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Predictors of Students' Performance in Nursing and Midwifery Technician Licensure Examination in Southern Malawi

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Abstract

Introduction

Success in the nursing and midwifery licensure examination is the only legal prerequisite to practice as a nurse and midwife in Malawi. However, the past decade has registered poor performance of students in Nursing and Midwifery Technician (NMT) licensure examinations for candidates who failed on the first attempt. The study sought to unravel whether students' socio-demographic and academic characteristics could predict NMT licensure examination performance on the first attempt.

Methods

We conducted a quantitative ex post facto using stratified random sampling. We reviewed 280 former NMT licensure exam candidate records from 2013 to 2017 with a study population of 2,668 NMTs. We reported descriptive statistics and used Chi-square / Fisher's exact test and logistic regression to determine the significance of associations and predictors respectively.

Results

We found that the NMT licensure examination could be predicted by students' academic characteristics, especially entry Malawi School Certificate of Education (MSCE) point scores [p < 0.001, OR 0.830, 95% CI (0.771-0.892)], and exit college final scores [p < 0.001, OR 1.214, 95% CI (1.131-1.303)]. We established that students' socio-demographic characteristics like age [χ2 (2, N =280) =13.143, p < 0.001], and marital status [χ2 (1, N = 280) = 5.645, p = 0.018] were significantly associated with NMT licensure examination performance but were not predictors of NMT licensure examination outcome. Furthermore, we did not find any association between NMT licensure examination performance and the sex of the students [χ2 (1, N = 280) = 0.523, p = 0.470].

Conclusion

NMT licensure examinations performance predictors are academic variables like entry MSCE and exit college final scores. Consequently, teaching institutions should frame relevant admission criteria, and timely support the students at risk of failure in licensure exams.

Key Words: Academic characteristics, Socio-demographics, Performance, Licensure examination, Nursing, and Midwifery Technician.

Introduction

Nurses and midwives form the largest workforce in the healthcare system in Malawi[1]. They are directly involved in providing patient care and make critical decisions that strongly influence patient outcomes[2]. Qualified nurses and midwives have knowledge and skills, which are essential in ensuring patients' safety and provision of high-quality care[3]. Thus, Malawi must have adequate well-qualified nurses and midwives. Nurses and Midwives Council of Malawi regulations stipulate that nurses and midwives sit for licensure examinations before practicing in various clinical settings after college. This aims to confirm they are competent and safe to practice nursing and midwifery. Success in the nursing and midwifery licensure examination is the only legal prerequisite to practice as a nurse and midwife in Malawi[4]. However, an effort to ensure quality training of nurses and midwives appeared to be threatened in the past decade by significant failure rates in Malawian nursing and midwifery training institutions[5,6,7,8]. The past decade registered poor performance of students in NMT licensure examinations despite the government and other stakeholders instituting strategies to ensure high-quality training for nurses and midwives[5,6,7,8]. Because of the value placed on success in NMT licensure examinations for both students and the program, it is significant for nurse educators to determine predictors of success in the licensure examinations[9,10]. Therefore, we conducted this study to determine whether students' socio-demographic and academic characteristics could predict NMT licensure examination performance in Malawi, especially on the first attempt.

Methods

Study design and Setting

We conducted a quantitative ex post facto design where we analyzed students' records from six Christian Health Association of Malawi (CHAM) colleges in southern Malawi. The colleges included were; St Luke's College of Nursing, Holy Family College of Nursing, St Joseph College of nursing, Mulanje College of Nursing, Malamulo College of Health Sciences, and Trinity College of Nursing. We selected these colleges based on their low students' performance in NMT licensure examinations over the past decade.

Additionally, they offer an NMT diploma program using a prescribed core curriculum by the Nurses and Midwives Council of Malawi.

Sample size and sampling methods

We targeted all NMT students who wrote licensure examinations between 2013 and 2017 from these colleges in southern Malawi (N=2,668). Using the Cochran[11] formula,

$$n = \frac{Z^2 p(1-p)}{d^2}$$

where Z is the standard normal variate (5% type 1 error (p < 0.05) is 1.96) : p is the proportion of students who failed exams, in our study, we calculated the average failure rate for the past decade from 2008 to 2017 which was 21.6% and lastly, d is the absolute error decided by the researcher, in this assessment, it was decided at 0.05. We sampled 280 records and extracted 56 records per college (stratum) from 2013 to 2017. By simple random sampling, we selected records per stratum. The inclusion criteria included records for NMT students who wrote licensure examinations between 2013 and 2017 from six CHAM nursing colleges in southern Malawi. The exclusion criteria included records for NMT students who wrote licensure examinations before 2013 and after 2017.

