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Medical Education

## Relationship between Admission Grades and Performances of Students in the First Professional Examination in a New Medical School

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### Abstract

In order to determine the relationship between the quality of Senior Secondary School Certificate Examination (SSCE) results, Joint Admissions and Matriculation Board organised Universities Matriculation Examination (JAMB-UME) scores, and student's academic performance at Lagos state University College of Medicine (LASUCOM), Nigeria, records of students admitted into the Medical School in 1998/99 were studied. Data transformations were completed and subsequently standardized. Standard descriptive statistics and correlation coefficient were used to determine the correlation between the variables. The results showed that there was no significant correlation between the SSCE and the JAMB scores. In addition, correlation between JAMB and the student performance at 100 level and pre-clinical sciences also proved to be non significant. These results indicate that SSCE is a better predictor of students' performance at pre-clinical sciences examination than JAMB Scores.

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### Key words:

Admission Process, JAMB, Pre-clinical sciences, Evaluation, Undergraduate

### INTRODUCTION

Decline in the performance of the students at the pre-clinical examinations in Nigeria and other countries has been previously reported by several authors (Olaleye and Salami 1997, Barbara and Syhia 2002, Adegoke and Moronha 2002). Some of the workers felt that the large number of students and the young age of the students are the major contributing factors to this high failure rate (Oyebola *et al* 1997). Others observed that the quality of teaching, disruptions of the academic calendar due to frequent Stay-at-home orders by labour unions (Bamgboye *et al* 2001, Nwoha 1992), inadequate facilities (Faisal and Annette 2001, Partrick *et al*, 2001), the validity of the SSCE, JAMB-UME scores, the entry admission procedures and class size are the major factors affecting students academic achievements in the pre-clinical examinations (Collins *et al* 1995, Ten Cate and Smal 2002).

Gibbs (1996) investigated the effect of the class size on the performances of the students in a University within a period of ten years. It was observed that students performance was inversely proportional to class size. This is one of the problems faced by the colleges of Medicine in Nigeria where class size has multiplied many fold in the recent years. This makes the admission process an important factor in student performance (Bamgboye *et al* 2001, Ayeni 1972, Grey *et al* 2001).

In our extensive search of the literature we could not find any work published in Nigeria on the validity and effectiveness of JAMB-UME Scores, and how UME plays a significant role in predicting medical students level of academic achievement at Pre-clinical Science examinations. Therefore, this paper addresses the issue with a view to providing empirical evidence towards finding a solution to the decline in performance of medical students, the extent to which Senior Secondary School

Certificate Examinations and /or Joint Matriculation Examination (JAMB-UME) scores and /or GPA in the first year in the University can predict performances in pre-clinical examination

Lagos State University College of Medicine is one of the new Medical Schools established in Nigeria. Admission into the Lagos State University Medical School is in two ways: through Higher School Certificate result or its equivalent (direct entry) and through Joint Admission Matriculation Board (JAMB) examination (confessional students). Successful candidates are admitted first into the Part1 (science) programme, where they receive lectures on Botany, Zoology, Biology, Chemistry and Physics, after which successful students proceed into the medical school and begin the medical school curriculum, starting with Anatomy, Biochemistry and Physiology. A Student is not allowed to proceed to the third year unless he scores 50% or above aggregate in the second year pre-clinical sciences. The pre-clinical science examination is internally conducted at the end of the 5<sup>th</sup> semester. Unsuccessful candidates who cannot meet the 50% cut off mark are either asked to repeat the class or to withdraw from the programme, depending on their performances. The effect of repeating or withdrawing from the Medical School as a result of poor performances causes a lot of psychological trauma on the students and their parents and a lot of concern to their lecturers.

## MATERIALS AND METHODS

Records of all students admitted into the Lagos State University Medical School in the 1998/1999 academic sessions were used as data in this study. 54 Students were admitted and their data were obtained from the Academic Record Office of the University's Medical School. Each students record contains detailed information on the personal characteristics, Secondary School Certificate Examination (SSCE) grades, scores at JAMB-UME, academic performances at the 100 Level examination and part 1, MBBS examination.

