FACTORS INFLUENCING BACHELOR OF SCIENCE IN CLINICAL MEDICINE STUDENTS' PERFORMANCE IN CLINICAL OFFICERS COUNCIL LICENSURE EXAMINATION IN NAIROBI, KENYA

EUNICE MUTHONI KURIA

SHS/MScHPE/448-3/2018

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF THE DEGREE OF MASTER OF SCIENCE IN HEALTH PROFFESSIONS EDUCATION OF AMREF INTERNATIONAL UNIVERSITY

2022

DECLARATION

DECLARATION

Declaration by student

This thesis is my original work and has not been presented for a degree or an award in any University.

Signature ..... Date 24-05-2022

Eunice Muthoni Kuria (BScCM)

Reg: SHS/MScHPE: 448-3/2018

Approval by Supervisors

The thesis has been submitted for examination with our approval as University supervisors.

Signature..... Date 25/05/2022

Name: Dr. (Sr.) Margaret Nyongesa, PhD

Lecturer – Amref International University

Signature..... Date 24/05/2022

Dr. Joseph Choge, PhD

Chairman of Clinical Medicine Department /Lecturer - University of Kabianga (UoK)

Signature ..... Date 24/05/2022

Name: Mr. Norbert Boruett

Lecturer -Amref International University

ii

COPYRIGHT

DEDICATION

I dedicate this work to my family who patiently shared their time to have me complete this work.

ACKNOWLEDGEMENT

I acknowledge contributions made by different people towards the completion of this thesis. My utmost gratitude goes to my supervisors, Dr. (Sr.) Margaret Nyongesa, Dr. Joseph Choge and Mr. Norbert Boruett for their encouragement and guidance. I also thank the former COC Registrar Mr. Mutinda Kissing'u for his support and all those who encouraged me throughout my study. I also appreciate the role played by Clinical Officers Council in allowing me to access the crucial data that I needed for my study. Special thanks go to the data clerk Susan Mwende who ensured that I got all the data needed for the analysis.

I express my sincere gratitude to my husband and children for their invaluable support during this study. To my peers at the work place, I hold a lot of gratitude.

ABSTRACT

Performance in a licensure examination is one of the indicators of quality assurance and shows that the graduates have met the professional standards. Performance in COC licensure examination has been fluctuating. The objective of the study was to investigate the association between socio-demographic, institutional and regulatory body factors and licensure examination performance of the graduates of BSc. in Clinical Medicine (BScCM). Using a retrospective and mixed method research design and purposive sampling techniques, quantitative consolidated data of 427 graduates of universities was collected from the COC Regulatory Human Resource Information System (rHRIS) targeting cohorts who sat for licensure examination from September 2016 to May 2019 examination series. The study had 219 males and 208 females ranging from 17-49 years. Qualitative data was collected from key informants. IBM SPSS version 26 software was used to analyze quantitative data while qualitative data was triangulated for thematic analysis. The results revealed that there was a signifcant relationship between sociodemographic, instituional and regulatory body factors and licensure performance. Regression analysis was used to measure the association of the various factor variables. The study found out that age had a statically significant relationship with performance, where students aged 30 years and above performed better than those of 30 years and below. (OR: 0.089, 95% CI 0.012-0.660 p=0.018). Mode of study and teaching methods had stastistical significance of (OR:0.105,95%CI 0.032-0.345,P=0.000 and OR:0.192, 95%CI 0.089-0.414P=0.000 respectively. Lack of content validity and timing in COC licensure examinations were reported by key informants to influence performance. In conclusion the study demonstrated that results can be used to predict licensure examination performance and findings are useful in planning recruitment and developing examination policies. It was recommended that COC review's her examination process, develop an examination blue print that will guide in setting examinations that test competency.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AMREF:	Africa Medical and Research Foundation
ANAC:	African Network of Associate Clinicians
BScCM:	Bachelor of Science in Clinical Medicine
BScN:	Bachelor of Science in Nursing
CAP:	Chapter
COC:	Clinical Officers Council
COVID-19:	Coronavirus disease 2019
FB:	Faith Based
FQE:	Final Qualifying Exam
FTF:	Face to Face
GLUK:	Great Lakes University of Kisumu
GOK:	Government of Kenya
GPA:	Grade Point Average
HPE:	Health Profession Education
IAPAE:	International Academy of Physician Associate Educators
JKUAT:	Jomo Kenyatta University of Agriculture and Technology

KCSE:	Kenya Certificate of Secondary Education
KEMU:	Kenya Methodist University
KUCCPS:	Kenya Universities and Colleges Central Placement Service
Max:	Maximum
MCQ:	Multiple Choice Questions
MDC:	Medical and Dental Council
MLW:	Middle Level Health Worker
MKU:	Mount Kenya University
Min:	Minimum
MS Excel:	Microsoft Excel
MSc CO:	Master of Science in Clinical Officers
MTLE:	Medical Technologists licensure examinations
NBME:	National Board of Medical Examinations
NCCPA:	National Commission of Certification of Physician Associate
NCK:	Nursing Council of Kenya
NACOSTI	National Commission for Science, Technology and Innovation
OR:	Odds Ratio

PSSP:	Private Sponsored Students Program
PANCE:	Physician Assistant National Certifying Examination
rHRIS:	Regulatory Human Resource Information System
SD:	Standard Deviation
SPSS:	Statistical Package for the Social Sciences
UoK:	University of Kabianga
WHO:	World Health Organization

OPERATIONAL DEFINATION OF TERMS

Admission criteria: Institutionalized basis of selecting students into Clinical Medicine training programmes.

Approved training institution: Training institution within or outside Kenya as may be approved by the Council by notice in the Gazette for the purpose of training

Calendar year for COC: From July to June of every year

Chairman of Department: The Head of the Clinical Medicine department in a University

Chairman of COC examination Board: The presiding officer of COC Examination Board which sets examinations.

Clinical Officer: A person who having successfully undergone a prescribed course of Clinical Medicine training in an approved institution and is a holder of a diploma or degree certificate in Clinical Medicine and Community Health.

Examination series: Examination either done in the month of May (series) or in September (series)

Factors: Variables in a study that influence results.

Fail:	Achievement of a score of 49% and below in the examination
Integrity:	Is the practice of being honest and showing a consistent and uncompromising adherence to strong moral and ethical principles and values in marking.
Licensure examination:	Is an examination given to a candidate who have completed basic training in Clinical Medicine (Diploma and BScCM) and have passed Final Qualifying Examination in their institution (within or outside the country) and is seeking registration and licensing.
Middle Level health workers:	Range of cadres that carry out diagnostic and treatment functions conventionally thought of as the responsibility of doctors, usually in primary and secondary healthcare settings.
Mode of study:	This is used to denote full time class starting Monday to Friday, part time class taking two or three days a week or weekend only class or distant learning

Multiple Choice Questions:	Questions that contain a stem and multiple options of which a correct answer is one of the options.
Pass:	Achievement of a score of 50% and above in the examination.
Performance:	Examination pass or fail in the Clinical Officers Council licensure examination. Also, achievement of Knowledge, skills and attitude.
Pre-service/Direct entry:	High school graduates who are enrolled directly for the Clinical Medicine program for four years on full-time basis, post-secondary school.
Regulatory Body:	Refers to the Clinical Officers Council or any other that oversights health professionals.
Short Essay Questions:	Questions that require candidates to recall specific names, facts, skills, symbols and basic knowledge.

Supplementary Examination:	This is an examination given to a candidate who has failed the first attempt of the pre-internship examination.
Upgrading/in-service:	Student on part time mode of study, who has a diploma in Clinical Medicine and Surgery before enrolling for the BSc program.

CHAPTER ONE: INTRODUCTION

1.1 Overview

This chapter presents the background information of the study, statement of the problem, research objectives, research questions, research hypothesis, justification, significance and limitations of the study.

1.2 Background of the Study

Clinical Medicine is a regulated profession by the Clinical Officers Council (COC) of Kenya. The COC is a body corporate semi-autonomous government agency, established under The Clinical Officers Council, Act Cap 260 in 1989 which was repealed and replaced by an Act of parliament No. 20 of 2017 of the laws of Kenya. A Clinical Officer is a health professional who is gazetted, qualified and licensed to practice medicine. Clinical Officers play an important role in the provision of health care and are the face of the health facilities, (Momanyi et al, 2016*)* being the first technical person to listen and address patient/client's needs. When fully qualified Clinical Officers serve with minimal supervision provided their immediate supervisors are satisfied.

Training of Clinical Officers in Kenya started at certificate level in 1928 until 1967 when the three-year diploma and an eighteen-month higher diploma in specialized areas commenced in the Kenya Medical Training College (KMTC). In 2009, a degree program was started at Mt. Kenya University followed by other universities in mounting the Bachelor of Science in Clinical Medicine (BScCM) pre-and in-service programmes. The undergraduate pre-service programme takes four years while the in-service (up-grading) takes three years. Graduates from both programmes undertake a one-year internship before they are licensed to practice Clinical Medicine profession. A Master of Science

programme in Clinical Medicine (MScCM) was started in 2015 to train Clinical Officers in specialized areas.

Licensure examinations are summative high-stake tests, used to make overall judgement in competence and fitness to practice of the examinees(Amanonce & Maramag, 2020). In Kenya, the COC provides licensure examinations to diploma, and to BScCM pre-service and in-service graduates since 2013 and 2016 respectively. Despite the successful performance in academic final qualifying examination from various training institutions offering BSc in Clinical Medicine programs, licensure examination performance has been fluctuating,. On failing the licensure examination, candidates have to re-sit a maximum of two supplementary examinations which are allowed within COC calendar year i.e. in May and September within a five-month interval. On failing the two supplementary exams, the candidates are required to undergo a six-month clinical attachment in a high-volume hospital before taking a clinical assessment. On passing the assessment, the candidate is deployed for a one (1) year internship where he/she practices under supervision (COC Examination policy, 2016).

There are approximately 24, 000 Clinical Officers in Kenya (COC reports) among them 950 are BSc graduates (COC, 2018) Clinical Officers in Kenya are categorized into four distinct groups: i) Master of Science Clinical Officers (MScCO), ii) Bachelor of Science Clinical Officers (BScCO pre-service (direct) and in-service upgrading respectively, iii) Specialist Senior Clinical Officers (SSCO) and iv) Registered Clinical Officers (RCO). COC report in 2017 indicates that Kenya had 65 approved Clinical Medicine training institutions, with seven (7) accredited Universities offering BScCM.

Categorization of Clinical Officers in Kenya is in line with the global and continental approaches in naming this cadre of health professions. Globally, Clinical Officers (non-physicians cadre of professionals) are in the category of International Labor Organization (ILO) Standard of Classification of Occupations' amendment term from 'paramedical practitioner' to Accelerated Medical Trained Clinician (AMTC) (Marie, 2017). The World Health Organization (WHO, 2010) started training programs for Physician Assistants (PA) i.e. professions with comparable concepts of clinical delegation and patient management in the United States of America (USA) in the mid-1960'(Hooker & Kuilman, 2011) which spread to Australia, Canada, Great Britain, The Netherlands, German(Hooker & Everett, 2012) India, Israel, Liberia, New Zealand, Saudi Arabia and Feldshers (countries formerly comprising the Soviet Union). In the USA, the National Board of Medical Examinations (NBME) examines the Physician Associates with a licensure examination known as Physician Assistant National Certifying Examination (PANCE) which Physician Associates must pass before becoming a Physician Associate – Certified. The Commission of Certification of Physician associates (NCCPA) assumes the responsibility of setting and passing standards, certification and re-certification(Pearson, 2022)International Academy of Physician Associate Educators (IAPAE) was started in 2008 by a dedicated group of educators and clinicians to bring together physician associates globally to develop and share best educational practices in licensure examinations while respecting regional culture.

