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Academic Performance and its Associated factors Among Medical Graduates Who Took Licensure Exam in Amhara Region, North West Ethiopia

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**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH**

**ACADEMIC PERFORMANCE AND ITS ASSOCIATED FACTORS
AMONG MEDICAL GRADUATES WHO TOOK LICENSURE EXAM IN
AMHARA REGION, NORTH WEST ETHIOPIA**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF HEALTH SYSTEM
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COLLEGE OF MEDICINE AND HEALTH SCIENCES BAHIR DAR UNIVERSITY
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MASTERS IN HEALTH SYSTEM AND PROJECT MANAGEMENT.**

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Bahir Dar University
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Full title of the proposal	Academic Performance and Its Associated Factors among Medical Graduates Who Took Licensure Exam In Amhara Region, Northwest Ethiopia
Duration of the study	September 2021 to July 2022
Study area	Northwest Ethiopia

Declaration

I, the undersigned, declare that the thesis comprises my work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged.

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Abstract

Background: Effective educational strategies, like delivering licensure exams after graduation, necessitate focusing on factors to maximize the academic performance of the students to improve the quality of pre-service education. But in Ethiopia, implementing this program will be difficult due to there being no data on medical graduates' academic performance on licensure exams and its associated factors. So to overcome this, the current study aimed to assess the academic performance of medical graduates on licensure exams and its associated factor.

Objective: - To assess academic performance and its associated factors among medical student graduates who took the national licensure exam in medical schools found in Amhara, North West Ethiopia.

Methods: Institution-based cross-sectional study was conducted among 1051 medical graduates from September 2019- September 2021 in medical schools found in the Amhara region of Northwest Ethiopia. The study participants were chosen using a cluster sampling technique. The data were collected from secondary sources at the Ministry of Health and medical schools using a structured checklist, and the analysis was performed using SPSS Version 23 software. A binary logistic regression analysis with a 95% confidence interval was also performed to identify factors associated with graduate academic performance on the licensure exam.

Results: The passing rate of medical graduates during the study period was 91.4%. Multiple logistic regression analysis revealed that age with AOR 0.63; 95 % CI: 0.52, 0.76, gender with AOR 0.39; 95 % CI : 0.22, 0.69, year of graduation with AOR 0.31; 95% CI :0.17, 0.60, repeating during internship with AOR 2.41; 95 % CI: 1.40, 4.17, repeating academic year with AOR 2.01; 95 % CI: 1.14, 3.56 and medical school seniority with AOR 0.06 95% CI : 0.01, 0.40, were factors that were significantly related to a graduate's academic performance on the licensure exam.

Conclusion and recommendations: During the study period, the passing rate of medical graduates was fair, which was associated with the age, gender, curriculum being implemented, and having academic as well as internship repeats. As result, policymakers should scale up work on curriculum and student education in class and during internships to improve the quality of medical graduates.

Keywords: Academic performance; Licensure examination; competency-based curriculum; Ethiopia.

Abbreviations

CBME	Competency-Based Medical Education
CGPA	Cumulative Grade Point Average
MoH	Ministry of Health
NIME	New Innovative Medical Education
SPSS	Statistical Package for Social Science
USA	United States of America
USMLE	United States Medical Licensing Examination
WHO	World Health Organization

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1. Introduction

2.2 Background

The term "quality of medical education" can mean different things to different stakeholders. It is defined as "the state of meeting required standards as prescribed by external agencies consistently." (1) Though medical students and doctors get benefit most from high-quality medical education, it is also important for our patients. That is why a recent Commonwealth Fund Task Force report emphasized, that "the quality of care that the public receives is determined to some extent by the quality of medical education students and residents receive (2, 3)

The primary goal of pre-service medical education is to train and produce physicians who will meet the needs and expectations of patients and society (4). Due to this, high-quality care for patients needs necessary education qualifications, good training, and ongoing professional development(5). Keeping this in mind, different countries apply for licensure exams before the graduates are going to start service to identify persons who possess the minimum knowledge and experience necessary to perform tasks on the job safely and competently(6).

Ethiopia has 28 public medical schools and six private medical schools, with six public and one private school located in the Amhara region of Northwest Ethiopia. The 13 public and six private medical colleges use the traditional medical curriculum. The other 13 public medical schools use the new Innovative Medical Curriculum. The rest two public medical schools, St Paul's Hospital Millennium Medical College use the integrated curriculum and Deber Tabor medical school uses the hybrid problem-based and competency-based curriculum (7).

In previous times, medical education uses the subject-centered curriculum which is the most widespread model for medical education. It generally includes 2-4 years of didactic instruction in basic and preclinical science followed by several years of instruction in the clinical disciplines, including varying amounts of practical work. The core concept in such a teacher-center education is to attain a strong knowledge base with little attention toward training in the application and development of clinical as well as soft skills(4, 8).

Due to the drawback of the structured traditional curriculum, many stakeholders, including academic accreditation organizations, employers, and academic institutions, desire to find a way to define and

assess students' attainment of educational outcomes and competencies related to their academic programs (9). Due to these attempts, competency-based education (CBE) has become widespread in recent years, even though it had begun in adult-focused degree programs during the 1970s in the United States (10, 11).

The idea of Competency-based medical education (CBME) was first introduced by Mc Gahie in 1978 in the United States. Competency-based differs from the subject-centered traditional models in 3 fundamental ways. "First, such a curriculum is organized around functions (or competencies) required for the practice of a specified setting. Secondly, it is grounded in the empirically validated principle that students of the intellectual quality found in medical schools, when given appropriate instruction, can all master the prescribed basic performance objectives. Thirdly, it views Education as an experiment where both the processes of student learning and the techniques used to produce learning, are regarded as hypotheses subject to testing"(8).

Although the pilot study started in 2008 as New Innovative Medical Education Initiative in Ethiopia(12), the initial competency-based integrated curriculum was developed In 2015. The curriculum was produced following a Can-Med competency model where the graduate profile (Educational outcomes) is categorized into 7 major physicians' competencies which include medical expert, professional, leader, communicator, collaborator, health advocator, and scholar(13). CaNMEDS is a framework that identifies and describes the abilities physicians require to effectively meet the health care needs of the people they serve. These abilities are grouped thematically under seven roles(14).



Figure 1:-CaNMEDS framework(14)

2.3 The statement of the problem

Medical education, particularly undergraduate medical education, is currently facing both internal and external challenges around the world. Some of the global challenges confronting medical education include a focus on disease to the exclusion of behavior, inpatient versus outpatient education, and the implications of a faculty whose research is highly focused at the molecular or sub-molecular level, exponential growth in knowledge, associated technologic ("disruptive") innovations, and societal changes that necessitate a spiral-model format for a medical education curriculum based on disease mechanisms (15, 16).

