlation analysis of this relationship was statistically significant (r [306] = .680, p = .000) between parental involvement and form three students' performance in Biology examinations in Kilifi County was revealed.

Conclusions

Parental involvement is related to students' performance in biology. This means that student performance either in biology or any other subject can be affected by the way parents get involved in students' life or school activities.

Because the level of parental involvement was moderate but correlated with the student performance, schools may need to strengthen the channels of parental involvement like communication, volunteering, participation in school activities, among others.

Recommendations

The study focused on students' performance in Biology. Similar studies may assess the contribution of the current study variables in the performance of other secondary school subjects.

Schools may need to initiate programs that parents are actively involved in their children education hence get to know how their children perform and their conduct.

The study targeted schools in the coast region of Kenya. Other studies may target other regions like the central or western parts of Kenya.

The study was correlational in nature. Other studies using other designs like experimental or qualitative designs may be conducted to extensively demonstrate how both home and school factors affect learner performance.

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APPENDIX

APPENDIX C: STUDENTS QUESTIONNAIRE

The Questionnaire here is meant to establish psychosocial home and school factors as correlates of Biology academic performance among form three students in Kilifi County, Kaloleni sub-county. Put a tick (√) on correct answer

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Respondent General Information

1. Tick on your age bracket:

16 Years and Below	17 Years	18 Years	Above 18 years

2. Gender:

Male	Female

3. Parents' marital status

Never married ( ) Married ( ) Separated( ) Divorced( ) Widowed ( ) Orphaned ( )

4. Type of Family

Single Parent ( ) Nuclear ( ) Polygamous ( )

Others ( )

APPENDIX D: TEACHER'S QUESTIONNAIRE

The Questionnaire here is meant to carry out a research on psychosocial home and school factors as correlates of form three Biology students' academic performance among form three students in Kilifi County, Kaloleni sub-county.

Put a tick (√) on the correct answer

Demographic information of the respondent

1. Indicate your gender:

Female	Male

2. What is your highest academic achievement?

Diploma	Degree	Masters	PHD

3. How long have you been in this profession?

1-5 Years	6-10 Years	11-15 Years	above 15 Years

4. Age:

25-30	31-35	36-40	41-45	46-50	51-55	Above 55

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APPENDIX G: KALOLENI SUB-COUNTY MAP

APPENDIX J: KREJCIE AND MORGAN FORMULA

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

Where:

S= Size of the sample

N= Size of the population

P= Proportion of population (0.050), d2= Degree of Accuracy (0.05)

X2= Chi-square value (3.841 for the 0.95).

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APPENDIX K: National, Kilifi County, Taita Taveta County, Kwale County and Mombasa County Biology K.C.S.E Academic Achievement percentage mean score for the year 2016-2019.

Percentage Mean Score					
Year	**National**	**Kilifi County**	**Kwale County**	**Mombasa County**	**Taita Taveta county**
2015	69.59	**58.24**	63.78	55.45	66.58
2016	58.37	**48.34**	53.67	50.34	59.67
2017	37.85	**20.64**	28.88	24.78	32.87
2018	51.67	**44.29**	53.66	48.45	55.58
2019	51.38	**43.32**	55.53	45.56	50.43

Source: KNEC (2019)