In Sub-Saharan Africa, Clinical Officers are grouped as Mid-Level Health Workers (MLW's). Recently the term "associate clinician" has been adopted by MLWs as a unifying term in the professional development of this cadre (Couper et al, 2018). In 2010 this

category of health care providers were identified in 47 out of 54 countries in sub-Saharan Africa (Eyal et al, 2015) although their roles varied widely between countries. They have different nomenclatures which includes: Clinical Officers in Kenya and Uganda, Medical Licentiates in Zambia, Physician Assistant in Ghana, Clinical Associates in South Africa (Marie, n.d)Assistant Medical Officers in Malaysia, Health Extension Officers in Papua New Guinea (Carter et al, 2017)and Community Health Officers (CHO) in Nigeria among others. All physician assistants who practice in Ghana, regulated by Medical and Dental Council (MDC), which is their regulatory body (Adjase, 2015) are required to enroll and pass a licensure examination. The creation of the African Network of Associate Clinicians (ANAC) which is an African Regional Body that brings together Clinician Associates through associations and training institutions formed in 2010 was an important step forward in recognizing MLW's, as health professionals who were making a significant contribution to primary health care, rather than being just a stop-gap measure *(*Coupe*r* et al*,* 2018).

1.3 Statement of the Problem

Licensure examination describes the last hurdle a candidate faces to be licensed to practice. The examination guides on graduates' minimum knowledge, progress, skills and qualification in a particular profession (Asuncion, 2020).

Fluctuation in COC licensure examination results poses a problem because a good licensing examination should be reliable to produce consistent results administered to different cohorts when based on prior specifications of established technical and professional standard. (Kleeman, 2018). In COC licensure examinations of September 2016 to May 2019, the graduate's performance showed fluctuating results. In these

examinations, 47.6% had a minimum grade results ranging from 33 to 40 and mean grade-below the 50% pass mark in May 2017. There was an increasing standard deviation ranging between 4.9 to 7.08 in the May examinations series while in September series, the standard deviation decreased from 7.2 to 5.9 (COC, 2018).

The COC commenced licensure examination administration of BScCM pre and in-service in 2013 and 2016 respectively. The exam period of three (3) year series was selected for consistency and adequacy of data captured for pre and in-service graduates. In preceding years, data was missing. (COC, 2018).

The purpose of licensing procedure is to protect the public from harm by barring incompetent professionals from practicing. Public must be protected by ensuring professionals achieve a certain level of competency and are better prepared for the realities of clinical settings (Kreutzberg et al, 2019).

The expectation of COC is that graduates released to the public are competent enough, to be able to provide the highest quality of healthcare to Kenyans as enshrined in the Constitution of Kenya 2010, Article, and 43(1) and in COC Examination Policy (2016).

The fluctuation of examinations is an on-going concern, it is not yet known what influences graduates' performance. There is insufficient research in COC on the factors that influence licensure examination performance of the BScCM graduates. The COC endeavors to address public complaints by providing solutions that are backed by evidence, some of which relate to performance in licensure exams. Persistence of fluctuating results render COC decisions non-conclusive especially when the decision relates to linking poor

performance of an officer with their performance in licensure examinations. It is in this backdrop that this study is undertaken to establish the factors influencing performance as viewed from the COC licensure examinations of September-May series of 2016-and 2019 respectively.

1.4. Broad Objective

To assess the factors influencing performance of the Bachelor of Science in Clinical Medicine students in the COC licensure examination in Kenya.

1.4.1 Specific Objective

1. To determine the influence between BScCM student's demographic factors and their performance in the COC licensure examinations.
2. To assess the relationship between institutional factors and performance in the COC licensure examinations.
3. To assess regulatory body factors and their relationship to performance in licensure examination by BScCM students.

1.5 Research Questions

1. What is the relationship between student's demographic factors and their performance in COC licensure examination?
2. What is the relationship between institutional factors and student's performance in COC licensure examinations?
3. What is the relationship between COC regulatory body factors and student's performance in the COC licensure examinations?

1.6. Research Hypothesis

Null (Ho) Hypothesis:

There is no statistically significant relationship among students demographic, institutional and regulatory body factors with performance of the COC licensure examinations by BScCM students in Kenya ($p > 0.05$)

Alternative (Ha) Hypothesis:

There is a statistically significant relationship among student's demographic institutional and regulatory body factors with performance of the COC licensure examinations by BScCM students in Kenya ($p < 0.05$).

1.7 Justification of the Study

There's limited research on licensure examination performance for BScCM graduates. However, studies on factors influencing licensure examination performance on other medical graduates such as nurses and medical technologists have been done (Okanga et al, 2017) and (Pasia et al,2012) A study on factors that influence the performance of Bachelor of Science in Nursing (BScN) graduates in the licensure examination in Kenya revealed that institutional factors, played an important role in the candidates' success in the examination. The results indicated that the overall national pass rate was 73% and the failure rate 23 % (Nyangena, et al, 2013). In a similar study, Pasia and colleagues (2012) found out the determinants of performance for graduates in the Medical Technologist licensure examination (MTLE) in Philippines revealed that clinical internship is a best predictor of passing MTLE.

Investigating the performance of the BScCM students in COC licensure examination provides valuable information that can be used to predict performance, enhance graduation rates and increase success on the COC licensure examinations and create polices. The information will be used by COC and other stakeholders including educational institutions in planning to enhance student performance and ensure up to date preparation of the students.

The study will benefit COC and training institutions in addressing the existing knowledge gaps and challenges encountered during the examination process, enhance content validity of COC examination, assess the best timing of the examinations, strengthen the existing minimum national standards for administration of the COC examination and guide on reviewing of the Council examination policy.

This study will increase the scientific body of knowledge on COC's licensure examination on performance of BScCM graduates.

1.8 Significance of the Study

Society and patients attach great importance to such an examination as it provides assurance that graduates have met minimum standards and are 'fit- for- practice (Norcini et al, 2011). Stakeholders in health generally demand and expect information on how professional bodies measure and monitor acquisition of competencies of health care professionals for safety of services rendered.

If licensure examination performance goes unchecked, the standards of practice may be compromised and therefore tarnish the integrity of the profession. Professionals who are incompetent and unfit to practice if licensed and released to the public, would expose the

public to sub-standard health care services and an increase in quackery (Sifris & Myhre, 2020). This would tarnish Clinical Officers as unprofessional cadre of health workforce who provide substandard healthcare, leading to public demand for increased protection. The study is significant as it provides COC with evidence, if requested by its stakeholders, to explain competences of the BScCM Clinical Officer professionals since it reveals the factors that determine success or failure of the licensure examination.

1.9 Limitations of the Study

- The COC database lacked some key variables that were important for the study, course duration and employment.
- Mode of study whether direct entry or part-time was not fully provided for in the database.

To mitigate the possible bias, data of training entry dates was subtracted from examination dates to get the course duration and any duration course of four years to six years was regarded as pre-service/direct entry while the rest were in-service/part-time, this helped the researcher to identify the mode of study. To identify status of employment, the individual respondent was given a phone call.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

According to Valli Jayanthi et al, (2014) research study he identified several factors that affect students' performance in licensure examinations. Some of the factors include learning styles, learning preferences, parental factors, family income, and class size. Several variables have been considered and a combination of factors play different roles as opposed to singular factor (Farooq et al, 2016) This study categorizes the variables as student's socio-demographics, institutional and regulatory body factors. Studies in various countries evaluating same determinants showed that these factors either influence or do not influence student's performance and none could be utilized as an actual determinant. The study aimed to assess the influence of these factors to BScCM student population to identify unique factors for success or failure in the licensure examination.

2.2 Review of Related Studies

2.2.1 Performance of Examination

High quality education is crucial to the development of any profession, licensure examination is increasingly becoming a high-stake test in which passing is an important milestone for graduates. Globally, many regulating bodies require their professional's e.g. nurses, pharmacists, candidates to pass a standardized licensing examination prior to practice (Coons, n.d). The demand for quality, safe practitioners in health care is paramount, especially with the increasing cost of health care. Current advanced technology in medical sciences has brought increasing awareness and knowledge through the internet which has increased public expectations for quality care and demands for their rights.

In Kenya, through the Clinical Officers Council, there is emphasis on licensure (pre-internship) examination as it plays important role in the licensing procedures which protect the public from harm by barring incompetent professionals from practicing. The Bachelor of Science in Clinical Medicine (BScCM) program was introduced in order to produce skilled Clinical Officers with in-depth understanding of the basic sciences as a foundation for clinical courses and adequate skills in management and leadership in community health. The program was also to offer opportunities for Clinical Officers to progress academically and at the same time improve standards of health care services in the country. The total number of BScCM graduates trained are about 1000 but those registered are 950 (COC, 2018).

2.3 Student's Demographic Factors Influencing Performance in COC Examination

Previous studies (Christopher & Redempta, 2016) have identified some factors that adversely affected student's performance in various examinations. However, no study has so far been done in Kenya regarding Clinical Officers licensure examinations. The study seeks to establish whether or not the same factors are responsible for influencing performance in COC licensure examinations. Literature on age, gender and employment is reviewed below.

2.3.1 Age

Valli Jayanthi et al, (2014) quoted Richardson who reports that students above 30 years (up-graders) embrace self-directed learning and seek a deeper understanding of their academic work hence perform better than the younger students. Adult learners bring learning styles and life experiences that are critical foundations and provide opportunities

to educators to embrace the life experiences and wisdom (Kenner & Weinerman, 2011). Clinical Officers (up-graders/ in-service) who have passed through the Clinical Medicine diploma program sit for the same examinations as pre-service /direct entry students.

2.3.2 Gender

According to Valli Jayanthi et al, (2014) research study in Singapore on factors contributing to academic performance of students in institution of higher learning found out that females exhibit higher Grade Point Average (GPA) scores than their male counterparts. Other studies by (Farooq et al, 2016) showed that female students were performing better academically than males. Studies have indicated that gender plays an important factor in influencing performance.

2.3.3 Employment

Based on the theory of andragogy, adult part-time upgrading students have a lot of commitments related to family and work or both (Stevens, 2018) or those employed need to balance work and academics. According to David Knowles' four principles of andragogy, adults need to plan and evaluate their instruction, embrace self - centered learning and get interested (Taylor & Hamdy, 2013).Giving recommendations on how to improve performance, employers should give scholarships for staff, fulltime benefits, allow employees prepare for exams and special recognition to motivate those that pass exams.

2.4 Institutional Factors Influencing Student's Performance in COC Examinations.

This study has considered the following factors; type of institution, entry qualifications, mode of study, school policies and lecturer qualification and experience.