There is evidence that medical trainees' academic performance in history-taking and physical examination skills has deteriorated significantly over the last 20 years. This could be explained by evidence of students' poor interviewing skills, which are critical to problem detection and diagnosis accuracy. Medical students frequently require additional guidance and training in identifying the most important components of the history and physical exam. This can be accomplished through the use of clinical reasoning exercises, small group workshops with real or virtual patients, and feedback and discussion (17, 18).

However, most African medical education curricula were adopted from the West to achieve comparable training standards; major global pedagogical shifts in medical education to improve academic performance and graduate quality have occurred over the last half-century without Africa keeping pace. Some of the issues of concern for Africa and its ability to keep up in the dynamic world of medical education are socioeconomic and political instability, failure to rapidly change the old curriculum with a more problem, system, and student-based one, and redefining the goals of medical education (19).

Despite public health being a national priority and improvements in maternal and child health, Ethiopia's health outcomes are still regarded as being subpar due to the country's severe doctor shortage and poor quality medical education which leads to the poor academic performance of our graduates (20, 21). In addition to the shortage of medical doctors like in other sub-Saharan African countries, there are also challenges Ethiopia is facing to deliver quality medical education which has an impact on the academic performance of the students. Some of these challenges include the flooding policy of medical doctors, infrastructure, and late changing the curriculum to the new problem-based and student-centered learning methods (22, 23).

All these challenges to academic performance will result in decreased quality of care that the medical graduates are delivering. The decline in the quality of medical education resulted in the exclusion of medical schools from annual international rankings, a loss of confidence in medical universities, a loss of confidence in graduate doctors, and a further decline in medical services. Currently, there is an agreement to reduce the Academic performance of medical graduates and the quality of medical education, which results in a large proportion of young medical graduates who lack communication skills, have a poor grasp of clinical logic, are unsure about which diagnostic tests to use, make poor treatment decisions, and have a poor grasp of ethical principles (24, 25).

Effective educational strategies in Ethiopia, as elsewhere, necessitate focusing on factors to maximize the academic performance of the students. However, because Ethiopia is a developing country, implementing this program will be difficult due to a lack of data on academic performance and its associated factors; especially no data on medicine graduates' academic performance on licensure exams and its associated factor. Aside from detecting academic performance, scientific evidence is insufficient to determine whether a variety of curriculum change that has been implemented in Ethiopia brings change to the academic performance of students. To overcome this visible literature gap in the area, the current study aimed to assess the academic performance of medical graduates and its associated factor in selected medical schools found in Amhara region universities.

2.4 Significance of The Study

Since the licensure exam starts recently in our country this study aimed to assess Academic Performance and its associated factors among medical student graduates who took the national licensure exam it is useful to assess the quality of our medical education and can be used as feedback for the medical schools in our country. And also these results and feedback can contribute to policymakers working on medical education.

On the other hand, the study would also help us to identify factors affecting the academic performance of a medical student from a different perspective and this can give direction for medical school and contribute to policymakers on what factors should we have to invest our time and resource to increase the academic performance of medical graduates and quality of medical education.

Since the study would assess the effect of the curriculum being implemented on academic performance by comparing the three curriculums currently implemented in our country, it determines whether a variety of curriculum change that has been implemented in Ethiopia brings change to the academic performance of students. So that it may help the medical school in the implementation of the new coming CBME curriculum by decreasing the challenges and increasing acceptability among the medical staff.

The finding of this research concerning the effect of the newly coming curriculum shift on the academic performance of medical graduates on licensure exams would also attract the intention of the researchers to investigate the idea since no studies are there in our country.

2. Literature Review

National licensing examinations (NLEs) are large-scale examinations usually taken by medical doctors close to the point of graduation from medical school. Licensure Exams are exams which are offered by governmental organizations for the purpose of regulating a specific profession or occupation. The purpose of licensure is to protect the health, safety and welfare of the consumer public not the profession(26, 27).The main purpose of licensure examination is to identify persons who possess the minimum knowledge and experience necessary to perform tasks on the job safely and competently--not to select the "top" candidates or ensure the success of licensed persons(6).

2.1 Academic Performance of Medical Students on Licensure Examinations

Overall pass rates for first time USMLE Step 1 test takers are: 94% for U.S. M.D. medical school graduates, 89% for U.S. D.O. osteopathic medical school graduates, and 73% for international medical school graduates. First-time USMLE Step 2 CK test taker pass rates are: 97% for U.S. M.D(28).

A study conducted in Gifu University, Japan using six consecutive cohorts of 531 medical students, the pass rate pass rate of national medical licensing examination in 2018 was 95.3% and the national pass rate was 90.1% (29).

A study was conducted using data came from all 547 examinees of the 2017 medical licensing examination for rural general practice in Hainan province, China. The study result showed that 68% passed Step 1, while only 23% of Step 1 passers passed Step 2, yielding an 15% overall pass rate of the whole examination (30).

Among 138 Medical Doctors who qualified outside South Africa and sat for the 2016 Health Professions Council of South Africa (HPCSA) Board Exam at UKZN's Nelson R. Mandela School of Medicine, about 90% passed the exam (31).

2.2 Factors affecting academic performance of medical graduates on licensure examinations

2.2.1 Socio-demographic factors

A study conducted in china to evaluate the performance of China's new medical licensing examination (MLE) for rural general practice, which determines the number of qualified doctors who can provide

primary care for China's rural residents, and to identify associated factors revealed that age, and gender are among factors which had significant association with passing Step 1(30).

There was a study conducted in United States using 1067 sample size to assess the associations of the demographic variables of gender, state of legal residency, student age, and undergraduate major with scores on the Medical College Admissions Test (MCAT) and the United States Medical Licensing Exam (USMLE) Step 1 and Step 2 Clinical Knowledge. The study shows that age at matriculation being less than 25 and male gender were associated with higher exam scores, although patterns differed between tests .

In USA a study was conducted using a series of hierarchical linear models with sample size 66,412 examinees from 133 U.S. Liaison Committee on Medical Education-accredited medical schools/campuses. The study was to examine the effects of examinee gender on United States Medical Licensing Examination (USMLE) Step 1 performance. The result shows that men tend to outperform women slightly on Step 1(32).