Ethical review and approval

We obtained ethical approval from the College of Medicine Research and Ethics Committee (COMREC, P.03/19/2616), a review board for Kamuzu University of Health Sciences (KUHES). Furthermore, we obtained permission from the CHAM secretariat and the respective CHAM colleges. The students' identities and their data were anonymized using codes and kept confidential using a computer with password protection.

Data Collection

Data were extracted from the former student's college records using a records analysis form. We adapted and modify the form to record socio-demographic characteristics, entry Malawi School Certificate of Education (MSCE) scores, program outcome performance in college, and NMT licensure examinations. The form was previously used in a similar study in the United States of America[12]. To ascertain the validity of the records analysis form, the items included were derived from relevant literature and guided by the research objectives. Furthermore, content validity was ensured through experts in nursing education who adequately reviewed confirming it met the minimum recommended standard[13]. Face validity was achieved by pre-testing at Malawi College of Health Sciences, Zomba campus, to ensure that records analysis form reliability captured the required information. To ensure privacy, each candidate's records were assigned a code. We hired two research assistants who abstracted the data from the records into the form and quality checks were done every day by the researchers.

Data Analysis

Data was entered in Statistical Package for the Social Sciences (SPSS) version 26 database where we cleaned and analyzed the data. We used descriptive statistics specifically counts, percentages, mode, mean, and standard deviation to characterize the study sample population and bivariate statistics (Chi-square/fisher's exact test) to access the relationship between independent variables: sex categorized as male or female, age categorized to those 20 years and below, 21 to 30 years and those above 30 years. Marital status at the start of the NMT course work categorized as single or married. Entry MSCE scores categorized as 20 points and below, 21 to 30 points, and those with above 30 points, and lastly exit college final scores were categorized as 60 percent and below, 61 to 75 percent, and those with over 75 percent. The dependent variable was the NMT licensure examination outcome categorized as passed or failed. We further used bivariate and multivariate logistic regression analysis to determine predictors for NMT licensure examination performance controlling for covariates. We considered a p-value of < 0.05 to be statistically significant and also reported 95% confidence intervals.

Results

Demographic characteristics of the study participants

We reviewed a total of 280 students' records from six CHAM colleges in the southern region of Malawi. Over half (n=165, 58.9%) of the records belonged to female students. The age of students ranged from 16 to 39 years (mean 22.0±4.327). The majority of the student were single (n= 232, 82.9%) at the start of NMT coursework and the entry MSCE point scores of the students ranged from 16 to 39 (mean 28.1±4.381) with over-thirds ((n=185, 66.1%) in the group of 21 to 30 points. The students' exit college final scores ranged from 48% to 85% (mean 64.6±5.479). However, over two–thirds (n=206, 73.6%) of the students were in the 61% to 75% as a modal class compared to only 2.1% (n=6) who scored above 75%.

Table 1: Background Characteristics of the Subjects (n=280)

Parameters	Percentage (n)
Student Sex	
Female	58.9 (165)
Male	41.1 (115)
Age Categories	
20 years & below	43.9 (123)
21 to 30 years	50.7 (142)
Above 30 years	5.4 (15)
Marital status	
Married	17.1 (48)
Single	82.9 (232)
MSCE point scores categories	
20 points & below	3.2 (9)
21 to 30 points	66.1 (185)
Above 30 points	30.7 (86)
College Final scores categories	
60 percent & below	24.3 (68)
61 to 75 percent	73.6 (206)
Above 75 percent	1.1 (6)

Table 2: Relationship between NMT Licensure Examination Outcome and Variables

Parameter	Pass Percentage (n)	Fail Percentage (n)	Total Percentage (n)	Fisher's Exact Test / Chi-square test	
				χ2	P-value
Age in categories					
20 years & below	74.0 (91)	26.0 (32)	43.9 (123)		
21 to 30 years	64.8 (92)	35.2 (50)	50.7 (142)	13.14	*0.001
Above 30 years	26.7 (4)	73.3 (11)	5.4 (15)		
Total	**66.8 (187)**	**33.2 (93)**	**100.0 (280)**		
Students Sex					
Female	68.5 (113)	31.5 (52)	58.9 (165)		
Male	64.3 (74)	35.7 (41)	41.1 (115)	0.523	0.47
Total	**66.8 (187)**	**33.2 (93)**	**100.0 (280)**		
Marital Status					
Married	52.1(25)	47.9 (23)	17.1 (48)		
Single	69.8 (162)	30.2 (70)	82.9 (232)	5.645	0.018*
Total	**66.8 (187)**	**33.2 (93)**	**100.0 (280)**		
Entry MSCE score					
20 points & below	100.0 (9)	0.0 (0)	3.2 (9)		
21 to 30 points	76.2 (142)	23.2 (43)	66.1 (185)	35.73	<0.001*
Above 30 points	41.9 (36)	58.1 (50)	30.7 (86)		
Total	**66.8 (187)**	**33.2 (93)**	**100.0 (280)**		
College Final score					
60 percent & below	39.7 (27)	60.3 (41)	24.3 (68)		
61 to 75 percent	74.8 (154)	25.2 (52)	73.6 (206)	29.65	<0.001*
Above 75 percent	100.0 (6)	0.0 (0)	2.1 (6)		
Total	**66.8 (187)**	**33.2 (93)**	**100.0 (280)**		