2.4.1 Type of Institution

Good performance of training in institutions enhances student learning. The purpose of any institution is to produce competent students who are equipped with knowledge, practical skills as well as educational capability for competing in the labor market. A study done in Nigeria revealed that performance of students was best in private institutions followed by the performance of students in the Mission institutions and least performance was in the state institutions (Ondo state School of Nursing et al, 2013).

Another study done on the relationship between institution type and overall performance at a medical school in United Kingdom provided modest supportive evidence that students admitted with similar grades showed government institution outperform students in private schools.(Kumwenda et al, 2017).

2.4.2 Admission Criteria Based on Entry Qualifications

High entry qualifications are associated with high pass scores and pass rates. As a requirement for enrolment to Clinical Medicine program at the University, BScCM graduates must have required mean grade and cluster subjects in O level before admission (Nyangena et al, 2013). Kenyan government universities have a criterion that categorizes the selection under the Kenya Universities and Colleges Central Placement Services (KUCCPS) versus the Private Sponsored Student Program (PSSP) basing on grade attained

in the Kenya Certificate of Secondary Education (KSCE) examinations. COC regulates the minimum entry requirements for the Clinical Medicine programs and institutions must adhere to the requirement on selection of Clinical Medicine students (COC Examination Policy, 2016). A study done in Moi and Egerton Universities revealed that a Kenya Certificate of Secondary Education aggregate grade at admission has no influence on students' performance in preclinical and clinical courses (Obwoge et al, 2017)

2.4.3 Mode of Study

A study carried out on open and distance learning concluded that there are higher chances of attaining higher learning outcome in distant learning than face to face learning and thus superiority of the FTF modality over its distance learning alternative has been successfully negated (Okanga et al, 2017) .

The Clinical Medicine program has not embraced distant learning, the student mode of study is full-time for pre-service students and part-time (weekend based) for the up-grading students. Part-time and distant learning have demonstrated higher abilities in patient care and managerial roles.

2.4.4 Lecturer Qualifications

Students require lecturer's as facilitators or guides in the student-directed learning, and this can only be successful if the lecturer has the right qualifications. Ernest Leroy (2013), stated "a poor surgeon hurts one person at a time, but a poor teacher hurts 130 people"?

Lecturer's qualifications is attributed to better student performance while shortage of qualified lecturers in any discipline leads to poor performance (Idowu, 2016). Student

performance is identified by the lecturers basing on their own levels of understanding (Sadler et al, .2013)

However, a study by (Amanonce & Maramag, 2020) found out that lecturer academic abilities did not have an effect on the students' instruction process and performance. Lecturer quality refers to all lecturer related characteristics that produce favorable educational outcomes.

2.4.5 Lecturer Experience

Lecturer experience is the key factor in personnel policies that affect employees with less experience. A study done revealed that lecturing experience does not give significant experience in student performance. A combination of experienced and less experienced lecturers contribute to student performance (Graham et al, 2020). World Bank report, also showed a positive correlation between the lecturer experience in years and the learners' academic achievements.(Darling-Hammond, 2006)). It was identified that with continued professional advancement, students performed better because of the increased chances they had on improving on their previous performances and this would automatically reflect in improved learner outcomes. Some research indicate that a lecturers' experience contributes to student learning only in the first few years in classroom but additional experience does not make any difference while other studies suggest that impact of experience on student achievement may continue beyond the first years

2.4.6 School Policies

These include teaching methods, class attendance and pass mark. Student's class attendance is a major concern for any educator. This was according to a study on factors

affecting student academic performance which found out that poor class attendance hinders academic achievement (Rawlani et al, 2018). The effect of student absence from class showed to have effects on student performance in any examination. (Arulampalam et al, 2012) Among the lecturer's related factors that were found to have high impact in relation to performance was lateness and absenteeism. On pass mark the goal of educational activities was to pass all student that have competencies (Knowledge, skills and attitude) and fail those who do not.

Teaching methods are those techniques the lecturer uses to bring the student in to contact with the content to be learned. Some examples include face to face/lectures, computer assisted learning/e-learning, mixed methods, group discussions, simulations, role-plays, self-directed methods, flip classrooms, distance learning techniques. Teaching methods can be traditional or innovative. A study on flipping the classroom to improve student performance found out that by correctly using innovative methods , faculty are better able to model students which enables the students to integrate theory and clinical practice (Låg & Sæle, 2019).

2.5 Regulatory Body Factors Influencing Student Performance in COC Examinations.

Licensure exams for Clinical Officers are set and conducted by the COC. Performance of any examination is influenced by several factors including methods and techniques used in conducting the examination. Factors include content validity of the examinations and time lapse after completion of perquisite final examination and taking of licensure examinations. Validity examines the entire process of setting, moderation of the test items and marked scripts, invigilation and marking.

2.5.1 Validity of the COC Licensure Examinations

A valid test is an accurate, true measure of a student competency (Young et al, 2018). Validity of an exam can be compromised if a test does not measure what it is supposed to measure, it does not reflect the knowledge and skills (Kleeman, 2017). Several proposals have been put forward on how to establish validity and discussion focused on defining different aspects of validity. Standards of educational and Psychological tests (1974) have been cited (Beck, 2020) suggesting different types of validity: Content, face, criterion related, and construct validity. This study focused on content validity as it would show the extent to which the test items in the COC licensure examinations cover the BScCM Core Curriculum.

Content Validity

Content validity refers to how a test measures the construct that it sets too measure. A test lacks content validity if covered topics are unrelated to the construct in any way. In practice content validity is often used to assess the validity of tests that assess content knowledge

(Zach, 2021). When high-stake assessments are being written, the developers often bring in subject specialist to check if both the content specialization and the matching assessment items reflect what is commonly taught. Validity is an evaluation of the quality of the interpretations and decisions that are made on the bases of an assessment result.

Physician Assistant National Certifying Examination (PANCE) objective is to test the competence of Physician Associates in United States, a blueprint guides on the conduct and content of the exam used i.e. attaining the highest level of validity and reliability. The test was categorized in two dimensions of the domains of knowledge and skills (NCCPA, 2019). Content validity, sometimes referred to as the principle of "inclusiveness" is concerned with the extent to which a test covers the content it is supposed to. Content validity can be established by comparing what is in the curriculum, for example, and what is in the test. In theory, the closer the comparison the better the content validity. There is no statistical test to determine whether a measure adequately covers a content area. Content validity usually depends on the judgment of experts in the field.

A valid examination utilizes the revised Blooms taxonomy of which Anderson Lorin modified the original terminology by changing Bloom's categories from nouns to verbs, the words became: Remember, Understand, Apply, Analyze, Evaluate and Create. Anderson renamed the cognitive, psychomotor and affective design as a basis of writing and coding items for examinations (Anderson et al, 2000) Using Anderson's revised taxonomies of learning in COC is key because Clinical Medicine licensure exam requires application of knowledge, skills and abilities, and so most of the test items are written at the application level of cognitive ability that needs complex thought processing.

Examination Process

Entire process of examination includes: setting, moderation of test items and marked scripts, invigilation and marking. Exam setters are identified by the COC examination board. Qualified lecturers with high integrity is a significant requirement for being a setter (Examination Policy, 2016). They set test items using the BScCM core curriculum. Exam setters ensure all the domains are captured, that is Knowledge, skills and attitude. The same standards are upheld for markers and moderators. The marking scheme is used faithfully and accurately and each marker signs against the final score of the question marked. Any information acquired during the marking exercise is highly confidential. This information includes; content of scripts, identities of candidates and marks awarded to their scripts. Failure to adhere to these instructions results in disciplinary action taken against the marker.

Comparing COC licensure examination and PANCE: the PANCE has a blueprint which provides a concise summary of the content and scope of the licensing examination. ("PANCE Blueprint," 2019), while COC has none but uses the core curriculum to guide the setters. Some countries like Ghana licensing examination are administered as online exams (Emmakd, 2019).

Professional moderation of examination ensures the scripts are marked in an academically rigorous manner with reference to the agreed marking scheme. COC examinations are moderated by both internal and external moderators this is done for the test items, marking scheme and marked scripts (Examination Policy, 2016). Good moderation practices, are important to the means of assessment been used, accurate and fair, acceptable and

appropriate to the medical discipline, evidence in the feedback is provided by the candidates (Ombasa, 2017).

2.5.2 Examination Timing in Relation to Completion of Training

This is the duration between completion of graduate's pre-requisite basic training in an institution and the time the graduate takes the licensure examination. This time can be prolonged by the graduate who is unable to sit for exams due to personal or institutional reasons. Established student's perception of licensure examination and their readiness to take it could affect their performance and predict their success or failure (Linda, 2015) Students who sit for the exam immediately they graduate have a higher chance of passing (Nyangena et al , 2013).

The COC examination is administered twice a year, in the month of May and September, (COC Examination Policy, 2016). A majority of the students do their academic Final Qualifying Examination (FQE) in July of every year and sit for the licensure examinations in September. For those trained outside Kenya, long duration before sitting for the COC licensure exam leads to poor performance.

2.6 Conceptual Framework

Figure 2.1: below presents the conceptual framework of the study

The framework for this study was adapted from Donabedian structure, process outcome model (2005). Based on descriptions by previous scientific studies (Patrick, 2015. Donabedian, 2012 and Truman, 2012), the conceptual framework was used to examine health service and evaluate quality care.

Educators find it difficult to transfer their education theoretical knowledge into practice, in conceptual article the Donabedian framework of structure, process and outcome that is traditionally used to evaluate quality healthcare was applied in educational environment to develop a programme to introduce inter-professional education on health sciences(Botma & Labuschagne, 2017). The authors worked from the premise that theory should guide action and action inform theory.

Basing on the perceptions, an improvement in the structural aspects would automatically yield a good process thus enhancing a good outcome. Taken in educational perspectives and as adapted by Truman, (2012) the concept of structure is viewed as those factors relating to students' socio-demographic, their environment which includes institutional and regulatory body factors. When structural factors are integrated in a specific program which is conceptualized as the process, they produce positive or negative outcome. Balancing these structural factors is important in determining students' performance. Structural factors include students' socio-demographic, (gender, age and employment), institutional (type of training institution, entry requirements, mode of study, lecturer's qualification and

experience, school policies) and regulatory body factors (content validity of examination and timings). All these factors can influence performance leading to either a pass or fail.

