Medical Students' KCSE Grade and Their Relationship to Academic Performance: A Case of Egerton and Moi Universities, Kenya

Ronald Omenge Obwoge[1, *], Mosol J. Priscah[2], Emarah Ashraf Mohamed[3], Fred Nyabuti Keraro[4], Simon Kangethe[5]

[1]Department of Community Health, Faculty of Health Sciences, Egerton University, Nakuru, Kenya

[2]Department of Midwifery and Gender/Moi University, Kenya

[3]Department of Surgery and Anaesthesiology, Moi University, Eldoret, Kenya

[4]Department of Curriculum, Instruction and Educational Management, Egerton University, Nakuru, Kenya

[5]Department of Medical Education, Moi University, Eldoret, Kenya

Email address:

obwogeo@yahoo.com (R. O. Obwoge)

[*]Corresponding author

Abstract: Admission into Kenyan public universities' medical schools is either by Kenya Universities and Colleges Central Placement Service (KUCCPS) or individual universities and their senates on self-sponsorship programmes (SSP) basis. The KUCCPS selected students have strong O-level grades in all subjects, with specific cluster science subjects and cumulative points. The SSP students need to have minimum university entry requirements and cluster subjects for admission unto the medicine and surgery (MBCHB) programme. The study aimed to compare the relationship between Medical Student's KCSE grade and their performance in preclinical and clinical levels at Medical schools of Egerton University (EU) and Moi University (MU). The study utilized ex post facto research design for Retrospective record review (3R) of medical students of academic year 2007/08, 2008/09 and 2009/10 as cohort classes of Egerton University and Moi University. This study was conducted in Egerton University and Moi University, medical schools. Both Universities admit medical students sponsored by KUCCPS and SSP students. This study's Population was Public Universities' Medical students (MBChB) who had been examined at both preclinical and clinical course levels. Students of academic years 2007/08, 2008/09 and 2009/10 were the accessible population. Admission characteristic were an independent variable and academic performance a dependent variable. This study used a Data sheet document to capture data from Academic Records offices. The students' performance at preclinical and clinical courses is not influenced by their KCSE grades at admission at MU and EU. KCSE English and Chemistry grades positively impact on preclinical performances. Biology, Mathematics, Kiswahili and Chemistry positively influence performance in Clinical courses. Performance in Preclinical courses like Medical Biochemistry, Medical Physiology, and Pathology can predict performance in clinical courses. The diploma program (in-service) does not influence performance in preclinical courses as it does in clinical courses. Performance in preclinical courses is a predictor for performance in clinical courses. KCSE aggregate grade at admission has no influence on students' performance in preclinical and clinical courses at MU and EU. The study recommends). Medical schools to consider an open entry Examination system for applicants who meet minimum cluster requirements regardless of the KCSE aggregate grade. Consider development of in-service curriculum that may allow the diploma holder to take track at clinical years.

Keywords: Medical Student, Admission Characteristics, Preclinical Performance, Clinical Performance, Academic Performance

1. Introduction

1.1. Background to the Study

Kenyan Universities' medical schools are among the schools that produce the medical doctors for the Eastern Africa region and beyond. Egerton University (EU) and Moi University (MU) are among the six public universities with medical schools. The selection of candidates to the medical schools is regulated by a national admission policy that spells out the criteria for admission.

[21] on Guiding Principles for the Admission of Medical Students indicates that selecting candidates for tomorrow's doctors' training is a huge and challenging task for medical schools. The unique nature of the medical profession requires certain capabilities to produce future doctors who will be competent in cognitive, psychomotor and affective skills. The desired characteristics need to be addressed in the admission process. Identification of this as future performance predictors at the admissions process will lead to selection of applicants who upon graduation will practice effectively. [19] who investigated on Wrong schools or wrong students found that the differences in admission policies among universities and financing possibilities available to individual students could influence the characteristics of students ultimately entering medical schools.

Globally, different schools have adopted their befitting criteria of who should join a medical school. Some medical schools base student admission criteria on straight high school scores while others subject applicants to college admission tests. Universities like Egerton University, University of Florida and University of Utah medical schools' admission requirements developed have unique entry requirements stressing on core subjects. These admission requirements may either be; high school subjects grades, high school aggregate grade, first science degree or general degree or/and entry examinations. This aims to select applicants who upon graduation are more likely to become good doctors, fulfilling community expectations and protectors of public health. [10] in their study on Factors associated with success in medical school indicate that previous academic performance is a good, but not perfect predictor of achievement in medical training, while among others gender is associated with success in medical training. [7], [11], [20], [24] and [1] in their studies on performance indicators found that high school grades are predictive of performance at medical schools". [26] in his study on validity of admission tools used to select students to health professions education calls for more studies to provide more reliable and valid ways of assessing non-cognitive characteristics of applicants. The question as to which admission characteristics are rational, fair and humane to potential applicants, medical schools and the public remain unanswered.