A study conducted in Saudi Arabia using a cross sectional study design to examine factors such as the students' demographic data, and identify whether these factors affect the academic performance of undergraduate medical students revealed that factors such as age and gender are among which have been shown to significantly affect medical student's academic performance(33).

A retrospective study was conducted in Kenya with a total sample of 427 students to assess factors influencing bachelor of science in clinical medicine students performance in clinical officer council licensure examination. The study result showed that age is one of the factor which were found to be significant factor associated with performance (34).

2.2.2 Students profile at graduation

A systematic review conducted in USA with the main goal of reviewing prior research and identify significant factors associated with Step 2 CK outcomes. From the systematic review the study findings suggest that academic success , having higher CGPA, throughout medical school positively influence the medical graduates performance on Step 2 CK (35).

In Australia a study was conducted using 427 final year medicine students with a primary aim of assessing the predictive validity of cumulative grade point average (GPA) for performance in the

International Foundations of Medicine (IFOM) Clinical Science Examination (CSE). The result of the study showed that there is strong and significant association between students CGPA and performance on IFOM (36).

A study conducted with data obtained from the academic records of 167 nursing students who graduated from a baccalaureate nursing program in the Southeastern United States between May, 1999 and December, 2003 showed that academic performance on National Council Licensure Examination for Registered Nurses (NCLEX-RN) is significantly associated with cGPA and having to repeat science courses(37).

A study conducted in China to evaluate the performance of China's new medical licensing examination (MLE) for rural general practice, which determines the number of qualified doctors who can provide primary care for China's rural residents, and to identify associated factors revealed in addition to age and gender the year of graduation is the other factor which had significant association with passing Step 1 medical licensure examination (30).

A study conducted in Thailand, with the aim to determine factors influencing the step 1 national licensing examination using 241 sample size showed that the step 1 national licensing examination had strong positive correlations with the comprehensive examination score and academic achievement (cGPA) during preclinical studies (38).

A study conducted in Kenya, using descriptive survey design and total sample size of 157 BScN nursing graduates students show that both repeating the basic science courses and nursing science course has significant relationship with failing of licensure exam(39).

2.2.3 Medical School/ University Related factors

A study was conducted in USA for seven year period (1992-1998) to determine the Influence of curriculum type on student performance in the United States Medical Licensing Examination, problem-based learning vs. lecture-based curriculum, with sample size of 689 students who took the United States Medical Licensing Examination Step 1 and 540 students who took Step 2. And the study showed that problem-based learning can provide students with the knowledge needed for the subsequent phases of their medical education(40).

A study was conducted to examine students' performances on Step 1 and Step 2 of the United States Medical Licensing Examination (USMLE) following the implementation of a problem-based learning curriculum. The result shows that The mean scores were higher on USMLE Step 1 for classes in the problem-based learning curriculum than for classes in the traditional curriculum(41).

However the sample size is small in India, A crossover comparative study was conducted in 2019 to assess efficacy of competency based medical education (CBME) and the traditional structured (TS) method in selected competencies of living anatomy of first year MBBS curriculum using 40 student. The study concludes that CBME method produces better performance of the students in the competencies of living anatomy (42).

A study was conducted in India at 2020 comparing the effectiveness of interactive methods (the competency based medical education) over traditional methods in teaching Biochemistry to Undergraduate Medical Students using cross-sectional intervention study with crossover design. The study concludes that student performance was increased in the interactive sessions and that overall satisfaction was good (43).

Using 60 Students as sample size a study was conducted using cross –sectional study Design within the Department of Physiology of the College of Medicine of King Saud University, Riyadh, Saudi Arabia at 2013. The results of the study show that students who belonged to a PBL curriculum obtained significantly higher knowledge and skills scores compared with students who belonged to traditional styles of medical school (44).

A report paper from Nigeria College of Medicine of the University of Ibadan in 2016 on the process of revising the methods of instruction and assessment in the core basic medical sciences directed at producing medical and dental graduates with a sound knowledge of the subjects sufficient for medical and dental practice concludes that despite understandable (and expected) challenges of its implementation process, the project has been rewarding as it has resulted in improved learning and performance at the final examinations(45).

A study conducted in Kenya using descriptive study design and 140 respondents to determine the effects of physical facilities on Kenya Certificate of Secondary Examination (KCSE) performance in Secondary schools in Bungoma South District, Kenya. The study revealed that Physical facilities were available and how they were utilized encouraged students to perform well in KCSE exams in and this influenced academic performance(46).

A cross - sectional Study was conducted between January 13 and March 30, 2019 using 120 students sample size in Bahirdar University medical school, Ethiopia to identify college facility-related factors affecting medical students' academic performance in the human anatomy course. The study concludes that large class size, inadequate classroom facilities, low internet access, and inadequate anatomy-teaching models were independent factors, which affect the performance of medical students in the human anatomy course exam(47)