Conceptual Framework

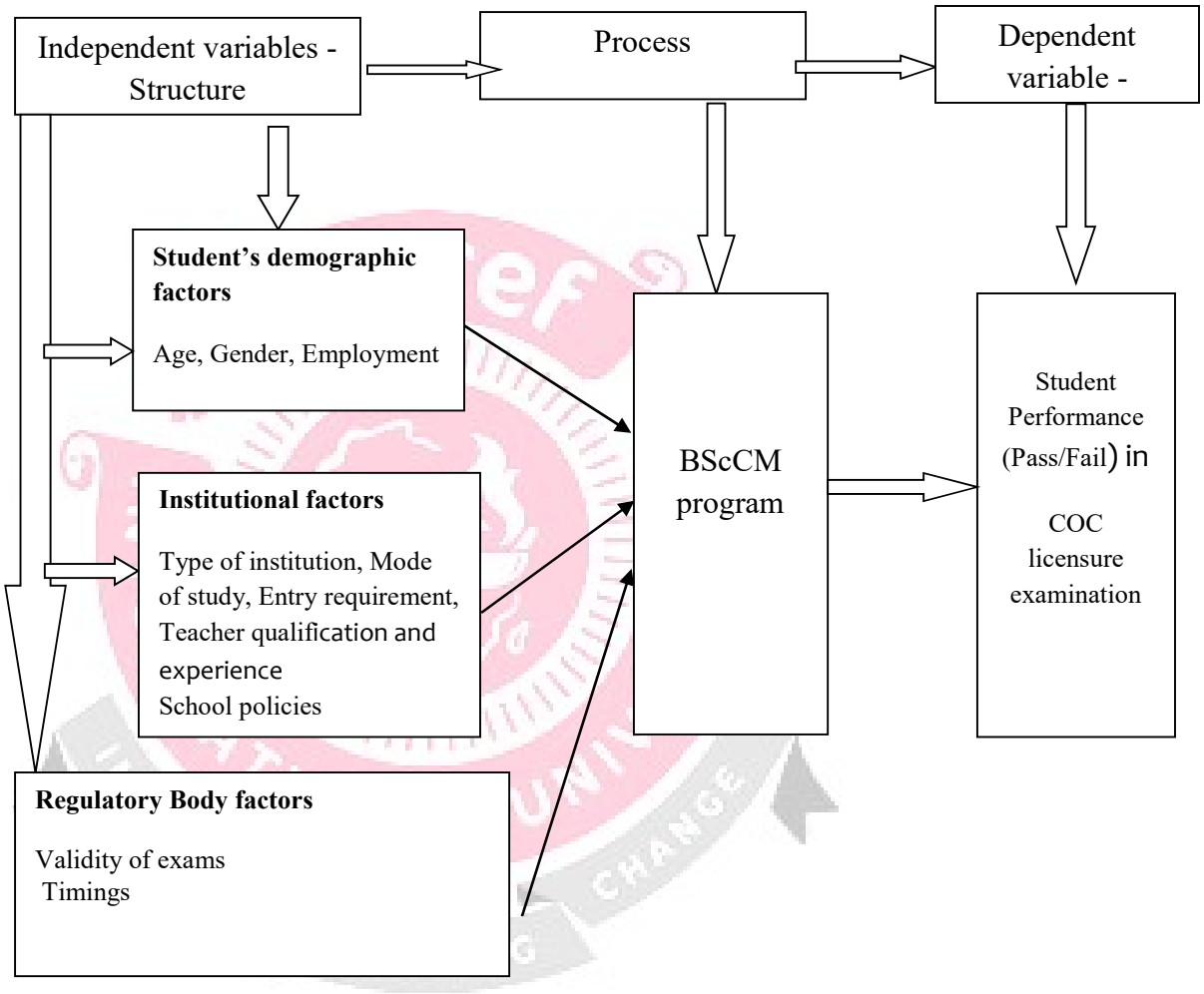


Figure 0.1: Structure Process Outcome Model adapted from Donabedian (2005)

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This Chapter describes the techniques and approaches that were used during this study. The research design, study site, target population, sample size, sampling procedures, and the instruments that were used for collection of data are all explained. It concludes with outline of data analysis and dissemination of the findings.

3.2 Research Design

The research design was a retrospective cohort study using both qualitative and quantitative data collection methods. The researcher chose to use this design because beyond describing the variables, the study made inferences about possible relationships that existed amongst the variables, thus giving meaning to the study. The researcher linked a particular outcome which is pass/fail in the COC licensure examination for BSc graduates with various independent variables and used past consolidated mark sheets and students' files to gather information from regulatory Human Resource Information System (rHRIS) and Key informant interview schedule guides (both manual and online) were used to collect relevant data from the key informants.

3.3 Study Site

There were two main study sites: Clinical Officers Council rHRIS and selected Universities in Kenya. The Clinical Officers Council, located in Nairobi, regulates all Clinical Officers and has a regulatory Human Resource Information System (rHRIS) where all evidence for the licensure examination administered for BScCM holders is kept. It had data concerning students enrolled for Clinical Medicine programs, their institutions, when they sat for the licensure exams and the outcomes for licensure examination. The other

study area was the selected universities offering Clinical Medicine programs, where students are enrolled at a capacity of 50 per intake. They included: Mt. Kenya University (MKU) and Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Central region, Great Lake University of Kisumu (GLUK), UZIMA and Kisii Universities in Nyanza region, Egerton University and University of Kabianga in Rift Valley region where Key informants were interviewed.

3.4 Target Population

The target population comprised of all BScCM students data, ranging from 17 – 49 years, who had sat for the COC examinations, from September 2016 to May 2019, Chairman of the COC examination board, seven (7) Chairmen of Clinical Medicine department and eleven (11) lecturers from Universities offering Clinical Medicine program which included: MKU, JKUAT, GLUK, UZIMA, UoK, Egerton and Kisii University.

3.5 Inclusion Criteria

Institutions offering BScCM program and had enrolled their students for COC licensure examination during the period of September 2016 to May 2019, both failed and pass students. All Chairmen of departments and lecturers in selected universities training in Clinical Medicine programs and chairman of COC Examination Board.

3.6 Exclusion Criteria

Institutions that had not enrolled their BScCM students for COC licensure examinations from September 2016 to May 2019. Data of students having a second examination attempt or more in the COC licensure examination and those who did not do exams from September 2016 to May 2019 but had booked exams.

3.7 Sampling Design

The researcher clustered the Clinical Medicine training institutions in three categories, government, private and faith -based institutions. Proportionate allocation of participants into cluster was done basing on their level of representation. Faith-based organizations and private institutions were few, three (3) in number. They were allowed in the sample. Government institutions selected using simple random sampling, three out of the four institutions were randomly picked, with more than thirty percent acceptable for a sample. This was achieved by picking three out of four folded papers representing government institutions from the box randomly. For key informants, purposive sampling was done, where Chairman of the COC examination board, Universities Chairmen of Clinical Medicine departments and lecturers were interviewed. Records for candidates who did the licensure exam from September 2016 to May 2019 were all included in the sample for data base analysis.

3.8 Sample Size Determination

The number of institutions meeting the inclusion criteria were seven. Four (4) government universities: Kisii University, Egerton University, University of Kabianga and JKUAT. Two (2) private universities – (MKU and GLUK), one (1) faith-based university (Uzima University). Three (3) government institutions: UoK, Kisii and Egerton Universities were

selected which formed 30% of the population. Two private and one faith-based universities were all included in the sample because they were few, leading to researcher using six institutions. One government university was used for conducting pilot study for the key informant interview but its COC database records were included in the main study. The institution was selected because it had similar characteristics with the study area.

Table 3.1: Sample Population of BSc Students

Institutions	Population	Sample
Government	650	242
Private	227	143
Faith Based	47	42
Total	924	427

Slovin's Formula (Tejada *et al,* 2012)

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Rationale of using the formula

The Slovin's formula (2012) is used when the population rendered cannot entirely be studied and thus a fitting sample which is smaller is acquired using the sampling technique. Utilizing this formula to derive a suitable sample from the population guarantees the researcher adequate degree of accuracy and presents extend the sample needs to be, in order to produce rational validity of the results. The formula takes into consideration the confidence levels and margin of errors when deriving a sample from a population.

The population was divided into groups that was clustered into different types of institutions. The formula was a perfect fit to acquire samples from the groups where sampling the whole population does not render the data needed whereas sampling each group guaranteed accurate results.

3.9 Instrument Development

Items for transcription form (**Appendix 1**) used to collect data from the Clinical Officers Council database were developed by the researcher with the aid of the supervisors. Variables in the form included: Index No/code, Age, Gender, Mode of study, Employment, Employer, Mean score in KCSE, Date of entry into training, Type of training institution, Date of completion of training and Dates of examination.

Key informant interview schedule guide that were was used to collect information from key informant (**Appendix 2,3 &4**) i.e. Universities Chairmen of Clinical Medicine departments and Chairman of COC examination board, were adopted from one used by the Task Force report from the nursing education institutions and faculty which was used across the institutions that the study was carried out. The items on the guide were revised and customized to fit the study. Google forms (**Appendix 5)** were used for the University lecturers due to travel restrictions during the COVID-19 pandemic.

3.10 Validity and Reliability of the Instrument

Validity is the extent to which an instrument measures what it purports to measure. A pilot study was done to test if the questions were answering what they were intended to test. One of the government institutions, JKUAT, was used for the piloting purposes, where the Chairman of the department was interviewed. A further refining of the tool was done after the pretest. Reliability is a measure of the degree to which an instrument yields consistent results or data after repeated trials.

3.11 Data Collection Procedures

Data collection involved retrieving information from the Clinical Officers Council rHRIS database at Nairobi. The key items required were identified and specific data was merged using the index numbers. Index numbers are unique identifiers assigned to qualified students after enrollment. The COC data clerk assisted in retrieving the information from the COC database.

Key informants' interviews were carried out using Key informant Interview schedule Guides and Google forms and the data was recorded. The respondents interviewed were the Chairman of the COC Examination Board, Chairmen of Clinical Medicine departments and lecturers from Universities with Clinical Medicine program. Data collection from the Key informants was collected by the researcher herself.

3.12 Data Management

The demographic data was identified using an index number which was the unique identifier, giving yielded results of 950. The raw data collected was cleaned by checking for spelling errors, elimination of any duplicate data, data accuracy and coding the data to be fit for analysis. From these, the index number was merged with the grade results that

had the same unique identifier yielding records of 945. To ensure only the first attempt students remained those with supplementary were excluded and data used for analysis was 924.

The course duration was available for some students, while for the majority it was not provided, therefore data of training entry dates subtracted from examination dates provided the course duration. Any duration course of four years to six years was regarded as pre-service/direct while the rest were in-service/upgraders, this helped the researcher to identify the mode of study. Date of birth and gender were available. All who passed were accorded 1 while a fail was accorded 2.

3.13 Data Analysis

The software used for data analysis was SPSS software Version 26. A descriptive overview of the students, frequencies and mean was used as measure of central tendency while range and standard deviation was computed as measure of dispersion. A univariate analysis was done, bivariate analysis was also done on the independent and dependent variables with p (less than or equal to) 0.05 being considered significant, Regression analysis was computed to determine the relationship and strength of the effect of independent variable (student's demographic, institutional & regulatory body factors) on the dependent variable (performance). Data had dependent variable that was dichotomous in nature i.e. two entries of either pass or fail.

To analyze and interpret the meaning of the qualitative data, similar responses to specific interview questions were grouped and thematic coding was done to make general sense of data.

3.14 Ethical Consideration

The researcher sought approval to conduct data from Amref International University and ethical clearance from the Research Ethics Committee of Amref International University (**Appendix 9).** The permit was from National Commission for Science, Technology and Innovation (NACOSTI). (**Appendix 8**) The researcher also sought permission from Clinical Officers Council to utilize data (**Appendix 7**). Universities that had submitted students for examination from September 2016 to May 2019 were selected. For justice, participant's anonymity was maintained prior to compiling and analysis. Database was maintained securely throughout the study to ensure that no harm to the participants or institution occurred. Informed consent (**Appendix 6**) was obtained from participants in the Key informant interviews from the institutions involved and they were allowed to withdraw from the study at any point without suffering any consequences.