In Kenya, admission of medical students into Public Universities' Medical Schools is a hotly contested exercise due to the limited chances available and resource constrained facilities. The undergraduate medical course takes six years. Egerton University and Moi University are among six public Universities with medical schools in Kenya. There are clear guidelines Kenyan medical schools use to select future doctors across the country. The guidelines allow admission either through Kenya Universities and Colleges Central Placement Service (KUCCPS) or individual university senates for self-sponsored programmes (SSP) basis that considers academic ability. The question worthy answering is 'What is the evidence base for using these criteria?' The KUCCPS selected students have strong O-level grades in all subjects, with specific cluster science subject and cumulative points specified for medicine (MBCHB). The SSP students have minimum university entry and cluster subject requirements. The selection to Medical Schools implies selection for the medical profession. Applicants are expected to have a high level of secondary school academic attainment. It, however, should be recognized that attainment of high academic grades at the secondary school level may not necessarily be an assurance for success in a career in a medical school.

The former Kenyan education system (7 years primary, 4 years' secondary and 2 years' high school) allowed students after secondary (O level) examination to specialize in either an art-based or science–based track in high school (A-level). After completion of two years in high school, admission into medical schools was based on the score of high school science subjects. Currently the basis is on general aggregate comprising arts and science subjects. Is the admission basis fair to potential students, medical schools and the public? [22] in his book on Training Research and practice indicates that getting the right policy for admission to medical school is a balancing act. It has to be fair to society by selecting people with the potential to be good doctors; and be fair to applicants-that diverse group of people who for many reasons want to set out on a long road to the medical career". The admission procedures should aim to select students with the ability and will to successfully complete the program and fit in the medical profession and effectively perform as per the expectations of the profession.

This study focused on Medical school students who had completed both the preclinical and clinical sciences in their medical training. The evaluations are rated in the respective competency-aligned domains in line with medical knowledge, patient care, interpersonal and communication skills, and professionalism.

The study analysed admission characteristics; gender, KCSE grades in relation to students' performance at preclinical and clinical subjects while at medical schools. It aimed at ascertaining its relevance as a basis of confirming fitness to enter professional training at medical school.

1.2. Statement of the Research Problem

Globally there is no standard admission criterion into medical schools. Egerton University, University of Florida and University of Utah medical schools have developed

unique entry requirements stressing on core subjects. Other universities in there admission criteria consider high school scores while others require applicants to have a first degree in either sciences or specific fields while other schools subject applicants to entry examinations. Some medical schools look upon both cognitive criteria (previous academic ability) and noncognitive factors (personality, learning styles, interviews, references, personal statements), and demographic factors (sex, ethnicity).

In Kenya there are six public universities that have medical schools. The six year program is divided into two phases; first three years are basic sciences (preclinical) years and the remaining years are clinical sciences. On successful completion, a bachelor's degree in medicine and surgery is awarded (MBChB).

The SSP basis requires; minimum of a mean grade B (Plus) and Cluster of; Language (English and Kiswahili) B+, Mathematics/Physics B+, Biology B+, Chemistry B+, or Diploma in Clinical Medicine with at least Credit. Some schools raise the criteria higher for SSP students while some admit at the minimum set criteria. Interestingly, the two admission characteristics have met the minimum entry requirement as per the KUCCPS, Commission for University Education (CUE) and Medical Practitioners and Dentists Board guidelines for medical schools.

Understanding that academic performance takes a central role in defining whether or not learning has occurred, in this situation it is not clear how these students perform in preclinical and clinical courses in relation to the entry admission criteria. There is no accessed evidence in Kenya in the literature that indicates the suitability of the selection criteria in use. The admission criteria based on cognitive ability (previous academic grades) is yet to prove its effectiveness in predicting future performance. While at medical school sometimes students repeat a year, retake supplementary exams, or even are discontinued on failing to meet the pass mark (academic grounds). More evidence is needed to prove other academic and non-academic reasons that may lead to poor performance. Without shading light on the relationships, the poor performance among some students may continue to be experienced. In view of the foregoing, this study investigated the relationship that exists between Medical Student Admission Characteristics (sponsorship, gender, KCSE grade) and their performance in preclinical and clinical courses.

1.3. Broad Objective

The study compared the relationship between Medical Student Admission Characteristics (sponsorship, gender, KCSE grade) and their performance (preclinical and clinical levels) at Medical schools of Egerton University (EU) and Moi University (MU).

1.4. Specific Objectives

The following specific objectives guided this study.
1. To determine the relationship between medical students' KCSE grade (s) and their performance in preclinical and clinical courses.
2. To compare the performance in preclinical and clinical courses of medical students based on sponsorship (KUCCPS and SSP).
3. To compare the performance in preclinical and clinical courses of medical students on the basis of gender.

1.5. Hypothesis

Due to the questions that were to be answered the study generated the following hypotheses:

HO_1: Medical students' KCSE grade (s) have no statistically significant relationship with their performance in preclinical and clinical courses.

HO_2: There is no statistically significant difference in performance between KUCCPS and SSP medical students

HO_3: There is no statistically significant gender difference in performance of medical students in the Preclinical and Clinical Courses.