3. Conceptual Framework

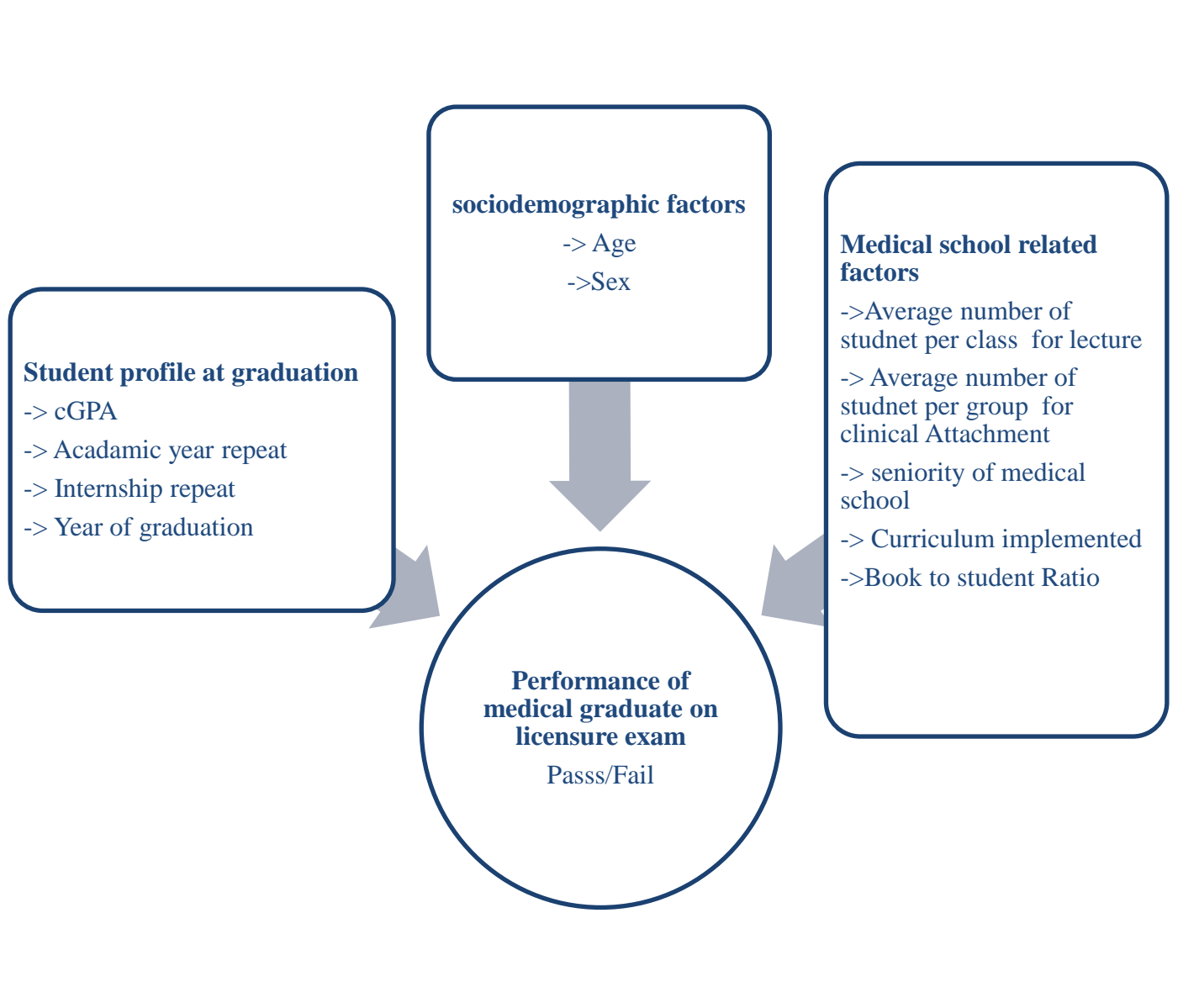


Figure 2:- Conceptual framework of academic performance and its associated factors among medical graduates who took licensure exam from September 2019- September 2021 in Amhara region Ethiopia

4. Objective

4.1 General Objective

- To assess academic performance and its associated factors among medical student graduate and took national licensure exam in medical schools found in Amhara region, North west Ethiopia.

4.2 Specific Objective

- To determine academic performance among medical student graduate and took National licensure Exam in medical schools found in Amhara region, North west Ethiopia.
- To identify factors associated with academic performance of medical student graduate and took national licensure exam in medical schools found in Amhara region, North west Ethiopia.

5. Methods

5.1 Study Area and Period

The study was conducted within four randomly selected public medical schools in Amhara region Bahirdar medical school, Gondar medical school, Debre Tabor medical school and Debre Markos Medical School. Amhara is a regional state in northern Ethiopia and the homeland of the Amhara people. Its capital is Bahir Dar which is the seat of the Regional Government located 565 km from Addis Ababa, the capital City of Ethiopia. There are Ten public universities in Amhara Region from which six of them have medical school. There are also two private medical schools. Gonder medical school was established in 1978 after, announcements were made for the establishment of a Medical Faculty in the Gondar College of Public Health and Training Centre by bilateral agreement reached between Karl Marx's University in Germany and Addis Ababa University. Bahir Dar university medical school was established in 2007 as one of the schools in Bahir Dar University. Debre Tabor University (DTU) established the College of Health Sciences (CHS) in 2013 with three academic programs namely, Medicine, Anesthesia, and Midwifery.

The study period was from September 2019 to September 2021 with accrual period of May 2022 to July 2022.

5.2 Study Design

A cross sectional study design was conducted among medical student graduate and took national licensure exam in medical schools found in Amhara region, North west Ethiopia.

5.3 Source Population

The source population was all medical student graduate and took national licensure exam in medical schools found in Amhara region, North west Ethiopia during the study period.

5.4 Study population

All medical student graduate and took national licensure exam in randomly selected medical schools found in Amhara region, North west Ethiopia during the study period.

5.5 Inclusion and Exclusion Criteria

5.5.1 Inclusion criteria

All medical student graduate and took national licensure exam for the first time in medical schools found in Amhara region, North west Ethiopia during the study period.

5.5.2 Exclusion criteria

All medical student graduate and took national licensure exam others than the first time in medical schools found in Amhara region, North west Ethiopia during the study period.licensure exam for the second time.

5.6 Study Variable

5.6.1 Dependent Variable

- Academic performance on National licensure Exam (Pass/Fail)

5.6.2 Independent Variable

- Socio-demographic factors
 - ✓ Age
 - ✓ Sex
- Student profile at graduation
 - ✓ CGPA
 - ✓ Having Academic Year repeat
 - ✓ Having Internship Repeat
 - ✓ Year of graduation
- university related factors
 - ✓ class room size
 - ✓ student size for clinical attachments
 - ✓ seniority of Medical school
 - ✓ Type of Curriculum being implemented
 - ✓ Book to student Ratio

5.7 Operational definition

Academic performance: is the result the medical student graduate will get on national licensure exam either passes or fails as per the MoH lisensure directorate decicsion.

Academic year repeat: is when the graduate has at least a year repeat during his/her first 5 year stay

Internship repeat: is when the graduate have at least an attachment repeat from the four major attachments during his/her internship period.

Class Size: is the standard number of students per class during lecture which is 40 student per class for medicine studnet as per Ministry of education guideline.

Student size for clinical attachments: is the number of students per group for clinical attachments either bedside or round as per each medical school implements.

Seniority of medical school: is the time the medical school are established and classification of their university according to Ministry of Education.

Type of curriculum being implemented: is the type of curriculum the medical school is using for teaching medical students, either competency based, NEMIE, or conventional medicine curriculum.

5.8 Sample Size determination

Sample size was determined based on the single population proportion formula by using the following assumptions:

$$n = \frac{(Z_{\alpha/2})^2 P(1-P)}{d^2}$$

Z = 95% confidence interval (1.96)

P =50% (proportion of medical graduate who pass the exam taken as 0.05 since there is no literature)

d= 0.03 (margin error)

$$n = \frac{(1.96)^2 * 0.5 (1-0.5)}{(0.03)^2} = 1067$$

5.9 Sampling Technique and Procedure

Cluster sampling technique was employed to select the medical school and the study participants. After medical schools were randomly selected all medical graduat's and took licensure exam for the first time during the study period was included in the study.