3.15 Dissemination of Research Findings

Research reports will be disseminated to the Clinical Officers Council (COC), forums such as scientific conferences for academic purposes and COC will disseminate to institutions as one of her activity.

CHAPTER FOUR: RESULTS

4.1 Overview

Findings of the study are presented in this chapter. The researcher organized them as per study objectives. It therefore required determining the relationship between selected variables and performance (pass/fail). This chapter presented demographic characteristics of the students in relation to performance, which included the age, gender and employment. It also provides results on institutional factors including, type of institution, and mode of study, admission criteria, lecturer characteristics, school policies, and their relationship to performance. Finally, the regulatory body factors which includes, content validity, examination process, timing and their relationship to performance and experience encountered during training captured by Key informant interviews schedule guides.

4.2 Student's Demographic Factors

The descriptive statistics derived from the consolidated mark sheet student's performance data in the COC rHRIS was presented in this section. It involved tests such as mean, median, minimum, maximum, standard deviation, skewness and kurtosis of various variables for the students. All the files per the sample were assessed. Table 4.1 presented a detailed descriptive statistic of age while table 4.2 presents gender.

4.2.1 Age of BScCM Students by Institution

The data on age of BScCM students by institutions was presented in **Table 4.1**. Age was divided into groups with an age interval of 10 years apart ranging from 20 years and below, i.e. 20-29, 30-39 and 40-49 years. Students between ages 20 - 29 years old were the majority, 193 (44.7%) followed by under 20 years old being 147 (34.4%), while the least were between age 40 - 49 years old 16 (3.7%) of the total students who sat for licensure

examinations. Government institutions had the highest number of students with the youngest student being 17 years and the oldest being 44 years. The mean age of government institutions students was 25 and a standard deviation of 7.079. Private institutions had the lowest mean age of 21.7 and standard deviation of 4.293 with the youngest student being 17 years old and oldest 40 years. Faith based institutions had the least number of students with the highest mean age of 30 years and standard deviation of 6.325. The oldest student was 49 years old with the youngest being 18 years old. All institutions had most of their students in the age 20 to 29, with government institutions having the highest number of 96 out of 242(39.7%) while both private and faith based institutions had 75 out of 143(52.4%) students and 20 out of 42(47.6%) students respectively. Students between 40 and 49 years were the least compared to the number of students in other age groups.

The data of age of BScCM students by mode of study was illustrated on **Table 4.1** the students were admitted under two categories: direct entry and part time. The highest number of students were admitted as direct entry with 255 (59.72%) with a mean age of 20.02 and a standard deviation of 3.07 while part time students were 172 (40.28%) with a mean age of 30.8 and a standard deviation of 5.15. The oldest student in direct entry Category was age 41 while the youngest recorded was 17 years old. In the case for part time students, the oldest student was 49 years old while the youngest was 22 years old.

Table 4.1: Age of students by Institution and Mode of Study

	Under 20	20 - 29	30 - 39	40 - 49	Total	Std Dev	Mean	Min-Max
Faith Based	3 (7.1%)	20 (47.6%)	16 (38.1%)	3 (7.1%)	42	6.325	30	18-49 years
Government	86 (35.5%)	96 (39.7%)	48 (19.8%)	12 (5.0%)	242	7.079	25	17-44 years
Private	58 (40.6%)	75 (52.4%)	9 (6.3%)	1 (0.7%)	143	4.293	21.7	17-40 years
Total	147 (34.4%)	193 (44.7%)	71 (17.1%)	16 (3.7%)	427	6.645	24.4	17-49 years
Direct	147 (57.6%)	101 (39.6%)	5 (2.0%)	2 (0.8%)	255 (59.7%)	3.073	20	17-41years
Part-time	0 (0.0%)	90 (52.3%)	68 (39.5%)	14 (8.1%)	172 (40.2%)	5.154	30.8	22-49 years
Total	147 (34.4%)	191 (44.7%)	73 (17.1%)	16 (3.7%)	427	6.637	24.3	17-49 years

4.2.2 Gender of BScCM Students by Mode of Study and Institution

The data on gender of the students in the institutions was illustrated in **Table 4.2**. Out of the total 427, 219 (51.29%) of the students were males while 208 (48.71%) were females. Comparing all the institutions, the number of male and female students from government institutions exceeded other institutions leading with 109 (45.04%) males and 133 (54.95%) females out of 242 students. The Faith-based institutions had the least number of students with 29 (69.05%) males and 13 (30.95%) females out of 42 students. The government institutions had a highest number of students attending the direct entry mode of study who were females with 81 out of 255 (60.9%) and highest number of part time students who were males with 61 out of 172 (56.0%). The least number of students recorded were from Faith-based institutions, where five 5 (38.5%) females and one (1) 3.4%) male who were from direct entry mode of study. It also clearly showed most students on part-time mode of study whether males or females preferred government institutions.

Table 4.2: Gender of Students by Mode of Study and Institution

Gender	Mode of Study	Training Institution			
		Faith Based	GOK	Private	Total
Female	Direct Entry	5 (38.5%)	81 (60.9%)	48 (77.4%)	134 (64.4%)
	Part Time	8 (61.5%)	52 (39.1%)	14 (22.6%)	74 (35.6%)
	Total	13 (30.95%)	133 (54.95%)	62 (43.36%)	208 (48.71%)
Male	Direct Entry	1 (3.4%)	48 (44.0%)	72 (88.9%)	121 (55.3%)
	Part Time	28 (96.6%)	61 (56.0%)	9 (11.1%)	98 (44.7%)
	Total	29 (69.05%)	109 (45.04%)	81 (56.64%)	219 (51.29%)
Total (Both Male and Female)	Direct Entry	6 (14.3%)	129 (53.3%)	120 (83.9%)	255 (59.7%)
	Part Time	36 (85.7%)	113 (46.7%)	23 (16.1%)	172 (40.3%)
	Total	42	242	143	427

4.3 Students Demographic Factors and Performance

To investigate the relationship between student'socio-demographic factors and their performance in the COC licensure examination. The following variables were examined: age, gender and employment

Overall Performance Basing on Age and Gender

The overall performance based on age and gender were illustrated in **Table 4.3**. Age was categorized into groups ranging from age under 20, 20 – 29, 30 – 39, and 40 – 49. Gender was categorized into two groups as either male or female. The overall percentage pass in all institutions was 387 out of 427. The highest pass was recorded in the ages 20-29 and was 45.5% which was followed by those ages under 20.Those in category of 30-39 performed well with no failures.

Gender results showed males performed better than females by having 51.4% pass against females with 48.6%.

Table 4.3: Overall Performance by Age and Gender

Variable	Category	Remarks		Total
		Fail	Pass	
Gender	Female	20 (50.0%)	188 (48.6%)	208 (48.7%)
	Male	20 (50.0%)	199 (51.4%)	219 (51.3%)
	Total	40	387	427
Age group in years	Under 20	24 (60.0%)	123 (31.8%)	147 (34.4%)
	20 - 29	15 (37.5%)	176 (45.5%)	191 (44.7%)
	30 - 39	0 (0.0%)	73 (18.9%)	73 (17.1%)
	40 - 49	1 (2.5%)	15 (3.9%)	16 (3.7%)
	Total	40	387	427

4.3.1: Age and Performance by Grouped Grades and Institutions

The information on the age of the students by grouped totals was demonstrated in **Table 4.4**. The age was grouped with interval of 10 years that consisted of under 20, 20 to 29, 30 to 39, and 40 to 49. The groups captured the ages of those students who are under 20 years, in their twenties, thirties and forties years. The grades were categorized as follows; under 40, 40 – 49.99, 50 – 59.99, 60 – 69.99, 70 – 79.99 and 80 and above. Further the grades were also categorized into two, for those who failed and those who passed the examinations, 49.99 being the threshold between pass and fail.

Grade group of 60 to 69.99 had the highest number of students who were from age group 20 to 29 years with 85 (47.8%) students. The lowest number of students recorded were those who had grades 80 and above and 40 to 49.99 each having one student. Most of students who were under 20 years scored between 50 and 59.99 with 66 (36.9%). Students who were between 30 and 39 years old mostly had scores between 60 and 69.99 and they

were the only age group who had 1 student scoring 80 and above. Comparing all age groups, students between 40 and 49 had the least students of 16 (3.7%) and most of the students at the age of 20-29 years old had scores between 50 and 59.99 and 60 to 69.99 each having 84 (46.9%) and 85 (47.8%) students respectively.

Table 4.4: Performance by Grouped Grades in Relation to Age

Group age	Grouped grade (%)						Total
	Below 40	40-49.9	50-59.9	60-69.9	70-79.9	Above 80	
Below 20	3 (50.0%)	21 (61.8%)	66 (36.9%)	47 (26.4%)	10 (34.5%)	0 (0.0%)	147 (34.4%)
20-29	3 (50.0%)	12 (35.3%)	84 (46.9%)	85 (47.8%)	7 (24.1%)	0 (0.0%)	193 (44.7%)
30-39	0 (0.0%)	0 (0.0%)	23 (12.8%)	40 (22.5%)	9 (31.0%)	1 (100%)	71 (17.1%)
40-49	0 (0.0%)	1 (2.9%)	6 (3.4%)	6 (3.3%)	3 (10.3%)	0 (0.0%)	16 (3.7%)
Total	6	34	179	178	29	1	427

The data on the age of the students by training institutions is illustrated in **Table 4.5**. Government institutions had more students who had passed their exams in all age groups. The highest number of students who had passed were from ages 20 to 29 years with 93(39.9%) out of 242, while those who were 40 to 49 years old had the least with 12 out of 242 (5.0%). In government institutions, students who had failed were under 20 years with 6 (66.7%) and those who were between 20 to 29 years were 3 (33.3%), age group of 30 to 39 years and 40 to 49 years had no students who had failed.

Majority of private institutions' students who had passed the examinations were between age 20 and 29 with 64 out of 114 (56.1%) students followed closely with students under 20 years with 40 out of 114 (35.1%). Although 30 to 39 and 40 to 49 age groups had the

lowest number of students who passed, none of their students failed the examinations. Most of the students in private institutions, 18 (62.1%), who failed exams were aged20 years and below followed closely by students aged 20 to 29, 11 (37.9%) with both of them being the highest across all institutions.

Faith-based institutions had the least number of students who had both passed and failed exams compared to all the institutions, the institution had a majority of students age 20 and 29 years, 19 (47.5%) in total who had passed exams. The lowest number of students (2) students had passed and were between 40 and 49 years. Only 2 students had failed the examinations, each from ages 20 to 29 and 40 to 49.