1.6. Scope of the Study

This study analysed admission and academic data of medical students' performance that had been assessed in preclinical and clinical subjects/courses. The study adopted ex-post-facto research design, since data already existed in the respective offices. The data for the study included those discontinued on academic grounds but excluded data of students transferred in and out of Egerton University and Moi University. Also for those who had gone through different educational systems other than Kenya's 8-4-4 system. A retrospective records review (3R) for the three [3] cohort classes of 2007/08, 2008/09 and 2009/10 academic years were done. The study matched the three cohorts between Egerton University and Moi University.

The study did not compare medical schools but instead analysed the performance trends independently in relation to admission characteristics.

2. Results

2.1. Socio-demographic Characteristics of the Study Sample

The study samples' socio-demographic characteristics range from those that pre-existed prior to admission to those at medical schools. A review of academic and admission records for MBCHB students of Moi and Egerton Universities was carried out. The study respondents' comprised 272 medical students in three cohorts of 2007/08, 2008/09 and 2009/10 academic years. The 272 students had gone through examinations at preclinical and clinical levels. A descriptive analysis of the total of 272 students was done to generate the study sample' socio-demographic characteristics statistics.

The study sample in the medical schools comprised 179 (66%) Moi university and 93 (34%) Egerton University, medical schools. The MBCHB student majority age at

admission at age group 17–20 years. At schools Majority of the students on admission in both medical schools were 17-20 years; 84% (150) and 86% [80] for Moi University and Egerton University respectively. Gender composition was overall 35% [95] female and 65% (117) male. Male students in Moi University were 65% (116) while in Egerton University they were 66% [25]. Both medical schools admitted majority of KCSE aggregate grade of A (plain) as 68% (121) and 47% [25] of Moi University and Egerton University respectively.

Students with diploma were 4% [7] from Moi University and 12% [11] of Egerton University. Among the 272 MBCHB students, 14% (18) repeated an academic year during their course of studies. Non completion rate (repeat and drop outs) were 14% [24] in Moi University and 18% [17] in Egerton University.

2.2. Students' KCSE Grades as Per Gender at Admission

The admission across the KCSE grades were grade A (62%), grade A-(25%), grade B+ (7%), grade B (3%), grade B-(2%), grade C+ (1%) and grade C-(.5%). The KCSE grades with majority at admission were; grade A (62%) and grade A-(minus) (25%). The female students were fewer in all grades. Lowest grades of C+, C, and C (minus) represented mature entry students admitted with diploma in clinical medicine.

2.3. The Relationship Between Medical Students' KCSE Grade(s) and Their Performance in Preclinical and Clinical Courses

The first specific objective of the study sought to determine the relationship between medical students' KCSE aggregate grade (s) and their performance in preclinical and clinical courses. The KCSE aggregate grade (items 6 to 13) and preclinical performance (items 15 to 21) and clinical performance (item 23 to 33) were used data to test the relationship (see *appendix II on abstraction sheet*). PPMCC (r) was used to determine the relationship between performance averages and KCSE grades. Further the null hypothesis "Medical *students' KCSE grade(s) have no statistically significant relationship with performance in preclinical and clinical courses"* was tested for difference in means using t-test, at significance of p≥.05. The results are presented in table 1 to 9.

2.3.1. Relationship Between Medical Students' KCSE Grade (s) and Preclinical Performance Means

The KCSE aggregate grades of Moi University and Egerton University medical students were correlated with their mean scores in preclinical and clinical courses. The results are presented in table 1.

Table 1. Medical students' KCSE grade (s) relationship to preclinical performance.

Preclinical means		Sig. (2-tailed)	Pearson Correlation	Performance means
	Combined [272]	.382	-.055	62.54
KCSE admission grade	MU [179]	.320	-.075	62.25
	EU [93]	.420	-.094	63.11

The results in table 1 indicate a Pearson's r value of–0.055 (Combined schools),-0.075 (MU) and-0.094 (EU). The PPMCC (r) valueis a measure of the strength of the linear relationship between KCSE aggregate grade and preclinical performance. The result of all the three indicates a negative association. This indicates that as the value of one variable (KCSE grade) increases, the value of the other variable slightly (preclinical performance) decreases. The *p* value are 0.382 (combined schools), 0.320 (MU) and 0.420 (EU) which are greater than *p* ≥.05. The null hypotheses are therefore accepted for all. Therefore Medical Students' KCSE grade (s) have no statistically significant relationship with performance in preclinical courses in either combined

school, Moi University or Egerton University Medical schools. The study suggests that students' performance at preclinical courses is not determined by student's KCSE grades.

2.3.2. Relationship Between Medical Students' KCSE Grade (s) and Clinical Performance Means

The medical students' KCSE aggregate grades of combined schools', Moi University and Egerton University were correlated with their mean scores in clinical courses using the PPMCC (r). The results of the 246 students at clinical level admitted using KCSE results are presented in table 2.

Table 2. Correlations of Medical students' KCSE grade (s) and clinical performance.