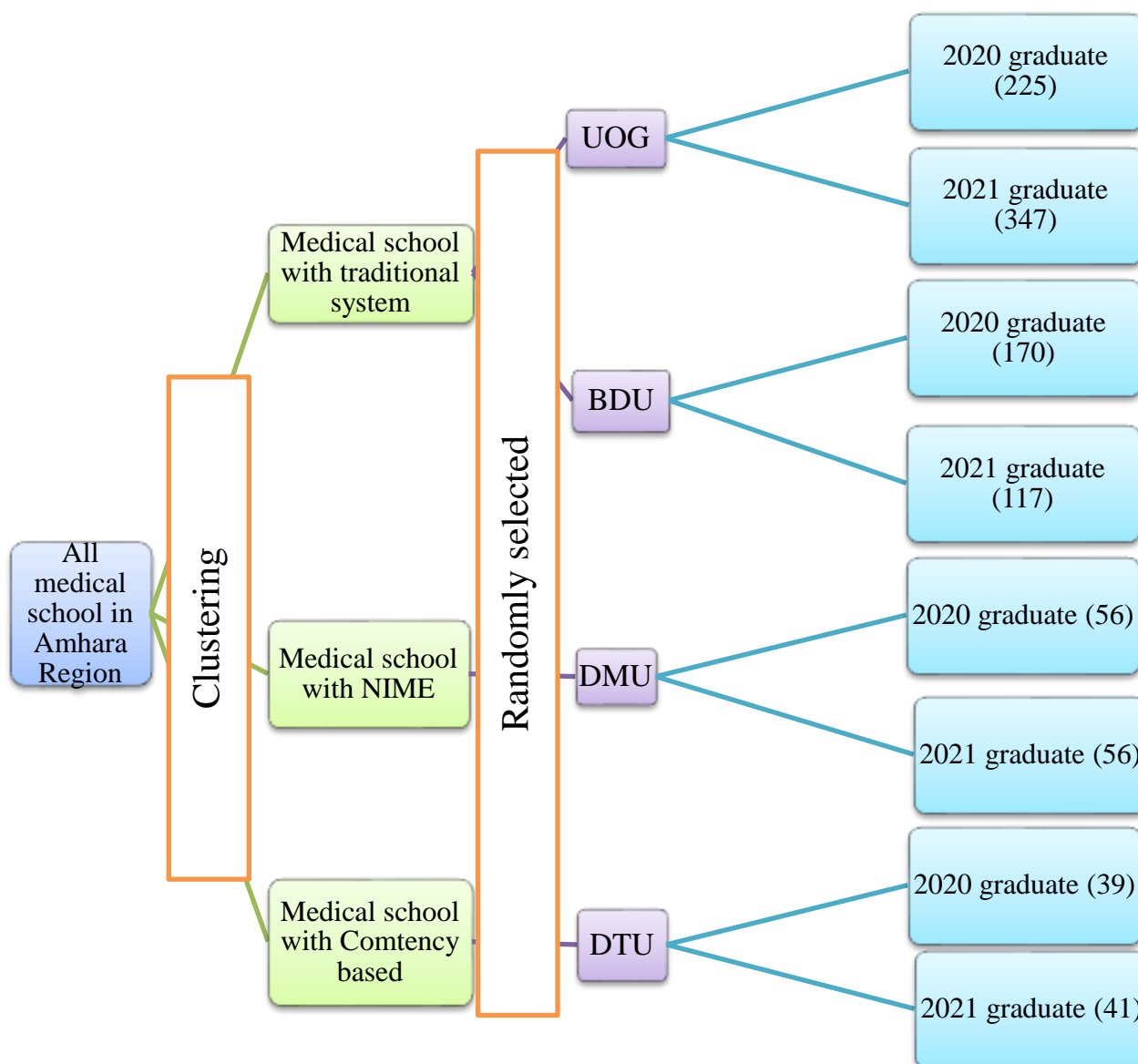


Figure 3:- sampling procedure for academic performance and its associated factors among medical graduates who took licensure exam from September 2019- September 2021 in Amhara region Ethiopia

5.10 Data Collection Procedure and Tools

Data were retrieved from secondary sources using a structured checklist for data extraction that was created after reading through various related literatures in terms of socio-demographic factors, performance on the national licensing exam, curriculum being used, and school profile. Among the secondary data, academic performance on licensure examination, age, and sex were retrieved by the investigator from the MoH licensure directorate, department responsible for administering the national

licensing examination. The remaining variables were retrieved from Bahirdar, Gondar, Debre Tabor, and Debre Markos medical schools.

5.11 Data Quality Assurance & Managements

A pretest was conducted by using the prepared checklist before 2 weeks of the actual data collection period to check the consistency, simplicity understandability, and completeness of checklist and availability of study variables. The filled formats were checked for completeness by principal investigator and data cleaning was done during data collection and analysis time. Once data is extracted, it was coded to avoid duplication.

5.12 Data processing and Analysis

Data was checked for its completeness and errors in coding and entering by the principal investigator before entering data to SPSS software version 23.0. The academic performance of the study participants was measured by the score they got on licensure exam. Descriptive statistics was used to describe the demographic characteristics of the participants. Binary logistic regression was carried out to determine factors associated with graduate's academic performance on national licensure exam. Assumptions of logistic regression were checked before data is analyzed and some of the variables which showed multi-collinearity have been removed.

The goodness of fit test for Binary logistic regression model was done by Hosmer and Lemeshow test in which, the p value is greater than 5%. Odds ratio was used to measure strength of association between independent variables and graduate performance on licensure exam with $p < 0.05$ at 95% CI being considered significant. Thus, Categorical variables was summarized as numbers and percentages and finally presented by using tables.

5.13 Ethical considerations

Ethical clearance was obtained from the Ethical Review Board of Bahir Dar University college of Medicine and Health sciences. Supporting letter was obtained from each selected Medical school Dean and coordinators. The data collected was entered in the software and final result of the study was protected with password. The confidentiality of information was kept throughout the entire study process and the information was used only for the study purpose.

6. Results

A total of 1067 Graduate medical student's files were reviewed to assess their medical performance from September 2019 to September, 2021; of which, 1051(98.5%) were included in the final analysis. These participants completed six rounds of the MoH-conducted licensing exam. Of these, 196 (18.6%), 20, 197 (18.7%), 402 (38%), 61 (5.8%), and 175 (16.7%) took the exam in respective November 2019, January 2020, March 2020, October 2020, January 2021, and August 2021. In total, 91.4 % of medical school graduates who took the exam during the study period passed.