Table 4.5: Performance by Institutions in Relation to Age

Group Age	Training Institution								
	Faith Based (%)			GOK (%)			Private (%)		
	Pass	Fail	Total	Pass	Fail	Total	Pass	Fail	Total
< 20	3 (7.5)	0 (0.0)	3 (7.5)	80 (34.3)	6 (66.7)	86 (35.5)	40 (35.1)	18 (62.1)	58 (40.6)
20-29	19 (47.5)	1 (50.0)	20 (47.6)	93 (39.9)	3 (33.3)	96 (39.7)	64 (56.1)	11 (37.9)	75 (52.4)
30-39	16 (40.0)	0 (0.0)	16 (38.1)	48 (20.6)	0 (0.0)	48 (19.8)	9 (7.9)	0 (0.0)	9 (6.3)
40-49	2 (5.0)	1 (50.0)	3 (7.1)	12 (5.2)	0 (0.0)	12 (5.0)	1 (0.9)	0 (0.0)	1 (0.7)
Total	40	2	42	233	9	242	114	29	143

4.3.2 Gender and Performance by Grouped Grades and Institutions

The information on the performance of the students in terms of grouped grade totals basing on gender was presented in **Table 4.6**. Most of the students (179) scored marks between 50 and 59.99%, with 90 (50.3%) being males and 89 (49.7%) females. Following closely were 178 students who had scored between 60 and 69.99%, with 98(55.1%) being male

and 80(44.9%) being female students. Only one female student scored above 80 % (100%) who was a female and 6 students scoring below 40%, 2(33.3%) female and 4(66.7%) male students.

Table 4.6: Performance by Grouped Grades in Relation to Gender

Gender	Grouped Total					
	Below 40%	40 - 49.99%	50 - 59.99%	60 - 69.99%	70 - 79.99%	Above 80%
Female	2 (33.3%)	18 (52.9%)	89 (49.7%)	80 (44.9%)	18 (62.1%)	1 (100%)
Male	4 (66.7%)	16 (47.1%)	90 (50.3%)	98 (55.1%)	11 (37.9%)	0 (0.0%)
Total	6	34	179	178	29	1

The data on the performance of the students in the different institutions based on gender was presented in **Table 4.7**. Government institutions seemed to have recorded the highest number of students who passed, with both males and females leading by 108 (46.4 %) and 125 (53.6%) respectively. Out of the total number of students registered in government institutions, only 9 out of 242 students failed. One (1) (11.1%) student was male and 8(88.9%) females.

Faith based institutions had the least number of students who failed exams, 1(50.0%) male and 1 (50.0%) female out of the total 42 students. Out of its 40 students who had passed the exams 28 (70.0%) students were males and 12 (30.0%) were females.

While private institutions recorded higher numbers of passing students, 114 in total, than faith-based institutions, they had significantly the highest number of failing students in all institutions. Out of the 29 failing students 11(37.9%) were female students and 18 (62.1%) were males.

Table 4.7: Performance by Institutions in Relation to Gender

Gender	Training Institute					
	Faith Based		GOK		Private	
	Fail	Pass	Fail	Pass	Fail	Pass
Female	1 (50.0%)	12 (30.0%)	8 (88.9%)	125 (53.6%)	11 (37.9%)	51 (44.7%)
Male	1 (50.0%)	28 (70.0%)	1 (11.1%)	108 (46.4%)	18 (62.1%)	63 (55.3%)
Total	2	40	9	233	29	114

4.3.3: Bivariate Analysis of Socio Demographic Factors (Age and Gender) and Performance

The bivariate analysis of socio demographic characteristics (age and gender) and performance is illustrated in **Table 4.8**. In this Table, age is categorized into two broad groups with one group of older students are 30 years and above while the other of younger students were ages below 30 years. There was a significant association between age group and performance. The proportion of those who passed and were aged 30 years and below was significantly higher than those above 30 years with 299 (77.3%) and 88 (22.7%) respectively, but those below 30 years had more students who had failed the exams, 39 (97.5%), than those above 30 years 1 (2,5%) out of 40 . This implies that those who were older had a higher mean grade of 62.52 while those below 30 years had a mean grade of 57.97. Gender and performance showed that female students had a higher mean grade of 58.95% by only 0.1% than the male students who had 58.85%. The logistic regression analysis was performed to determine the association between grouped age and performance as demonstrated in Table 4.8. There was a negative association between grouped age and performance. (B = -2.414, *p-value = .018*). The students who were below 30 years of age

are 0.089 less likely to pass the examinations than students who were above 30 years of age (OR = 0.089, 95%CI (0.012-0.660). Further analysis on gender demonstrates no significant association (B = 0.057, *p-value = 0.798*).

Table 4.8: Logistic Regression Analysis of Socio-Demographic Factors and Performance

	Group	Remarks (%)				B	OR	95% C. I	P-Value
		Fail	Pass	Total	Mean Grade			Lower Upper	
Range of age	30 and above	1 (2.5)	88 (22.7)	89 (20.8)	62.52	-2.41	0.089	0.012 – 0.660	*P=.018*
	Below 30	39 (97.5)	299 (77.3)	338 (79.2)	57.97				
	Total	40	387	427					
Gender	Female	20 (50.0)	188 (48.6)	208 (49.7)	58.95	0.057	1.059	0.475 – 1.773	*P=.798*
	Male	20 (50.0)	199 (51.4)	219 (51.3)	58.85				
	Total	40	387	427					

4.3.4 Employment and Performance

The data on the employment status of students based on performance is demonstrated in **Table 4.9**. None of the students who were below 20 years were employed. Even though 49 out of 191 (25.7%) students who were between ages 20 and 29 were employed, 142 out of 191 (74.3%) students were not employed which is the highest number of unemployed students. Students who were between 30 and 39 years had 42 out of 73(27.3%) students who had passed examinations and employed while 31 out of 73 (42.5%) students had passed but unemployed. Out of 15 students who had passed exams, they were aged between

40 and 49 years, 10 (66.7%) students were employed and 5 (33.3%) students were unemployed. Clearly shows students who were employed performed better than those who are not employed in those aged 30 and above.

Table 4.9: Employment Performance by Grouped Age

Grouped Age	Employment status	Remarks		
		Fail	Pass	Total
Under 20	Unemployed	24 (100%)	123 (100%)	147 (100%)
	Employed	0 (0.0%)	0 (%)	0 (0.0%)
20 - 29	Unemployed	14 (93.3%)	128 (72.7%)	142 (74.3%)
	Employed	1 (6.7%)	48 (27.3%)	49 (25.7%)
30 - 39	Unemployed	0 (0.0%)	31 (42.5%)	31 (42.5%)
	Employed	0 (0.0%)	42 (57.5%)	42 (57.5%)
40 - 49	Unemployed	1 (100%)	5 (33.3%)	6 (37.5%)
	Employed	0 (0.0%)	10 (66.7%)	10 (62.5%)
Total		40	387	427

The logistic analysis was performed to determine the association between employment and performance as demonstrated in **Table 4.10** The employment was a significant factor to predict the performance of the students (X^2 (1) = 15.586, $p < 0.000$). The model accounted for approximately 7.7% of the variance in the performance of the students (Nagelkerke R^2 = 0.077) and correctly classified 90.6% of the cases. There was a negative association between employment and performance. (B = -2.609, $p = 0.010$). The students who were unemployed are 0.074 less likely to pass the examinations than students who are employed (OR = 0.074, 95%CI (0.010-0.543).

Table 4.10: Logistic Analysis of Employment and Performance

	Remarks (%)			Logistic Regression				
	Fail	Pass	Total	B	Sig.	OR	95% C.I. for Exp (B)	
							Lower	Upper
Unemployed	39(12)	287(88)	326 (100)					
Employed	1(1)	100(99)	101 (100)	-2.609	0.01	0.074	0.01	0.543
Total	40(9.4)	387 (90.6)	427 (100)					

4.4 Institutional Factors and Performance

To examine institutional characteristics and their relationship with performance in the COC examinations. The characteristics examined included type of training institution which was categorized as government, faith based and private. Mode of study was categorized as either direct entry or part time. The school policies examined included policy on teaching methods, student class attendance and pass mark, while the teacher characteristics included teacher qualifications, and teacher experience.

4.4.1 Type of Institution and Performance

The trend of frequency of the number of students who were registered in comparison to examination series and training institution are illustrated in **Figure 4.2** and **4.3**. Private institutions had the highest number of students registered for the examinations for three consecutive examination series. Government institutions had its highest number of students in examinations series while private and Faith-based institutions had students

lower than 5 students. Faith based Institutions had unstable registration of students for examinations whereby they had two consistent examination series with no students,

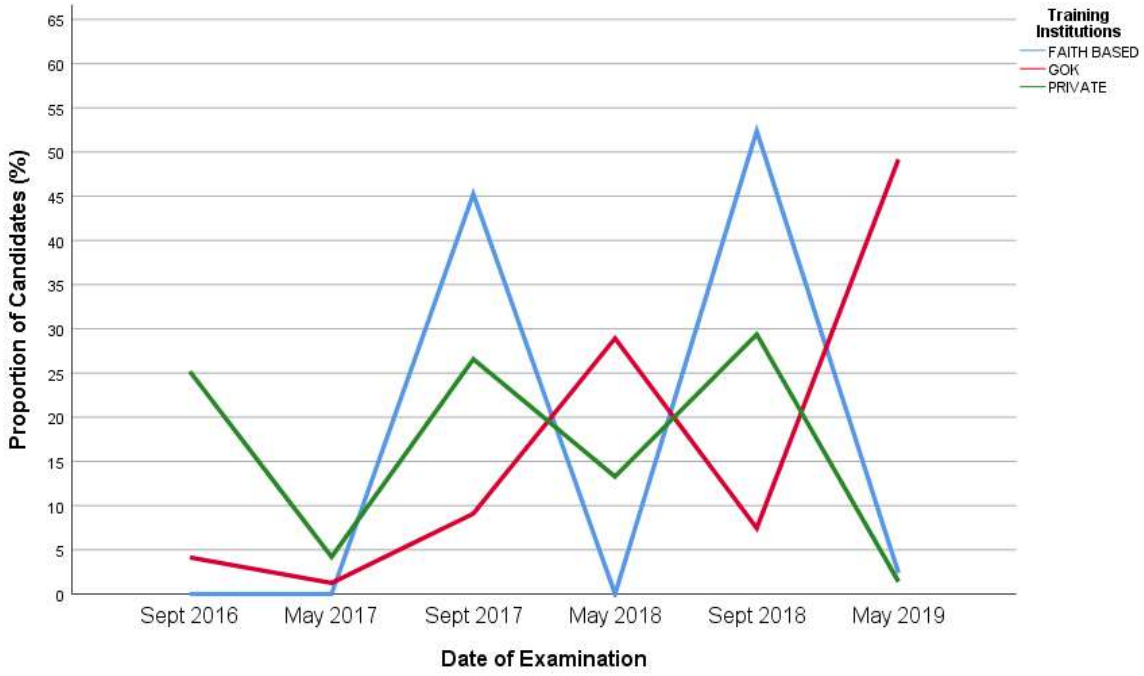


Figure 0.1 Year of COC Examination Series by Institutions

The performance of institutions based on the remarks on their results of examination was illustrated in **Table 4.11.** Generally, the mean grade was higher in the Government institutions of 61.56% compared to the performance in the Faith-based institutions with a close mean grade of 60.59% while the lowest is the private institutions with 53.91%. The Government institutions had a higher mean grade due to higher number of students 233(96.3%) out of 242 who had passed the examinations compared to 9 (3.7%) who had failed. Private institutions had a lowest mean grade despite the higher number of students of 114 out of 143 (79.7%) who had passed. The COC examinations compared to 29 (20.3%) students who had failed the exams.