Clinical means		Sig. (2-tailed)	Pearson Correlation	Performance means
	Combined [252]	.387	.058	63.29
KCSE admission grade	MU [177]	.829	-.018	62.15
	EU [75]	.862	-.021	65.27

The results in table 2 indicate a Pearson's r value of 0.058 (combined schools),-0.018 (MU) and-0.021 (EU). The PPMCC (r) value is a measure of the strength of the linear relationship between two variables. This result indicates a

positive correlation in scores of combined schools but negative correlation in Moi and Egerton Universities Medical schools. Therefore it indicates that as KCSE grade increases as the clinical performance mean decreases in combined

schools scores. Also results indicate p-value 0.387 (combined), 0.829 (MU) and 0.862 (EU). The *p* values are greater than *p ≥.05,* the null hypotheses are therefore accepted. The Medical Students' KCSE grade (s) have no statistically significant relationship with performance in clinical courses.

The study suggests that students' performance in clinical courses is not determined by student's KCSE grades at either combined school, Moi University or Egerton University.

2.3.3. Relationship Between Medical Students' Cluster KCSE Grade(s) with Preclinical Courses Performance

The medical students' subject specific KCSE aggregate grades of Moi University or Egerton University were correlated with their mean scores in preclinical courses using the PPMCC (r). The results of the 272 students at preclinical level admitted using cluster KCSE results are presented in table 3.

Table 3. *Relationship between Medical students' KCSE grade (s) and preclinical courses performance.*

Model	Unstandardized Coefficients		Unstandardized Coefficients	
	Combined schools		MU	EU
	β	Std. Error	β	β
(Constant)	63.480	.883	62.996	66.363
English	.437	.345	.647	-.246
Kiswahili	-.092	.318	-.534	.066
Mathematics	-.298	.448	-1.065	1.511
Biology	-.175	.622	.094	-.983
Chemistry	.199	.818	.635	-.070
Physics	-.709	.439	-.442	-1.348

The results in table 3 indicate for combined schools a β of.437 (English), .199 (Chemistry), Kiswahili (-.092), Mathematics (-.298), Biology (-.175) and physics (-.709). The β identify the average change in independent variable associated with 1 unit change in the dependent variable, statistically controlling for the other independent variables. Therefore, performance in English subject has a positive and chemistry had little relationship with performance in preclinical courses. Performance in the rest of subjects had negatives relationship to performance in Preclinical Averages. The results suggest that high school KCSE grades in English and Chemistry positively impact on students preclinical performances.

Further result in table 3 indicate for Moi University a β of .647 (English) and .094 (Biology) and .635 (Chemistry), while at Egerton University a β of .066 (Kiswahili) and 1.511 (Mathematics) having a positive relationship to preclinical performance.

2.3.4. Relationship Between Medical Students' KCSE Grade(s) with Performance in Specific Clinical Courses

The 246 of Moi University and Egerton University

medical students' KCSE aggregate grades were correlated with their mean scores in specific clinical courses using the PPMCC (r). This was to determine the relationship between the KCSE aggregate grade (s) and their performance in specific clinical courses. The results are presented in table 4.

Table 4. *Correlations of KCSE grade (s) with performance in specific Clinical courses.*

Model	Unstandardized Coefficients		Standardized Coefficients	
	β	Std. Error	MU	EU
			β	β
(Constant)	63.159	.832	62.780	67.045
English	-.368	.319	-.069	-.816
Kiswahili	.095	.285	.290	.288
Mathematics	.438	.455	.227	1.087
Biology	.313	.586	-.010	.339
Chemistry	.830	.768	.320	2.048
Physics	-.731	.405	-.423	-1.722

a. Dependent Variable: Clinical performance means R square.030

The results in table 4 for MU indicate a β of .227 (Mathematics), .290 (Kiswahili) and .320 (Chemistry) had positive correlation to performance in clinical course, while results for EU indicate a β of 1.087 (mathematics), .288 (Kiswahili), .339 (Biology) and .2.048 (Chemistry). Therefore KCSE subjects of Mathematics, Kiswahili, Biology and chemistry positively influence students' performance in clinical courses.

Further results in table 4 indicate for combined schools scores that Unstandardized Coefficients (β) of KCSE subject grades as; English (β-.368) Kiswahili (β.095), Mathematics (β.438), Biology (β.313), Chemistry (β.830) and physics (β of-.731). The β identify the average change in independent variable associated with 1 unit change in the dependent variable, statistically controlling for the other independent variables. Therefore when schools' scores are combined English and physics subject have a negative correlation while Biology, mathematics, Kiswahili and chemistry had positive correlation to performance in clinical course. This result suggests that good performance in KCSE grades in English and Chemistry influences good performance in Clinical courses.

2.3.5. The Performance in Preclinical Sciences as a Predictor for Performance in Clinical Sciences

To determine if performance in preclinical courses is a predictor of performance in clinical courses, a PPMCC (r) was used. PPMCC (r) was used as a measure of the linear correlation between performance in preclinical courses and performance in clinical courses. It measures the correlation between performances in preclinical courses means as a predictor of performance in clinical courses. To achieve this, the mean scores in preclinical courses were correlated with the means scores in clinical courses. The results are presented in table 5 and 6.