6.1 Socio-Demographic characteristic and Student Profile at Graduation

More than three fourth (75.5%) of the participant in the study were male and the mean age for female is 25 (± 2 SD) and 27 (± 3 SD) for males with minimum age of 23 and maximum age of 38 at the time they took licensure exam. From the participants, 58 (5.52%) students scored cGPA of less than or equal to 2.49, 472 (44.91%) scored from 2.50 to 2.99 cGPA, 463 (44.05%) from 3.00 to 3.49 and 58 (5.52%) scored greater than or equal to 3.5 with over all mean of 2.99 (± 0.3 SD). (Table 1)

Regarding year of graduation 630 (59.9%) of the student graduated in 2020/21 G. C. and 421(40.1%) student graduated in 2019/20 G.C. Of all student participated in the study 161 (15.32%) had repeated at least in one of the attachment during his/her internship stay which are Internal Medicine, Surgery, Gynecology and Obstetrics and Pediatrics. And also 260 (24.74%) of the student have at least a year academic repeat during their stay in campus. (Table 1)

Table 1: Socio-demographic characteristics and graduate profile of medicine student graduated from September 2019 to September 2020 and took National licensure exam

Variable	Categories	Frequency	Percentage %
Sex	Female	258	24.55%
	Male	793	75.45%
CGPA	Less than or equal to 2.49	58	5.52%
	From 2.5 To 2.99	472	44.91%
	From 3.0 To 3.49	463	44.05%
	Greater than or equal to 3.5	58	5.52%
Year of graduation	2020/21 graduate	630	59.94%
	2019/20 graduate	421	40.06%
Does she/he have repeat during her internship?	No	890	84.68%
	Yes	161	15.32%
Does she/he have academic year repeat?	No	791	75.26%
	Yes	260	24.74%

6.2 Medical school/ University profile

Among 1051 graduate participants in the study 112 (10.7%) have completed their education with NIME, 80 (7.6%) graduate with competency based curriculum and 859 (81.7%) graduated with Conventional medicine curriculum. More than half of medical graduates, 572(54.4%), participated in the study completed Doctor of medicine degree in first generation medical school.

Most of the graduates, 971 (92.4%), participated in this study learnt their lecture class with average number of students greater than 40 which is considered as the standard class size for medicine. And also the average number of student per group for clinical attachment differs among the participants, which is 80 (7.6%) of them attached their clinical attachment with average number of six students per group, 399 (38%) with twelve students per group and 572 (54.4%) with fifteen student per group. (Table 2)

Table 2: Medical School characteristics and graduate profile of medicine student graduated from September 2019 to September 2020 and took National licensure exam.

Variables	Categories	Frequency	Percentage %
Curriculum Being Implemented	NIME	112	10.7%
	Competency Based	80	7.6%
	Conventional	859	81.7%
Medical School Seniority	Third Generation	192	18.3%
	Second Generation	287	27.3%
	First Generation	572	54.4%
Average Number Of Student Per Class	Less or Equal To 40	80	7.6%
	Greater Than 40	971	92.4%
Average Number Of Student Per Group For Clinical Attachment	6 Student	80	7.6%
	12 Student	399	38.0%
	15 Student	572	54.4%

6.3 Academic performance of Medical Graduate on Licensure Exam

Among all female medical graduates and took licensure exam, 233 (90.3%), have passed the exam and 728 (91.8%), males have passed the exam. From all participants having repeat during their internship, 133 (82.6%) have passed the exam which is low when compared to graduate who don't have internship repeat and pass the exam which is 828 (93.0%). Again Graduates who have Academic year repeat during their undergraduate study, 210 (80.8%) have passed the exam and which is lower when compared to graduates who didn't have academic year repeat, 751 (94.9%).

Among graduates who have been graduated in 2019/20, 405 (96.2%) have passes the exam and which is greater than graduates who have been graduated in 2020/21 and passed the exam, which is 556 (88.3%). When we see the cGPA of the graduates as it increases the probability of passing the exam significantly increased which are 67.2% for those who has cGPA less than or equal to 2.49, 86.0% for cGPA from 2.5 to 2.99, 98.9% for cGPA from 3.0 to 3.49 and 100% for cGPA greater than or equal to 3.5. Regarding the curriculums which are implemented among those medical schools almost all 98.9

% of the graduates have passed the exam while it is 92.1% for those with conventional curriculum and 81.3% for those with NIME curriculum

Table 3: Academic performance of Medical Graduate on Licensure Exam of Medical graduates from September 2019 to September 2021 G.C.

Variables		Academic performance on licensure	
		fail Number (%)	pass Number (%)
Sex	Female	25 (9.7%)	233 (90.3%)
	Male	65 (8.2%)	728 (91.8%)
Does She/he have Academic Year repeat?	No	40 (5.1%)	751 (94.9%)
	Yes	50 (19.2%)	210 (80.8%)
Does She/he have repeat during her Internship?	No	62 (7.0%)	828 (93.0%)
	Yes	28 (17.4%)	133 (82.6%)
Year of Graduation	2021 Graduate	74 (11.7%)	556 (88.3%)
	2020 Graduate	16 (3.8%)	405 (96.2%)
cGPA	Less than or equal to 2.49	19 (32.8%)	39 (67.2%)
	From 2.5 to 2.99	66 (14.0%)	406 (86.0%)
	From 3.0 to 3.49	5 (1.1%)	458 (98.9%)
	Greater than or equal to 3.5	0 (0.0%)	58 (100.0%)
Curriculum being implemented	NIME	21 (18.8%)	91 (81.3%)
	Competency based	1 (1.3%)	79 (98.8%)
	Conventional	68 (7.9%)	791 (92.1%)

6.4 Factors Associated with academic performance on Licensure exam

From the multiple logistic regression age, sex, year of graduation, having repeat during their internship attachment, having academic year repeat and medical school seniority were statistically significant factors with graduates academic performance on licensure exam.

According to this study, a medical graduate's likelihood of passing the licensure exam decreases by 37% (95 percent CI= 0.52, 0.76) as their age increases by one unit at the time they take the exam. Additionally, compared to male graduates, female graduates have a 61 percent (95 percent CI=0.22, 0.69) lower likelihood of passing the licensing exam. Additionally, compared to medical students who graduated in 2019/20 G.C. and took the licensure examination, those who graduated in 2020/21 G.C. were 69 percent (95 percent CI= 0.17, 0.60) less likely to pass the exam. When compared to students who graduated from third generation medical schools, graduates of first and second generation medical schools are 94 percent less likely to pass the exam with a confidence interval of 95% CI=0.01, 0.40) and 95 percent CI=0.01, 0.38), respectively.