The student's grades in each of the five core subjects at the (SSCE) (English, mathematics, Chemistry, Physic and Biology ) were computed as indicator of quality of SSCE results. The maximum aggregate score attainable is 30 points for the worst student who would have scored C6 in each of the 5 subjects, and 5 points for the very best student, who could have scored A1 in all the five subjects. (Bambgoye et. al. 2001). The JAMB-UME scope was need for the selection of students into merit admissions and other admissions.

The data were processed on a personal computer using; Epi-info package 6.0 for data entry and statistical analysis. Frequency distribution and descriptive statistics were used

to summarize the data. The analysis of variance technique and the student ttest were used to access the effect of age, sex, quality of SSCE scores and the JAMB-UME scores on the performance of students at the 100 level examinations. The spearman correlation coefficient were used to determine the correlation between the SSCE, JAMB-UME scores, 100 Level examination results and pre-clinical sciences performance. All statistical tests were at the 5% probability level.

## RESULTS

The results of this study showed the personal characteristics of students admitted into the Medical School in 1998/1999 academic session (Table 1).

**Table 1**  
The Distribution of Students By Personal Characteristics

S/N	Characteristics	Frequency	%
1.	<b>Age</b>		
	15-17	4	7.4
	18-20	32	59.3
	21-25	18	33.3
2.	<b>Sex</b>		
	Female	34	63.0
	Male	20	37.0
3.	<b>UME score</b>		
	200-230	29	53.7
	>230	25	46.3

There were 54 students whose mean age on admission was 19.8 years with standard deviation (SD) of 2.0 years. The sex ratio (F: M) was 1.7, while all the students were from the southwest region of Nigeria. The maximum score obtainable in JAMB-UME was 264 and the students had a mean score of 229.4 with standard deviation of 5.2. All the students scored above the cut off point for merit admission for this group of students.

The results also showed the frequency distribution of the students by their grades in the secondary school certificate subjects (Table 2).The highest proportion of students (25.9%) had grade 1 in Chemistry, followed by Physics (18.5%) and Mathematics (14.8%). While the highest proportion of students (29.6%) had grade 6 in both English and Biology.

Table 3 shows the frequency distribution of the students by their scores at the 100 level examinations in Biology, Botany, Zoology, Chemistry and Physics and the pre-clinical sciences examinations in Anatomy, Biochemistry and Physiology. The mean scores in Biology was 66 (SD, 8.2) botany 67 (SD, 12.1), Zoology 63.9 (SD, 12.3) Chemistry 59(SD,.7.5) and Physics 57.9 (SD, 6.9). The distribution of the scores showed that the students did best in

Physics with 96.3% scoring at least 50% and the worst was chemistry 92.6% scoring 50% and above.

The performances of the students at the pre-clinical sciences indicated that Biochemistry recorded the best performances of 87.9% and highest failure was recorded in physiology 21.3%. In Anatomy, the mean was 55.4 (SD, 8.1), Biochemistry had a mean of 57.0 (SD, 8.8)

and Physiology mean score was 51.4 (SD, 5.9) (Pass mark for each subject is 50 marks).

The results of this study showed that students aged less than 19 at entry had a higher mean score in all the subjects compared to those aged 19 and above and the difference was statistically significant only in Biochemistry (Fig. 1).