Table 4.11: Institutions and Performance

Training Institution	Remarks	Count	Column Total N %	Mean grades
Faith Based	Fail	2	4.8%	60.59
	Pass	40	95.2%	
	Total	42	100.0%	
GOK	Fail	9	3.7%	61.56
	Pass	233	96.3%	
	Total	242	100.0%	
Private	Fail	29	20.3%	53.91
	Pass	114	79.7%	
	Total	143	100.0%	

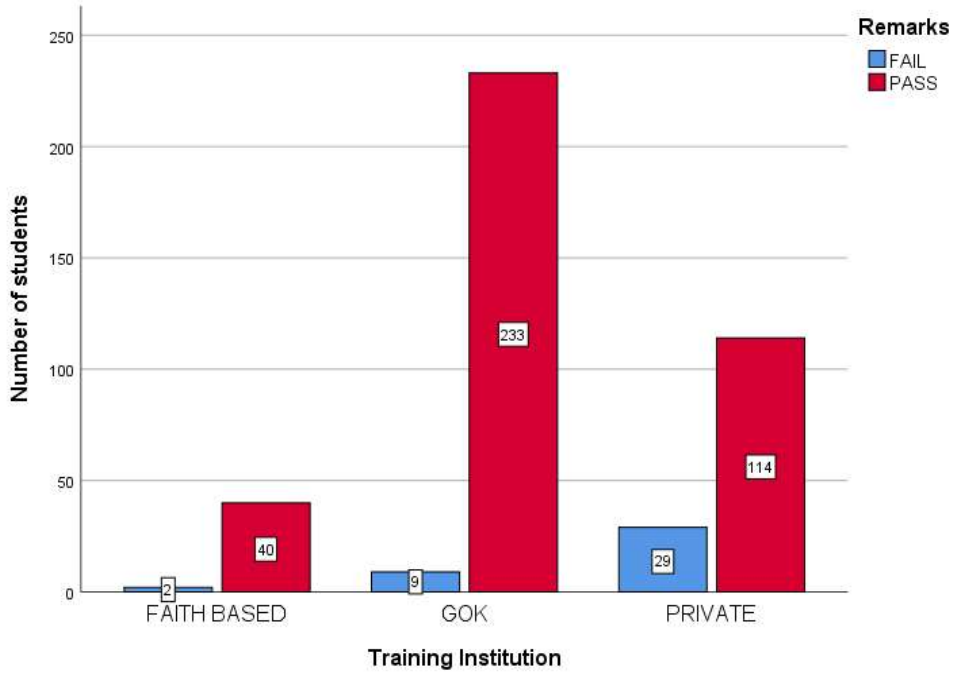


Figure 0.2 Performance of students by Type of Institution

4.4.2 Logistic Regression Analysis of Institutions and Performance

Logistic regression analysis for type of training institution and performance are illustrated in **Table 4.12**. There was a highly significant relationship among the performance of students in Government and Private Institutions respectively *(p<0.001)* unlike Faith-based institutions *(p=0.292).* Private institutions were 0.158 more likely to perform better than other institutions while Government institutions were 5 times more likely to perform better than any other institutions.

Table 4.12: Logistic Regression Analysis of Institutions and Performance

Institutions	Remarks (%)			Logistics Regression			
	Fail	Pass	Total	OR	95% C.I. Lower and Upper		P Value
Private	29 (72.5)	114 (29.5)	143 (33.5)	0.158	0.077	0.328	*P* < .001.
Government	9 (22.5)	233 (60.2)	242 (56.7)	5.211	2.414	11.25	*P* < .001.
Faith Based	2 (5.0)	40 (10.3)	42 (9.8)	2.19	0.509	9.422	*p = 0.292*
Total	40	387	427				

4.4.3 Mode of Study and Performance

The information on the performance of the students based on mode of study and grouped totals of the COC examination was illustrated in **Table 4.13**. All the institutions had both the part time and direct entry group of students. Most of the part-time students scores ranged from 60-69.99 (54.5%), 70--79.99(58.6%) and 80 (100 %).while for direct the highest students scored ranged from 50 -59.99 (69.8%).

Table 4.13: Mode of Study and Performance

Mode of Study	Grouped Total (%)						Total
	Below 40	40 - 49.99	50 - 59.99	60 - 69.99	70 - 79.99	Above 80	
Direct Entry	6 (100)	31 (91.2)	125 (69.8)	81 (45.5)	12 (41.4)	0 (0.0)	255 (59.7)
Part time	0 (0.0)	3 (8.8)	54 (30.2)	97 (54.5)	17 (58.6)	1 (100)	172 (40.3)
Total	6	34	179	178	29	1	427

A binary logistic regression was performed to determine the association between the mode of study and performance as demonstrated in **Table 4.14**. The mode of study was a significant factor to predict the performance of the students (X^2 (1) = 24.125, $p < 0.000$). The model accounted for approximately 11.9% of the variance in the performance of the students (Nagelkerke $R^2 = 0.119$) and correctly classified 90% of the cases. There was a negative association between mode of study and performance. (B = -2.258, p < .000). The direct entry students are 0.105 less likely to pass the examinations than the part time students (OR = 0.105, 95%CI (0.032-0.345).

Table 4.14: Logistic Regression Analysis of Mode of Study and Performance

Mode of Study	Remarks			Logistic Regression				
	Pass	Fail	Total	B	Sig	OR	95% CI	
							Lower	Upper
Direct Entry	218 (56.3)	37 (92.5)	255 (59.7)	-2.26	0.000	0.105		
Part Time	169 (43.7)	3 (7.5)	172 (40.3)				0.032	0.345

4.4.4 Admission Criteria and Performance

Performance of institutions based on the admission criteria is illustrated in **Table 4.15**. The admission of students into the university primarily depends on the cluster points acquired

with KCSE results as its reference point. The criteria selection of all universities conformed to the Clinical Officers Council requirements for entry in BScCM program, whereby C+ was used as the minimum requirement for every student. However, this may vary in all university because of the cut off points they have within their policies. The cluster points for different courses differ whereby each one of them have set a specific cluster points a student must have to be admitted. However, this only applied to the students who were admitted under KUCCPS program which maintained higher points unlike PSSP student who basically must have a minimum of C+ to be admitted to similar courses that KUCCPS students are being admitted into. The Government institutions were the recipient of most students with B+ and above, followed by private institutions and Faith-based institutions. Based on the grading a majority of students had B and B- with 109 (25.5%) and 151 (35.4%).

Table 4.15: Number of KCSE Students Admitted by Institutions

KCSE Results	Training Institution			Total
	Faith Based	GOK	Private	
A	0 (0.0%)	18 (7.4%)	0 (0.0%)	18 (4.2%)
A-	0 (0.0%)	17 (7.0%)	3 (2.1%)	20 (4.7%)
B+	1 (2.4%)	17 (7.0%)	11 (7.7%)	29 (6.8%)
B	6 (14.3%)	60 (24.8%)	43 (30.1%)	109 (25.5%)
B-	19 (45.2%)	68 (28.1%)	64 (44.8%)	151 (35.4%)
C+	9 (21.4%)	33 (13.6%)	14 (9.8%)	56 (13.1%)
C (up-graders)	7 (16.7%)	29 (12.0%)	8 (5.6%)	44 (10.3%)
C-	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	42	242	143	427

The data in **Table 4.16** generally show that students with higher KCSE grades performed correspondingly better than those with lower grades. However, it was noted that significantly high numbers of students with grades B and below were awarded less than 50% in their examination results. For those who had a C grade who were mostly part-time students, none got below 50%.

Table 4.16: KCSE Results and Performance

KCSE Results	Grouped Total (%)					
	Under 40	40 - 49.99	50 - 59.99	60 - 69.99	70 - 79.99	80 and above
A	0 (0.0)	0 (0.0)	2 (1.1)	10 (5.6)	6 (20.7)	0 (0.0)
A-	0 (0.0)	0 (0.0)	8 (4.5)	9 (5.1)	3 (10.3)	0 (0.0)
B+	0 (0.0)	2 (5.9)	10 (5.6)	15 (8.4)	2 (6.9)	0 (0.0)
B	2 (33.3)	7 (20.6)	48 (26.8)	47 (26.4)	5 (17.2)	0 (0.0)
B-	4 (66.7)	23 (67.6)	64 (35.8)	52 (29.2)	8 (27.6)	0 (0.0)
C+	0 (0.0)	2 (5.9)	27 (15.1)	23 (12.9)	3 (10.3)	1 (100)
C	0 (0.0)	0 (0.0)	20 (11.2)	22 (12.4)	2 (6.9)	0 (0.0)
C-	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

4.4.5 Lecturer Qualification and Experience with Performance of training Institutions

The qualifications of the lecturers from different institutions in relation to the performance of the training institutions was illustrated in **Table 4.17**. The private institutions had most of the lecturers, nine (9), who responded to the questionnaire. Amongst them five (5) lecturers had attained a master's degree and four (4) had bachelor's degree. Four (4) of the

lecturers had six (6) and above years of experience and five (5) had below six (6) years of experience. Government institutions followed closely with eight (8) respondents and out of the eight (8) lecturers, one (1) lecturer had a doctorate, six (6) had attained master's degree and one (1) lecturer had bachelor's degree, four (4) of the lecturers had above six (6) years of experience and four (4) were below six (6) years of experience. Faith based institutions didn't have as much respondent as the rest of the institutions but there were four (4) respondents in total. All the four lectures had attained at least a bachelor's degree. The four (4) lecturers had below six (6) years of experience. Government institutions had the highest mean score with most of their lecturers having a master's degree. Private performed lowest even though they had lecturers with both bachelors and master's degree.

Table 4.17: Lecturer Qualification and Experience and Performance

Institution	Qualifications (No.)				Experience (Years)			Mean
	Doctorate	Masters	Bachelors	Total	< 6	>6	Total	Grade
Faith Based	0	0	4	4	0	4	4	60.59
GOK	1	6	1	8	4	4	8	61.56
Private	0	5	4	9	4	5	9	53.91
Total	1	11	9	21	8	13	21	

4.4.6 School Policies and Performance

The school policies that considered to be examinable in relation to the performance of the students were the teaching methods, class attendance and pass mark. The teaching methods that the institutions reported to engage in were face to face, which included two distinctive methods i.e., student-oriented methods where students undertake classes by listening, looking and taking notes either face to face or online and mixed methods where students alongside routine lectures, they can be interactive in either practical work problem solving

exercises or discussions. The class attendance policies were different across all the institutions with some having it at 80% attendance and above while others had below 80%. However, the respondents did not mention if the policies were enforced in their institutions. There was a statistical significance between class attendance and performance (OR: 0.158. 95% C.I: 0.077 -0.328, P < 0.00). This indicated that those students who had class attendance above 80% were 0.158 times more likely to perform better than those had below 80%. There was a statistical significance between the teaching methods and performance (OR: 0.192, 95% C.I: 0.089 – 0.414, P< 0.00). The students who were being taught using mixed methods were 0.192 times more likely to perform better than students who were taught using student- oriented methods. However, there was no statistical significance between the pass marks and performance (p = 0.292).