The study also found that compared to medical graduates who had at least one internship repeat and took the licensure exam, those who had no repeats during their internship and took the exam were 2.41 (95% CI: 1.40, 4.17) times more likely to pass the exam. Additionally, compared to medical graduates who had an academic year repeat and took the licensure exam, those who did not had the repeat had a 2.01 (95 percent CI=1.14, 3.56) times higher chance of passing the exam.

Table 4: Factors Associated with academic performance on Licensure exam of Medical graduates from September 2019 to September 2021G.C.

Variables	Categories	Licensure Result		COR with 95% CI	AOR with 95% CI	P-value
		Pass N (%)	Fail N (%)			
Age (Continuous Variable)				0.83 (0.79, 0.88)	0.63 (0.52, 0.76)	0.000
Sex	Female	233 (24.2%)	25 (27.8%)	0.83(0.51, 1.35)	0.39 (0.22, 0.69)	0.001
	Male	728 (75.8%)	65 (72.2%)	1	1	
Year of Graduation	2020/21 Graduate	556 (57.9%)	74 (82.2%)	0.30 (0.17, 0.52)	0.31 (0.17, 0.60)	0.000
	2019/20 Graduate	405 (42.1%)	16 (17.8%)	1	1	
Does She/he Have Repeat During Her Internship?	No	828 (86.2%)	62 (68.9%)	2.81 (1.74, 4.55)	2.41 (1.40, 4.17)	0.002
	Yes	133 (13.8%)	28 (31.1%)	1	1	
Does She/he Have Academic Year Repeat?	No	751 (78.1%)	40 (44.4%)	4.47 (2.87, 6.96)	2.01 (1.14, 3.56)	0.016
	Yes	210 (21.9%)	50 (55.6%)	1	1	
Medical School Seniority	Third Generation	170 (17.7%)	22 (24.4%)	1	1	0.003
	Second Generation	263 (27.4%)	24 (26.7%)	1.42 (0.77, 2.61)	0.06 (0.01, 0.38)	
	First Generation	528 (54.9%)	44 (48.9%)	1.55 (0.91, 2.67)	0.06 (0.01, 0.40)	

7. Discussion

The study was aimed to assess the level of academic performance and its associated among medical student graduate and took national licensure exam in medical schools found in Amhara region, North west Ethiopia. Among a total of 1051 graduates and took licensure exam about (91.4 %) students have passed during the study period. When compared to studies done in the United States, Japan, and South Africa, the results of this study were fair, despite the fact that the exam's complexity was different (28, 29, 31). By taking into account the total cost of preparing medical students to be professional physicians, we anticipate a 100% pass rate. Our current finding is not bad, though, when the nation considers the "flooding" policy that caused serious educational issues that were not fully resolved by straightforward initiatives. To maintain high standards in medical education and achieve a pass rate higher than what we currently have, concurrent increases in funding are required for faculty expansion as well as infrastructure development(23).

Age and gender are found to be statistically significant factors in the current study that are associated to the academic performance of medical graduates on the national Licensure exam. As medical graduates get older, they are less likely to pass the licensing exam, and female medical students are less likely to pass the exam, as was also shown in a previous study conducted in the United States (48). Long medical school stays make it more likely for students in developing countries are increasingly likely to be exposed to lifestyle diseases like depression as they get older. As a person gets older, increased living standard may threatens their ability to maintain their standard of living, which causes stress and psychological ill health. The level of competition in the medical field is constantly increasing, and this has resulted in stress that lowers the quality of life for older medical students. Having a long and demanding medical education can have a negative impact on students' psychological health as they get older, which may explain why older medical students have a lower chance of passing (49-51).

On the other hand , female students in medical school are negatively impacted by gender bias both directly and indirectly. It may hinder their progress, keeping them at a lower grade scale, and it may also have psychological effects that cause low self-esteem and occasionally poor work performance. According to findings from earlier studies, between 50 and 75 percent of students encountered gender discrimination. The offensive conduct included being passed over for professional opportunities, spreading potentially harm, using sexist epithets, and even making sexual advances. Both faculty and

residents are accused of harassing students. Although harassment occurs frequently during medical school, women are more frequently affected by it due to their gender. This issue is thought to be exacerbated by the hierarchical power structure of medicine, which places men in its highest positions (52, 53). Additionally, female medical students may still struggle with the strain of their dual roles as women and doctors, conflicts between their career and lifestyle choices, and challenges with timing pregnancies that have significant social value(54). Our findings and those of previous research indicate that Ethiopia could lessen the impact of gender and older age on academic performance by incorporating age criteria as entry behavior or by providing older students with additional supportive education and more necessities for female students in order to make up for their social and gender-based pressures.

From this study almost all (98.75%) Students who have learnt with the competency based curriculum have passed the national licensure exam, (81%) of student with NIME and (92.08%) of student with the conventional curriculum have passed the exam. These results are also in line with study conducted in USA (41). This result is also in line with a study conducted in 2019 to assess efficacy of competency based medical education (CBME) and the traditional structured (TS) method in selected competencies of living anatomy of first year MBBS curriculum and the study concludes that CBME method produces better performance of the students in the competencies of living anatomy (42). In Ethiopia, a program called the New Innovative Medical Education Initiative (NIMEI) was started in February 2012 to train medical professionals using a new methodology and curriculum (12). After the curriculum has been put into practice, the task of instructing medical students is taken on by second generation universities (55) without an adequate number of senior staff members and in the absence of their own hospitals. On the other hand, advanced labs and senior staff are required for medical education to continue. The success, achievement, and satisfaction of students are significantly influenced by their learning environment including human power(56, 57). The difficulties that universities face in continuing the program in newly established medical schools may be the cause of why students who followed this program had relatively the lowest pass rate. The study also highlighted the need for strong physical infrastructure, establishing national and international partnerships, and addressing faculty shortages in basic and clinical sciences for the benefit of faculty development at universities that have the program.

In addition, despite the lack of scientific support, the author believes that there are some things that can be done to improve the way that students enter the NIME program. Students from other natural

sciences, such as mathematics, biology, and chemistry, have joined the program and learned medicine for only five years, when it actually takes six years to complete the curriculum. This might affect educational quality, which actually calls for another study that should be recommended for future researchers to prove our claims.