**Table 2.**

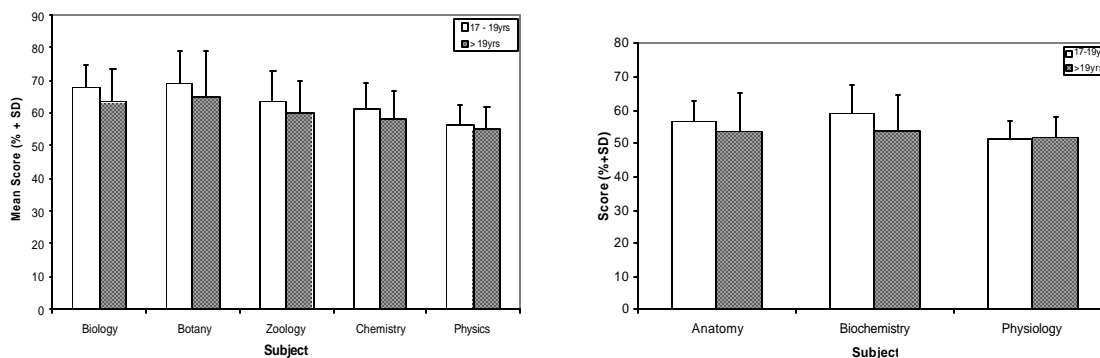
The Frequency Distribution of Student's Scores in Senior School Certificate Subjects.

Subject	Grades						Total
	1	2	3	4	5	6	
<b>English</b>	0 (0.0%)	2 (3.7%)	12 (22.2%)	9 (16.7%)	15 (27.8%)	16 (29.6%)	54 (100%)
<b>Mathematics</b>	8 (14.8%)	3 (5.6%)	21 (38.9%)	6 (11.1%)	9 (16.7%)	7 (13.0%)	54 (100%)
<b>Biology</b>	0 (0.0%)	4 (7.4%)	8 (14.8%)	13 (24.1%)	13 (24.1%)	16 (29.6%)	54 (100%)
<b>Chemistry</b>	14 (25.9%)	8 (14.8%)	15 (27.8%)	8 (14.8%)	2 (3.7%)	7 (13.0%)	54 (100%)
<b>Physics</b>	10 (18.5)	6 (11.1%)	22 (40.7%)	3 (5.6%)	9 (16.7%)	4 (7.4%)	54 (100%)

**Table 3.**

The distribution of student's scores at the examination at 100 Level and 200 Level

Subject	Grades				Total
	0-39	40-49	50-59	60-100	
<b>100 Level</b>					
Biology	0 (0.0%)	3 (5.6%)	7 (13.0 %)	44 (81.5%)	54 (100%)
Botany	2 (3.7%)	1 (1.9%)	10 (18.5%)	41 (75.9 %)	54 (100%)
Zoology	1 (1.9%)	2 (3.7%)	17 (31.5%)	34 (63.0 %)	54 (100%)
Chemistry	0 (0.0%)	4 (7.4%)	23 (42.6%)	27 (50.0%)	54 (100%)
Physics	0 (0.0%)	2 (3.7%)	39 (72.2%)	13 (24.1 %)	54 (100%)
<b>200 Level</b>					
Anatomy	5 (7.6%)	4 (6.1%)	40 (60.6%)	17 (25.8%)	66 (100%)
Biochemistry	7 (10.6%)	1 (1.5%)	32 (48.5%)	26 (39.4%)	66 (100%)
Physiology	3 (4.5%)	11 (16.7%)	49 (74.2%)	3 (4.5%)	66 (100%)



**Fig. 1:** The distribution of Student's scores at the 100 level (1a) and 200 level (1b) examinations by age Admission Grades and Student Performances in the First Professional Examination Medical School

**Table 4**  
Distribution of student's scores at 100 Level and 200 Level Examination by sex

Subject	Sex (n)	Mean score (%)
<b>100 Level</b>		
Biology	F (34)	66.3±8.4
	M (20)	64.9±9.3
Botany	F (34)	68.2±10.7*
	M (20)	65.3±14.3
Zoology	F (34)	62.5±8.2
	M (20)	60.9±10.4
Chemistry	F (34)	59.8±7.6
	M (20)	59.9±7.6
Physics	F (34)	54.7±5.6*
	M (20)	58.1±6.6
<b>200 Level</b>		
Anatomy	F (34)	53.3±9.4*
	M (20)	58.1±8.5
Biochemistry	F (34)	55.6±9.7
	M (20)	58.0±10.5
Physiology	F (34)	50.0±6.3*
	M (20)	54.1±3.9