We found a significant association between age categories and NMT licensure examination performance [χ2 (2, N=280) =13.143, p<0.001]. Close to three-quarters (n=91, 74.0%) of the student aged 20 years and below passed the NMT licensure examination on the first attempt. For the older students (above 30 years), 73.3% (n=11) failed the NMT licensure examination on their first attempt. We found no statistically significant association between sex and NMT licensure examination outcome [χ2 (1, N=280) =0.523, p-value =0.470]. Thirty-five percent (n=41) of the male students failed the NMT licensure examination compared to 31.5% (n=52) of female students.

On marital status, we observed a significant association with NMT licensure examination [χ2 (1, N=280) =5.645, p =0.018]. Sixty-nine percent (n=162) of the single students passed on the NMT licensure examination on the first attempt compared to 52.1% (n=25) married students. We found a significant association between entry MSCE point scores and NMT licensure examination performance [χ2 (2, N=280) =35.729, p<0.001]. None of the nine students who scored 20 points and below failed the exam on the first attempt. It was further observed that 76.2% (n=142) of the students with entry points between 21 and 30 passed the NMT licensure examination on their first sitting, whilst 58.1% (n=50) of the students with entry points above 30 failed the NMT licensure examination on their first sitting.

We observed a statistically significant association between exit college final exam scores and NMT licensure examination performance [χ2 (2, N=280) =29.645, p<0.001]. Six students who had exited college with final examination scores above 75% passed the NMT licensure examination on the first attempt. Furthermore, the study results illustrate that a large proportion, 60.3% (n=41) of the students who scored below 60% failed the NMT licensure examination on the first attempt.

Logistic Regression Analysis of NMT Licensure Performance and other Variables

Table 3 below displays analyses run to determine predictors for NMT licensure examinations performance. Based on the results, entry MSCE point scores [p-value < 0.001, OR 0.830, 95% CI (0.771-0.892)], and exit college final scores [p-value < 0.001, OR 1.214, 95% CI (1.131-1.303)] were significant predictors of NMT licensure examinations performance. The results indicated that entry MSCE point scores were a strong predictor variable of NMT licensure examinations performance [p-value < 0.001, OR 0.830, 95% CI (0.771-0.892)] in the presence of other variables. The results showed that as entry MSCE points increased by one unit (one point), the chances of passing the NMT licensure examinations decreased by 17.0%. This was coherent with the bivariate analysis results, which showed an inverse association pattern,

Table 3: Multiple Logistic Regression of Demographic and Academic Variables on NMT Licensure Examination Performance

	Unadjusted		Adjusted	
	OR (95%CI)	P value	OR(95%CI)	P value
Sex				
Male	Reference			
Female	0.831[0.502-1.374]	0.470	-	-
Age in Years	0.904[0.853-0.959]	<0.001*	0.958[0.883-1.038]	0.292
Marital Status				
Single	Reference			
Married	2.129[1.132-4.005]	0.019*	1.705[0.665-4.373]	0.267
Entry MSCE point scores	0.818[0.764-0.877]	<0.001*	0.830[0.771-0.892]	<0.001*
Exit College final scores	1.199[1.127-1.275]	<0.001*	1.214[1.131-1.303]	<0.001*

P < 0.05 *Significant findings

such that as MSCE points increased, the percentage pass rate in NMT licensure examinations alternatively decreased (100.0% to 41.9%). Another significant academic predictor variable of NMT licensure performance was exit college final scores [p-value < 0.001, OR 1.214, 95% CI (1.131-1.303)].

The odds ratio showed that as student exit college final scores increased by one unit (one mark), a student had 1.214 times the chance of passing NMT licensure examinations on the first attempt. The results were consistent with the bivariate analysis, which showed a direct association pattern between exit college final scores, and NMT licensure pass rate such that as the exit college final scores increased, the percentage pass rate in NMT licensure examinations increased respectively (39.7% to 100.0%).