Table 5. *Performance in preclinical means as predictor of performance in clinical means.*

		Sig. (2-tailed)	clinical means (PPMCC (r))
Preclinical means	Combined (272)	.000	.709**
	MU [179]	.000	.744**
	EU (93)	.000	.777**
Model	Unstandardized Coefficients		Standardized Coefficients
Preclinical means	B	Std. Error	Beta
(Constant)	21.226	2.691	
Combined (272)	.665	.042	.709
MU [179]	.479	.035	.744
EU [93]	.893	.077	.777

**. Correlation is significant at the 0.01 level (2-tailed). Preclinical mean 62.25, clinical means 62.15

The results in table 7 indicate that PPMCC (r) is .744 (MU), .777 (EU) and .709** (Combined schools). Pearson Correlation was used to measure of the linear correlation between preclinical performance means and performance in clinical courses. This result indicates a strong positive correlation**.** The Medical students' performance in preclinical sciences strongly correlated to the performance in clinical sciences in MU, EU scores and when scores are combined. The results suggest that preclinical courses performance positively correlates to performance in clinical course in MU, EU and combined schools scores.

Further results in table 5 indicate p-value of .000 for MU, EU and combined schools scores. This is less that p-value of .05; therefore the Null hypothesis is rejected for all the three categories of MU, EU and combined schools scores. Therefore there is statistically significant relationship with performance in preclinical courses and performance in clinical courses in all either MU, EU or at combined scores.

The result suggests that Medical students' performance in preclinical sciences is a predictor for performance in clinical courses, can be predicted at preclinical level. The schools can take remedial interventions at the preclinical level to avoid failures or poor performance at clinical courses.

2.3.6. The Performance in Specific Preclinical Courses as a Predictor for Performance in Clinical Sciences

To determine if performance in specific preclinical courses is predictors for performance in clinical courses, PPMCC (r) was used. The mean scores in preclinical courses were correlated with the mean scores in clinical courses. PPMCC (r)'s Unstandardized Coefficients B was used to determine the relationship of performance in specific preclinical courses and performance in clinical courses. Using 'Sig' it determines if performance in preclinical sciences is a predictor of performance in clinical sciences. The results are presented in table 6.

Table 6. *Performance in Specific Preclinical courses as a predictor in performance in Clinical courses.*

Model		Unstandardized Coefficients		Standardized Coefficients	EU	Sig (combined schools.	Sig MU	Sig EU
		B	Std. Error	Beta				
1	(Constant)	26.990	2.961		9.115	.000	.000	.000
	Human Anatomy	.004	.049	.008	.074	.941	.941	.647
	Medical Biochemistry	.166	.060	.276	2.752	.007	.000	.000
	Medical Physiology	.214	.072	.288	2.962	.004	.004	.005
	Immunology	.079	.060	.130	1.328	.186	.186	.225
	Microbiology and Parasitology	.027	.061	.051	.439	.661	.661	.661
	Pharmacology	-.008	.048	-.016	-.159	.874	.874	.874
	Pathology	.082	.036	.202	2.301	.023	.023	.035

a. Dependent Variable: Clinical performance means
b. R Square.572

The result in table 6 on MU and EU indicates Medical Biochemistry (MU-.000, EU-.000), Medical Physiology (MU-.004, EU-.005), and Pathology (MU-.023, EU.035) had p-value less than.050; therefore these courses performance are predictors of performance in clinical courses. Results for combined schools indicate PPMCC (r)' Unstandardized Coefficients B and *"p"* of specific preclinical courses as; Human Anatomy (B=.004, p=.941)

Medical Biochemistry (B=.166, p=.007), Medical Physiology (.214, p=.004)), Immunology (.079, p=.186) Microbiology & Parasitology (.027, p=.661), Pharmacology (-.008, p=.874) and Pathology (.082, p=.023). The result suggests Human Anatomy, Medical Biochemistry, Medical Physiology, Immunology, Microbiology & Parasitology and Pathology the coefficient is positive which indicate that they are

unrelated to performance in Clinical courses. And Pharmacology coefficient is negative which indicate that is related to performance in Clinical courses.

Further result in table 8 for combined schools scores indicate; Medical Biochemistry, Medical Physiology, and Pathology had p-value less than .050; therefore these courses performance are predictors of performance in clinical courses. The results suggest that any changes in Medical Biochemistry, Medical Physiology, and Pathology's performance can result to changes in the performance in clinical courses.