Table 4 shows that in 100 level examinations, females performed relatively better than their male counterparts. At the pre-clinical sciences (200 level), the pattern was reversed in favour of males and the differences are significant only in Physiology ( $P<0.01$ )

The performances of the students at the 100 level and pre-clinical Sciences examination by aggregate SSCE scores were grouped as above average and average performance. The students with above average (score 5 – 15) had higher score in all the subjects either at 100 Level or pre-clinical sciences examination compared to those with average grade (score 16 – 30) except in physics where the average

student had a slightly lower mean score and all the differences were significant. (Table 6).

The performance of students at 100 level and pre-clinical sciences examinations by the JAMB – UME score classification. Student with a JAMB score at merit level 231 and above had insignificant higher at the 100 level examinations. (Table 7). At the pre-clinical examination these students still maintained higher score on the average except in Anatomy where other admission students had a mean score that is slightly above average than merit student, but the differences were not significant in both groups.

The correlation matrix between the JAMB scores, aggregate SSCE scores and the performance at 100 level and pre-clinical sciences examination are presented in Table 8. In all the subjects at the 100 level, aggregate SSCE scores were more correlated not the performances at the pre-clinical sciences than in JAMB scores. In addition, the SSCE aggregate score was not correlated not the JAMB scores. However, the JAMB score correlated only with the students' performance at Physiology ( $P<0.01$ ). (Table 8a).

## DISCUSSION

The nature of the medical profession requires that future doctors have certain basic skills and abilities. Methods for measuring those attributes are therefore needed when admitting students into the medical school. The students are admitted into first year 100 Level on the basis of their performance in the national examination conducted by JAMB -UME.

**Table 6.**  
Summary statistics of the scores at 100 Level and 200 Level Examination by quality of their SSCE result

Subject	SSCE	Summary statistics			
		Mean	SD	N	P value
<b>100 Level</b>					
Biology	5-15	67.7	7.5	17	0.26
	16-30	64.8	9.2	37	
Botany	5-15	69.8	10.1	17	0.28
	16-30	65.9	12.9	37	
Zoology	5-15	61.7	7.8	17	0.95
	16-30	61.9	9.7	37	
Chemistry	5-15	60.4	7.0	17	0.70
	16-30	59.5	7.8	37	
Physics	5-15	54.7	6.4	17	0.29
	16-30	56.6	6.0	37	
<b>200 Level</b>					
Anatomy	5-15	57.1	7.9	17	0.28
	16-30	54.2	9.9	37	
Biochemistry	5-15	57.9	8.8	17	0.47
	16-30	55.8	10.5	37	
Physiology	5-15	52.4	4.7	17	0.46
	16-30	51.1	6.3	37	

**Table 7.**  
Summary statistics by the quality of their UME score

Subject	UME	Summary statistics			
		Mean	SD	N	P value
<b>100 Level</b>					
Biology	205-230	64.2	9.7	29	0.16
	231-264	67.5	7.2	25	
Botany	205-230	65.4	13.6	29	0.28
	231-264	69.1	10.0	25	
Zoology	205-230	60.9	10.1	29	0.42
	231-264	62.9	7.6	25	
Chemistry	205-230	59.3	7.3	29	0.61
	231-264	60.4	7.9	25	
Physics	205-230	55.7	6.1	29	0.73
	231-264	56.3	6.3	25	
<b>200 Level</b>					
Anatomy	205-230	56.4	9.6	29	0.27
	231-264	53.6	8.9	25	
Biochemistry	205-230	56.6	10.7	29	0.93
	231-264	56.4	9.1	25	
Physiology	205-230	51.1	6.1	29	0.53
	231-264	52.1	5.5	25	