The year the student graduated (and took licensure exam) is another predictor variable which had a statistically significant association. This outcome may be explained in a variety of ways, but the COVID-19 pandemic and the country's recent war are the two most significant factors that may have contributed. Stress, fear, and anxiety are unavoidable effects of an outbreak of a poorly understood contagious disease (COVID-19). Due to the pandemic's ongoing spread, sensational media coverage, and implementation of social lockdown, university students experience negative mental health outcomes. Due to the cancellation and postponement of anticipated events like exchange studies and graduation ceremonies, graduating class students are more negatively impacted (58) . This finding teaches us that students who experience unequivocal environmental and other similar siege require significant psychological and other social treatments.

Medical school seniority is the other factor which had statistically significant association ($P=0.003$) with graduates academic Performance on licensure examination which is students graduated from first and second generation medical school are 94% less likely to pass the exam, when compared to graduates from third generation medical school. This discrepancy may be explained with the curriculum those medical schools are implementing, which is conventional medicine curriculum is implemented in first and second generation medical school whereas competency based curriculum is implemented in third generation medical schools. This is also supported from my study that almost all 98.75%, only one student failed, have passed the exam among graduates who have completed their medical education with competency based medical curriculum.

Academic Year Repetition (during their studies) is yet another element that significantly influenced graduates' academic results on licensing exams. Compared to graduates who had an academic year repeat, those who didn't have one are more likely to pass the licensing exam. This result is consistent with a study done in Kenya, which revealed a significant link between failing the licensing exam and repeating nursing sciences and basic science courses(39).

In addition to repeating an academic year, having at least one internship attachment during their final year of attendance resulted in significantly poorer academic performance. There are two ways to

interpret the results of the current study. Academic-related stressors are the main cause of poor academic performance such as repeat for medical students in medical school. These stressors include not having enough time to review what has been learned, having disagreements with teachers, not knowing what is expected of them, having to deal with patients who are ill or dying, not wanting to study medicine, and feeling pressured to perform poorly. Additionally, those who repeated my had to deal with more stress because they felt guilty for wasting more time and settling a lengthy medical journey. They might perform worse academically as a result (59).

Secondly with a few exceptions, such as students who repeat due to poor conduct or students who fail to give informal things like sexual benefits for teachers, the majority of students who repeat during intern or in prior year studies are those who have low academic performance. Therefore, compared to students who have not yet repeated classes, it is indeed reality for students with a history of failing classes will perform academically worse on licensory exams. The present report suggested that medical academic institutions in charge of supporting education for those students experiencing academic repeat and looking into the causes of academic repeat during internship and prior year studies.

8. Limitation of the Study

There are some limitations in this study. Some variables that might have association with Licensure exam Results like staff profile, dormitory size and library size, internet access were not included. This study used only the last final status, which is either pass or Fail, of study participants. There was no cut point defined for pass as well as for fail. Due to this, there might be differences in the cut point to pass or fail depending on the time they took the exam.

9. Conclusion and recommendations

2.1 Conclusion

During the study period, the passing rate of medical graduates was fair, which was associated with the age, gender, curriculum being implemented, having academic as well as internship repeats. As result, policy makers should scale up work on curriculum and student education in class and during internships in order to improve the quality of medical graduates.

9.1 Recommendations

For Medical schools

- Medical school has to work on the factors identified to improve the gaps seen on new graduates of their school.
- There should be close monitoring of the students and the new curriculum implementation which the government started it through all medical schools.
- Should work on students who will have either academic or internship repeat with close advisory

For policy makers:

- As already started they should consider implementation of the competency based curriculum in all medical school
- Again as already started the policy makers should terminate the NIME curriculum and change it with competency based curriculum within the country

For researchers:

- Further study factors affecting academic performance of graduates on licensure exam should be conducted with other study design, method and large sample size at country level

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11. Annex

2.1 Annex 1- Information form sheet

Title of the Research Project: Academic Performance and Its Associated Factors among Medical Graduates Who Took Licensure Exam In Amhara Region, Northwest Ethiopia

Name of Investigator: Dereje Bedane (MD)

Name of the Organization: Bahir Dar University, College of Medicine and Health Sciences, School of Public Health, Department of Health System Management and Health Economics.

Introduction: This information sheet is prepared for National Licensure exam team of MoH, School Dean, registrar head and focal person of randomly selected medical schools. This form aims to make the above-concerned bodies clear about the purpose of research, data collection procedures and get permission to conduct the research.

Purpose of the Research Project: To assess academic performance and its associated factors among medical student graduates who took national licensure exam from September 2019- September 2021 in Ethiopia.

Procedure: To achieve the above objective, the information will be taken from secondary source of the licensure exam previous results and study participants record at their institution.

Risk and /or Discomfort: Since the study will be conducted by taking appropriate information from the secondary source, it was not inflict any harm to the study participants. The name or any other identifying information was not recorded on the checklist and all information taken will be kept strictly confidential and in a safe place. The information retrieved will only be used for the study purpose.

Benefits: the research has no direct benefit for one whose data is included in this research. But the indirect benefit of the research for the participant and other clients in the program is clear. This is because the output of the study may contribute to the medical education quality and also for future curriculum planning.

Confidentiality: to reassure confidentiality the data on the secondary sources will be collected by those individuals who are trained and work collaboratively with the investigator. Information will be

collected without the name of the clients. The information collected from this research project will be kept confidential and stored in a file. Besides, it will not be revealed to anyone except the investigator and it was kept in a key and locked system with a computer pass ward.

Person to contact: This research project will be reviewed and approved by the institutional review board of the College of Medicine and Health Science, Bahir Dar University. If you have any question you can contact any of the following individuals (Investigator and Advisors) and you may ask at any time you want.

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Thank you for your cooperation:

11.1 Annex 2- Data extraction tool

Part I: Socio demographic characteristics and student profile			Remark
101	Age	-----	
102	Sex	1. Male 2. Female	
103	cGPA	-----	
104	Does he/she have Academic year repeat in his medical education?	1. Yes 2. NO	
105	Does she/he have Repeat on Internship Attachment	1.Yes 2.No	
106	Year of graduation	1. 2020/21 2. 2019/20	
Part II: Academic Performance on the licensure exam			
201	Result of the student on licensure exam	3. Pass 4. Fail	
Part III: University Related factors			
301	Curriculum being implemented	1. Conventional (traditional) 2. NIME 3. Competency based curriculum	
302	Medical school seniority	1. Third generation 2. Second Generation 3. First generation	
303	Average Class size	1. Lecture _____ 2. Practical_____	
304	Book to student ratio	_____	