2.3.7. KCSE, Age, and Preclinical Course Means as Predictor for Performance in Clinical Courses

In determining if medical school, Age, KCSE aggregate grade and Preclinical means are predictors of performance in Clinical courses, PPMCC (r) was used. The age, KCSE grades and preclinical were correlated with the mean scores in clinical courses. PPMCC (r) was used to determine if medical schools, KCSE aggregate grade, Age and Preclinical means are predictors of performance in Clinical courses. This determines which the predictors of performance in Clinical courses. The results are presented in table in table 7

Table 7. Predictors (Age,, KCSE aggregate grade and Preclinical means) as performance in Clinical means.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	17.604	3.018		5.832	.000
	School attended	3.138	.476	.310	6.597	.000
	Age	.082	.091	.048	.897	.370
	KCSE Grade	-.035	.246	-.008	-.142	.887
	Preclinical Means	.602	.039	.660	15.258	.000

a. Dependent Variable: Clinical Means

The results in table 7 indicate that *p* value are: Schools attended (.000), Age (.370), KCSE aggregate Grade (.887), Preclinical means scores (.000) and Schools attended, Preclinical means scores is less than .05. Therefore the medical Schools attended, Preclinical means determine the performance in clinical courses. The result suggests that medical schools attended, Preclinical means means are statistically significant except KCSE aggregate grade and Age. Therefore medical school attended and Preclinical means are predictors of performance in clinical courses.

2.3.8. Comparison of Performance Between Medical Students with KCSE and Those with Diploma in Preclinical Courses

To compare the performance in preclinical courses between medical students with and those without diploma a t-test was used. The t-test measure was used to determine if Preclinical courses mean scores have a statistically significant difference between medical students with and those without a diploma qualification. The results are presented at table 8.

Table 1. Independent Sample t-test on medical students' performance in preclinical courses with diploma and without.

Preclinical means	With Diploma	No Diploma	Levene's (a)		t-test for Equality of Means			Mean Difference	Std. Error Difference	95% (b)	
			F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**			**Lower**	**Upper**
MU [179]**	61.57	62.28	.156	.694	-.346	177	.730	-.730	2.044	-4.741	3.325
EU [93]**	63.36	63.07	.547	.461	.149	91	.882	.290	1.945	-3.574	4.155
Combined**	62.67	62.54	.555	.457	.097	270	.923	.131	1.357	-2.541	2.804

(a)Test for Equality of Variances
(b)Confidence Interval of the Difference
(c)** Equal variances assumed

The results in table 8 indicate that p-value are 0.730 (MU), 0.882 (EU) and 0.923 (Combined schools), at a significance of p≥0.05. These three *p* values are greater than .05, therefore null hypothesis for the three categories are accepted. Therefore, there is no statistically significant difference in performance in preclinical courses between medical students with previous diploma and those without in sores at MU, EU or at combined schools. So the study suggests that the relationship between students with diploma and without is not statistically significant in MU, EU or at combined schools scores. Any differences between their preclinical performances Means are due to chance and not likely due to

the differences in prior knowledge. The performance in preclinical courses is not directly related to either students having a diploma or not prior to admission.

2.3.9. Comparison of Medical Students' Performance in in Clinical Courses Between Those with KCSE and Diploma Qualifications

In determining the difference in performance in Clinical courses between medical students with and those without diploma, a t-test was used. The independent t-test was used to test the performance difference of medical students with and without diploma prior to admission in Clinical courses

means. The results are presented in Table 9.

Table 2. Independent-Samples t-test on Relationship between medical students' performance in Clinical courses with diploma and without.

Clinical Means Equal variances assumed	With Diploma	No Diploma	Levene's (a)		t-test for Equality of Means					95%(b)	
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
MU [179]	63.80	62.09	.653	.420	1.177	154	.241	1.707	1.450	-1.158	4.572
EU [93]	66.80	65.08	1.065	.305	.793	88	.430	1.725	2.176	-2.600	6.050
Combined	65.80	63.13	.031	.86	2.06	244	.040	2.68	1.30	.123	5.22

(a)Test for Equality of Variances (b) Confidence interval of the difference

The results in table 9 indicate p-value are 0.040 (Combined schools), 0.241 (MU) and 0.430 (EU) which is less than .05 for combined schools and greater than for MU and EU scores. The Null hypothesis is therefore rejected for combined schools scores. And it's accepted for MU and EU medical schools scores. Therefore, there is a statistically significant difference between performance in clinical courses between medical students with and those without a diploma qualification at admission in combined schools scores. Any differences between the combined schools' scores Means are likely not due to chance but due to the differences in prior knowledge. For MU and EU clinical scores, there are no statistically significant difference between performance in clinical courses between medical students with and those without a diploma qualification at admission.

3. Discussion

Specific objectives 1 of the study sought to determine the relationship between medical students' KCSE grade (s) and their performance in preclinical and clinical courses. Results in Table 1 indicate a Pearson's r value of-0.075 (MU),-0.094 (EU) and–0.055 (Combined schools). This is an indication of negative association for the three categories of MU, EU and combined schools, scores. This suggests as the KCSE grades increases the performance in preclinical courses decreases in MU EU and combined schools scores.