**Table 8.**  
Correlation matrix of SSCE, UME, 100 Level and 200 Level Performances at examination correlations

	ANAT	BIOCHEM	BIOL	BOT	CHEM	JAMB	PHYSICS	PHYSIOL	SSCE	ZOO
ANAT	1.000	.663	.457	.517	.540	-.286	.212	.625	-.254	.452
BIOCHEM		1.000	.489	.589	.610	-.190	.384	.665	-.468	.519
BIOL			1.000	.536	.645	-.070	.105	.420	-.364	.545
BOT				1.000	.670	-.092	.412	.506	-.331	.612
CHEM					1.000	-.122	-.295	.523	.488	.706
JAMB						1.000	.029	.018	.107	-.095
PHYSICS							1.000	.291	-.356	.228
PHYSIOL								1.000	-.336	.440
SSCE									1.000	-.518
ZOO										1.000
<b>Significance (P value)</b>										
	ANAT	BIOCHEM	BIOL	BOT	CHEM	JAMB	PHYSICS	PHYSIOL	SSCE	ZOO
ANAT		.000	.001	.000	.000	-.046	.143	.000	-.078	.001
BIOCHEM			.000	.000	.000	.191	.006	.000	.001	.000
BIOL				.000	.000	.635	.473	.003	.010	.000
BOT					.000	.528	.003	.000	.020	.000
CHEM						.404	.040	.000	.000	.000
JAMB							.845	.905	.463	.515
PHYSICS								.042	.012	.115
PHYSIOL									.018	.002
SSCE										.000
ZOO										

We considered the first year students appropriate group to study because differences in performance are usually more noticeable early in the course than in the final year. This is because of the "survival effect", which manifests as students progress to the final year. The result of this study can therefore be regarded as preliminary to a larger study of students in the next few years.

The results of this study showed that the majority of the students were below 20 years of age and the younger students performed better than older. Previous studies shows that the older students poor performance were attributed to financial problems and family responsibilities which cause major stresses that impact on course performances and can lead to withdrawal (El Mouzan *et al* 1991)

The present study also suggests a gender difference in favour of female and their performance at first year examination were better than their male counterparts. However the males' performances at the pre-clinical sciences examination were better than that of the females. The sex differentials in performance of the student were not significant. This observation is similar to the results of previous studies, which suggested that sex was not significantly related to academic performance (Jaffreys *et al* 1965, Susec-Michieli and Kalsnik 1983). Our observation in performances between the two sexes may be due to cultural influence. Also the positive attitude of the society to female education may be responsible for the better performances of the female than male students. (Bamgboye *et al* 2001)

The students' performances were significantly better in all the subjects at the 100 Level but are unable to maintain the average performances at the pre-clinical sciences examinations. This is consistent with findings from previous studies, which have reported that the students admitted on merit performed well in all the subjects at the first year but were unable to maintain the advantage at the pre-clinical sciences examination (Huff *et al.* 1999, Shazali *et al* 1997). The reason for this is not clear. The Correlation between the JAMB-UME scores and the performances at the 100 Level examinations in most of the subjects is between 0.3-0.4, which is similar to the results of other investigators (Shazali *et al* 1997).

The results of this study therefore suggest that the SSCE is better correlated with 100 level and pre-clinical sciences examination than JAMB-UME scores. The better correlation of the aggregate SSCE with the 100 level and pre-clinical examination than the JAMB score runs against the study that was conducted in Arabian Gulf in which the MCAT/overall score was a better predictor of the student performance (El-Mouzan *et al*, 1991). Several factors could be responsible for the difference including organisation of the examination and societal morality.

We suggest that each Medical School develops a system that suits its situation, including the type of students it wishes to admit, the characteristics of the community from which applicants may likely have impact. Therefore, the admission selection criteria may predict the performance of their students during pre-clinical and clinical years.

In conclusion, the SSCE scores are a better predictor of performance at pre-clinical examination than the JAMB scores. More attention needs to be given to SSCE results, and the real value of JAMB-UME will be determined by future investigations, including its predictive value in relation to the students' final year

examination results, or even better with their early performance as medical professionals.

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