Discussion

Nursing and midwifery education should be taken as an important aspect of healthcare provision, by ensuring the recruitment of the right candidates to undertake the right training to provide the necessary healthcare[10]. This study determined predictors of performance in NMT licensure examinations. The results suggest that student performance in NMT licensure examinations could be predicted by students' academic characteristics, especially entry MSCE point scores. The results showed that as entry MSCE points increased by one unit (one point), the chances of passing the NMT licensure examinations decreased by 17.0%. This was coherent with the bivariate analysis results, which showed an inverse association pattern, such that as MSCE points increased, the percentage of pass rate in NMT licensure examinations alternatively decreased (100.0% to 41.9%). Literature from related studies suggests that pre-entry qualification was an important benchmark for success in nursing schools[14,15]. In a related study, Truman discovered that students who passed the National Council Licensure Examination-Registered Nurse (NCLEX-RN) possessed statistically higher pre-admission Grade-Point Average (GPAs) (p=0.011) and Scholastic Aptitude Test (SAT) verbal scores (p=0.009), than those who failed[13]. Similarly, Doe

et al,[16] established an association between entry grades obtained in the West African Senior School Certificate Examination (WASSCE) and performance in the licensure examinations. It was discovered that 45.5 % of students with an entry aggregate between 20 and 24 failed licensure examinations, while the majority (76.9%) with an entry aggregate of 11-14 passed the examinations on the first sitting. Chi-square statistics indicated that the higher the grade point a student attained, the better performance he or she achieved in licensure examinations[16]. The results from this study suggest program entry qualification especially MSCE performance plays an important role in determining the students' success in the NMT licensure examinations. Nursing programs often utilize a standardized exit exam score to assess students' readiness for the nursing licensure examinations and to plan for remediation steps to improve pass rates[14]. This study established that exit college final scores were another significant academic predictor of NMT licensure examinations performance. The odds ratio showed that as student exit college final scores increased by one unit (one mark), a student had 1.214 times chances of passing NMT licensure examinations on the first attempt. Further, these results were consistent with the bivariate analysis, which showed a direct association pattern between exit college final scores, and NMT licensure examination pass rate. As the exit college final scores increased, the percentage pass rate in NMT licensure examinations increased respectively (39.7% to 100.0%). In a related study in the United States of America, Mitchell[15], discovered that a combination of nursing program academic outcomes predicted NCLEX-RN performance. Similarly, Doe et al[16] in their study found that performance in the licensure examinations seemed to increase with an increase in Final Grade Point Average (FGPA). There was a positive relationship between the final grade point of students and licensure examinations outcome at a 0.05 confidence level. The study revealed that only 5 % of students with a Final Grade Point Average (FGPA) between 3.6 and 4.0 failed the licensure examinations whilst the majority of students (83 %) with a Final GPA of 1.5 to 1.9 failed the examination on the first attempt[16]. Furthermore, Amankwah etal[10], also established that college final Cumulative Grade-Point-Average (CGPA) had a strong positive relationship with performance in licensure examinations (AOR = 15.27; 95% CI = 6.28, 27.11). They concluded that students' college final CGPA could be a good predictor of performance in the licensure examinations. Consequently, results from this study demonstrate that exit college final scores could predict the outcome of NMT licensure examinations.

The current study results may have been affected by some methodological limitations. The study only examined data of students who graduated successfully from the program by taking the exit college final examination and then completing the NMT licensure examination. Students who were not successful in the exit college final examination were not included in this database, as they did not sit for licensure examinations, and this should be taken as a study limitation

when considering these results.

Conclusion

The study confirmed that NMT licensure examination performance predictors are academic variables like entry MSCE scores and exit college final scores. We observed that students with lower entry MSCE points and higher exit college final scores tend to perform better in NMT licensure examinations and vice versa. Therefore we suggest that students should receive more support earlier in their academic careers right away from secondary school to prepare them for nursing, midwifery, and other professions. Furthermore, we propose nursing and midwifery education institutions to constantly analyze valid predictors of academic performance in their colleges. Lastly, colleges should formulate relevant admission criteria, then timely recognize and intervene in students who are at risk of failure through the provision of needed support to increase their chances of success in NMT licensure examinations.

Acknowledgments

Conflict of interests

The authors declare that they have no competing interests.

Authors' contributions

MGM carried out the study starting from conception, analysis, and interpretation of data and reviewing the manuscript. AM participated in reviewing, data analysis, drafting, and commenting on the manuscript. All authors read and approved the final draft of the manuscript.

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