Further results indicate a p-value of 0.320 (MU), 0.420 (EU) and 0.382 (combined schools) which are greater than $p \geq .05$. Therefore the Null hypothesis for all the three categories (MU, EU and combined schools scores, scores) are accepted. Results indicate that there is no statistically significant correlation between KCSE admission grade and performance in Preclinical mean scores for MU, EU and combined schools scores. That means scores increase in students' KCSE admission grade variable do not significantly relate to changes in performance in Preclinical means.

This is contrary to [4] whose investigations on high school grades and preclinical scores that showed the high school grades were a better predictor of performance at preclinical MBBS examination. This is in support to [25] who in their investigation on analysis of high school grades that showed SSCE is a better predicator of students' performance at pre-clinical sciences examination than other criteria. The study

suggests that students' admission KCSE grades didn't predict performance in preclinical courses. The students with lower KCSE grades worked hard to attain the expected pass marks. Students with lower admission KCSE grades' Performance in preclinical courses was not any different with performance of others students of higher KCSE grades during admission.

Results in Table 2 indicate that Pearson's r value is 0.058 (combined schools) for relationship between KCSE grades and Clinical performance. This is a positive relationship between KCSE grades and Clinical performance. This therefore suggests that the better the students' KCSE grades the performance improves in clinical courses. Students with high KCSE grades perform better in clinical courses. But result indicates the relationship is negative at individual medical schools of MU and EU. This is in agreement with [29] in their study on Relationship between academic and clinical performance that found an existence of a relationship between student academic and clinical performance. Further results indicate p-value 0.387 (combined), 0.829 (MU) and 0.862 (EU). The *p* values are greater than $p \geq .05$. This indicates that the Medical Students' KCSE grade (s) have no statistically significant relationship with performance in clinical courses. The study suggests that students' performance in clinical courses is not determined by their KCSE grades at either combined school, MU or EU.

The results in table 3 indicate at combined medical school scores performance in English, and chemistry subjects have a positive relationship with performance in preclinical courses. The results suggest that high school KCSE grades in English and Chemistry positively impact on students preclinical performances. Further results in table 3 indicate for MU; English, Biology and Chemistry, while at EU Kiswahili and Mathematics having a positive relationship to preclinical performance.

Further result in table 3 indicate for MU English, Biology and Chemistry have a positive influence in preclinical performance, while at EU Kiswahili and Mathematics having a positive relationship to preclinical performance. So, specific subjects at admission have positive influence over students' performance in preclinical courses. This is in agreement with [13] in their study on Prediction of Preclinical Students' Performance that concluded that performance in one subject significantly correlated with the performance in the other subjects. This is in contrary to [14] who in the study on whether we can improve how we select medical students' shows that previous high school sciences

do not predict clinical performance, but English correlates with performance in clinical courses.

Further results in table 4 indicate that Unstandardized Coefficients (β) of English (β-.368) and physics (β of-.731), while Kiswahili (.095), mathematics (.438), Biology (.313) and chemistry (.830). The performance in Clinical courses is negatively correlated with KCSE grades in English and physics. The KCSE grades for Kiswahili, Biology, mathematics and chemistry positively relate with performance in clinical courses for combined scores. This is in support of [15] who in their investigation on Identifying best practice in the selection of medical students which indicates that academic criteria should be clear on which attributes are needed when admitting as the right basis for the student's selection into the medical school. The KCSE grade in Kiswahili has influence on clinical courses performance. Therefore for a better performance in clinical courses it's necessary for the students to have better KCSE grade in Biology, Kiswahili, mathematics and chemistry. While at MU subjects; Mathematics, Kiswahili and Chemistry had positive correlation to performance in clinical course, while results for EU mathematics, Kiswahili, Biology and Chemistry. Therefore KCSE subjects of Mathematics, Kiswahili, Biology and chemistry positively influence students' performance in clinical courses.

The results in table 5 indicate that Combined schools, MU and EU performance scores in preclinical courses has a positive correlation with scores in clinical courses. The Medical students' performance in preclinical courses correlated to the performance in clinical courses in combined schools, MU and EU scores.

The results in table 5 indicate that PPMCC (r) is .709[**] (Combined schools), .744 (MU), and .777 (EU). This result suggests that Medical students' performance in preclinical sciences is a predictor for performance in clinical sciences courses for combined schools, MU and EU scores. Those students who performed well in preclinical courses did well too in clinical courses. The performance of preclinical courses has a direct impact on the performance at clinical courses. Among other prerequisites for performance in clinical, the performance in preclinical courses at medical school is important. The result on MU and EU indicates Medical Biochemistry, Medical Physiology, and Pathology are predictors of performance in clinical courses. It is in agreement to [28] who in their investigation on Predicting performance found that Pre-clinical course GPA positively predicted performance in clinical courses. Therefore, at Preclinical courses assessment preparation of performance in clinical courses is necessary; the former is a prerequisite of the latter level. The preclinical courses are more cognitive based unlike the clinical level which in addition has more of motor and affective based courses. This is in supports of [27] who in their study on Correlation of admission criteria with performance suggested that Clinical performance is not generally predicted by pre-entry academic scores'.

Further results in table 5 indicate there is statistically significant relationship with performance in preclinical

courses and performance in clinical courses in all either MU, EU or at combined scores.

Though result in table 6 suggests no association between performances in individual pre-clinical course with clinical courses. Therefore performance in individual course could not solely predict performance in clinical courses. In preparation of tomorrow's doctor starting at junior levels the emphasis for better performance should start at preclinical courses. This agrees with [23] study on Prediction of Preclinical Students' Performance. The study concludes that performance in one subject significantly correlated with the performance in the other subjects. The preclinical courses are a prerequisite to clinical performance for training a medical doctor. A school can take remedial interventions at the preclinical level to avoid failures or poor performance in clinical courses.

Further the results in table 7 indicate that medical schools attended, gender and Preclinical means are statistically significant except Sponsorship, KCSE aggregate grade and Age. This is contrary with [16] who in his investigation on individual admission criteria as predictors on academic a performance showed that high-school grade being the most predictive. Also contradicts [15] who in her study on Validity of the MCAT for predicting medical school performance alluded that the MCAT is an indicator of academic preparation. The KCSE grade as predictor differs with [25] who in their study on Relationship between admission grades and Performances found that high school grade is a better predicator. But in support of [5] who in their study on ability of a medical school admission process to predict clinical performance found that admission ranking and interview process at this medical school did not predict clinical performance. This is also in contrary to [3] & [13] who in their investigations on Predictors of academic and clinical performance concluded that pre-admission academic grades were predictive to clinical performance. This is in agreement to [14] who in his study on whether we can improve how we select medical students indicates that age does predict clinical performance.

Results in Table 8 indicate that *p*-value s for combined schools' MU and EU is greater than *p*-value .05. So, result suggests that there is no statistical significance between Performance in Preclinical means of students with diploma and those without during admission for combined schools', MU and EU. Students with previous diploma do not perform any better than those without in pre-clinical courses. Therefore Preclinical performance is not related to whether students had a diploma or not at admission. Thus having a diploma can't guarantee better performance at preclinical courses. This is unlike findings by [16] investigation on individual admission criteria on academic a performance, he found that Prior academic achievement is highly reliable and moderately a valid indicator of the ability to assimilate the medical knowledge. However, [6] in their study on variable that predict preclinical performance found that type of undergraduate studies undertaken are the significant predictors with direct influence.

The results in table 9 for combined schools scores indicate p-value is less than p-value .05, which suggests that there is a

statistically significant difference between performance in clinical courses between medical students with previous diploma and those without (direct from high school). As indicated by [6] in their investigation on entry grade in Predicting Academic and Clinical Achievement a relationship exists since those students with a science degree perform better and do well in medicine. The differences between students with diploma and those without are due to the differences in prior knowledge gain at diploma course. This is in conformity with [2] in their study on Influence of Pre-Admission Tracks on Students' Academic Performance which indicates that understanding science is core to the understanding of medicine. But contrary at separate result of MU and EU which indicate there are no statistically significant difference between performance in clinical courses between medical students with and those without a diploma qualification at admission.

4. Summary, Conclusion and Recommendation

4.1. Summary of the Findings

The following is a summary of the major findings of the study:

There is no statistically significant relationship between Medical Students' KCSE grade(s) with performance in preclinical and clinical courses at MU, EU or Combined schools scores. KCSE aggregate grades at admission do not influence Students' performance in preclinical and clinical courses.

4.2. Conclusions

On the basis of the findings, the following conclusions are made:

A KCSE aggregate grade at admission has no influence on students' performance in preclinical and clinical courses at Moi and Egerton Universities. KCSE grades in English and Chemistry grades positively impact on students' preclinical performances. KCSE's Biology, Mathematics, Kiswahili and Chemistry positively influence performance in Clinical courses. Of interest is Kiswahili influence in performance in clinical courses. Emphasis is necessary for students to have better grades at admission. Prediction of performance at clinical courses can be at performance of Specific courses like Medical Biochemistry, Medical Physiology, and Pathology courses. The acquired knowledge and skills at diploma program does not influence in-service student's performance in preclinical courses as it does in clinical courses. This implies that its necessary subjecting the mature entry students to same curriculum in MBCHB program al preclinical level. So the practical clinical experience that in-service students have impacts to their performance in clinical courses. Student's KCSE grade, age, and performance in preclinical courses predict the performance in clinical courses.

4.3. Recommendations of the Study

In view of the above conclusions the following recommendations are made.

Medical schools should consider an open entry Examination for applicant who meet minimum cluster subjects requirements regardless of the KCSE aggregate grade. This will give wider opening to those interested into the career to sit for the Open entry examination. The cluster should emphasise on; English, Biology, Mathematics, Kiswahili and Chemistry. Considering that KCSE grades and sponsorship do not influence performance at preclinical and clinical courses. Also enhance Student support and guidance interventions appropriately at preclinical level to students whose performance indicate weakness at preclinical level. This will reduce further casualties in clinical performance level. This will caution them and boost their learning ability as it's predicted at this level.

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