Table 4.18: Logistic Regression of School Policies and Performance

Variable		Remarks (%)		Logistic Regression		
		Pass	Fail	OR	95% C.I.	p value
Pass Marks	Below 50	90.1	9.9	0.457	0.105-1.964	0.292
	Above 50	95.2	4.8			
Teaching Methods	Face to face	83.2	16.8	0.192	0.089-0.414	P<0.000
	Mixed	96.3	3.7			
Class Attendance	Below 80	79.7	20.3	0.158	0.077-0.328	P<0.000
	Above 80	96.1	3.9			

4.5 Regulatory Body Characteristics and Performance

The regulatory body (COC) administers licensure examinations to all Clinical Officers. Concept of validity of COC licensure examination was examined. Entire examination process, timing and any changes they would wish to be implemented in the licensure examination organization and conduct from Key informants' reports.

4.5.1 Validity of the Examination

Clinical Officers Council licensure examination was set based on the BScCM core curriculum in collaboration with other Clinical Medicine core books. Validity was measured by using the core curriculum versus test items to check if they matched. The examination content covered most of the disciplines in Clinical Medicine and ensured wide range of important aspects. Exam setters were guided on how they should set the test items which included Short Answer Questions (SAQ) and Multiple-Choice Questions (MCQ). The test item and marking scheme were subjected to the moderators who had qualifications in Medical education. The markers who were also experts in the specific disciplines reviewed the marking key before using them and on agreement marking proceeded. An examination moderator would sample a 1/3 of marked scripts and assess if there is a measure of reliability (consistency and fair application) of the same to all candidates. If any significant variance was observed, then it was used to moderate the final score of all the candidates.

Table 4.19: Key Informant profile table

Informant Index	Occupation	Institutions	Mode of Study	Academics	Experience (Years)
L1	Senior lecturer	Private	Part-time/Direct Entry	Masters	7-9 years
L2	Lecturer	Private	Part-time entry	Bachelors	10-19 years
L3	Clinical instructor	Private	Direct entry	Bachelors	4-6 years
L4	Tutorial fellow	Private	Part-time entry	Masters	4-6 years
L5	Lecturer	GOK	Direct entry	Doctorate	7-9 years
L6	Senior lecturer	GOK	Direct entry	Doctorate	10-19 years
L7	Tutorial fellow	GOK	Direct entry	Masters	1-3 years

L8	Tutorial fellow	GOK	Part-time entry	Masters	4-6 years
L9	Lecturer	GOK	Direct entry	Masters	Above 20 years
L10	Assistant lecturer	Private	Direct entry	Bachelors	7-9 years
L11	Lecturer	Private	Direct entry	Bachelors	4-6 years
L12	Clinical instructor	Private	Direct entry	Masters	4-6 years
L13	Lecturer	Mission	Part-time entry	Bachelors	1-3 years
L14	Lecturer	Mission	Direct entry	Bachelors	Below 1 year
L15	Assistant lecturer	Private	Direct entry	Masters	10-19 years
L16	Clinical instructor	Mission	Direct entry	Bachelors	Below 1 year
L17	Lecturer	Mission	Part-time entry	Bachelors	1-3 years

When asked to comment on the views on validity of COC examinations, a majority of the respondents commented that COC examination does not really cover the content and competencies it supposed to: "*fitness to practice"*

One participant responded;

"For COC examinations to be considered valid, many lecturers who actually teach in various institutions should be involved in setting, marking and/or moderating the marked examination results. This will ensure various teaching approaches, course updated content and type of setting, etc., are included in the examinations." (L7, GOK, Doctorate)

One of the respondents saw the need of evaluating the questions in the examination papers and how it should be responded. The respondent suggested;

Systematic analysis of every question and how it should have been answered, should be availed to every institution, after release of results. This will prove the validity and help in achieving improvements in future performances.

Another respondent commented;

It is relevant for summative evaluation of knowledge retention and transfer. It helps as well to figure out knowledge value for BSc. Clinical Medicine. (L18, Mission, BSc)

Comparing the perspective each respondent said, some viewed validity of COC examination should be reinforced by including practical examinations alongside the theory examinations. Another respondent further commented on the same context of reinforcing the COC examination by suggesting that students should be examined in all aspects that can replicate the real situations that are experienced in the field.

One of the respondents commented on the effects of valid COC examinations by saying;

"It's wonderful as it ensures students are vetted on their preparedness to their respective fields" (L4, Private, BSc)

A respondent responding positively about the validity of COC examinations, *where they felt that it's a good tool for standardization for students who have qualified in different institutions and it evaluates their preparedness to tackle real life problems* (*L4, GoK MSc*). Comparing the comments from the key informants, it is clear that the validity of the examination is under a threat, whereas one respondent clearly commented that it was of *no value*. . (*L5 Private, MSc*) This could highly affect the performance of the students.

Examination Process

On answering the question *"tell me about the examination process* "the key informant at the Clinical Officers Council of Kenya examination board stated that;

The pre -internship examination process starts with identifying the setters who are experts in every field as per the curriculum and examination policy. The setters use the core curriculum to set MCQs and SAQs with their marking key as many as their can, covering all the units for that subject. This test items are then saved in the examination bank which create a good bank with test items to be used for the next 3 years. Later the examination board identifies and invite experts in medical education/HPE who moderate retrieved test items from the examination bank. This forms another examination test item moderated bank.

During the marking process, the markers on arrival are taken through the marking guidelines as stipulated by the examination policy. Every marker is a specialist in a subject and marks only one question for all the candidates and scores are entered in the regulatory human resource system (RHRIS) which is used to analyze the results for all candidates. Moderation of marked scripts for paper 1 containing SAQs was done as from the 3rd day of marking and their findings report were used to moderate the final score of candidates (C1, GOK, MSc)

One of the respondents gave a detailed response on how the lecturers play a key role in examination process. The respondent said;

"The COC examination process was okay but could be improved. One approach to improvement was to request some lecturers from each training institution to send a set of

sample questions and answers to COC periodically. Some of these questions should actually be included (or modified accordingly) in subsequent COC examinations. The COC can then gauge the standard of setting in each case. If found sub-standard, the institution (or individual lecturers who set the examination(s) should be notified, under confidentiality) and vice versa" (L11 Private, BSc).

Another respondent had the same view and responded;

"The process was good in that there was a team to set the exams, a team to validate, a team to mark and a team ensure the marks awarded are as per the answers in the answer sheet" L18 Mission, BSc)

One of the respondents commented on the examination and how it's given to students. He commented;

"Having one day to test all units is substandard. We need to test students all round i.e. statistics, biochemistry, disaster management and epidemiology should form part of core areas to be examined at COC level" (L18 Mission, BSc)

One of the respondents had a different opinion suggesting that, for the *COC examinations to be strengthened it should also incorporate practical examinations. (L8, GoK MSc)*

" Another respondent said;

There was a concern about the integrity of marking??? Duration may not be adequate (L10, GoK, MSc)

Another respondent said;

On asking the question on their "perception *on the examination process*," some of the comments included:

Respondent:

"*However, there was need for improvement, especially in uniformly distributed setting, marking and moderation of examinations and results" (C1, Gok, MSc)*

Another respondent

"*It's tedious" (L15, Mission, BSc)*

Examination Malpractices

On inquiring concerning examination malpractices;

The respondents were keen to note on the malpractices in the COC examinations. Most of them identified that they experienced minimal almost none malpractices on the examinations.

However, one of the respondents observed a setback that contributed to malpractices in COC examinations. The respondent commented;

"Due to the fact that many candidates are examined at the same time, it could be possible to leave loopholes for cheating during the examination." (L4. Mission. BSc)

Another respondent also commented;

"Duplicating some questions. We need different questions testing similar concepts. In different exam situations. Allow all institutions offering the program to participate in setting then sample the questions. (L8, Mission, BSc)

One of the respondents commented;

"Those found to engage in them should be punished as spelt out in the COC examinations regulations. So far, the enforcement has been fair in my institution" (L7.GoK, Doctorate)

4.5.2 Examination Timing

On responding to a question on "*what is your perception on COC examination timing and performance?"* one of the respondents gave details on the timing of examination and how they affect institutions saying;

"The timing of the examinations should be made to be fair to all players. Currently it tends to favor those institutions which manage to finish and present their candidates in May and September of each year, respectively. If an institution is late by even a short time, it is locked out until six months later. This tends to disadvantage the candidates who have to wait for six months or longer. In other words, the COC should first verify the readiness of each institution before fixing the COC examination dates, ensuring that as many as possible should get the chance to present their candidates in time." (L7, GoK, Doctorate)

Many of the respondents said that the timing of their examinations is appropriate, and the performance of the students are taking a normal curve of distribution. Although it was viewed that way by some of the respondent who said that the timing can be appropriate, but the performance varies with different students and different campuses.

One of the respondents had a suggestion on the timing for those who failed exams saying;

"Timing is okay but for those who don't make it in practical exams should be given one rotation of the department, then be given a special exam. For those who fail theory examinations should as well be allowed to revise for 3 months and sit for special examination." (L18, Mission, BSc).

4.5.3. Organization and Change

Given an opportunity of all respondent to comment on the "*changes they would like to see implemented on the organization and conduct of the COC licensure examination*, here are some of the comments:

The Key informant from COC examination board commented that:

"Perform test items analysis so as to remove the difficult ones after candidates' scripts have been marked, analyze performance of each subject examined independently to show specific areas of improvement instead of general performance and administer online examination for both paper one and two"

Another respondent

"*COC should give equal opportunity to all lecturers to get involved in setting and marking COC examinations, without necessarily picking the same individuals to get involved nearly every year. Some places may have only one lady lecturer. That means the lady lecturer will attend marking every year owing to gender consideration. This will deny many lecturers of the opposite gender to equally participate in marking of examinations*.

COC should make efforts to spot - check the standards of teaching/setting of internal institutional examinations, to ensure they meet the minimum standards and over reliance

on Doctors/Consultants in the setting of COC examinations should be avoided. Some of the consultants do not teach Clinical Officers regularly, so they might set questions that may not conform to the standard requirements for Clinical Officers (i.e. some of the consultants may only be familiar with the standard set for Doctors; hence may not be appropriate for Clinical Officers in some instances). Some may even have hidden grudges against Clinical Officers and may therefore try to portray the false image that Clinical Officers are incapable of doing well academically.

Close follow up of institutions that persistently have candidates that perform poorly most times, should be done by COC. This should be with a view to improving standards and no form of victimization of individual students/institutions or favoritisms of others should be entertained for whatever reason". (L7, GoK, Doctorate)

Other responses from respondents included:

"*Consider technology advancement in administration and marking of the COC exam, the BSc exam to have more clinical questions, conduct a study to find out the validity of the examinations, more practical oriented questions and examination to include practical's and theory". (L9, GoK, BSc)*

CHAPTER FIVE: DISCUSSION

5.1 Introductions

The chapter covers discussions of the findings. This was done by comparing the results and other researchers' findings and recommendations.

5.2 Discussions of Results

5.2.1 Student Factors and Performance

The researcher found that a proportion of those students who passed and were below 30 years of age were 0.089 less likely to pass the examinations than those students above 30 years of age (OR = 0.089, 95%CI 0.012-0.660 p=0.018). This could be attributed to the fact that these students were up-grading, had more working experience in the clinical areas and could have also done a similar exam previously. This study supports (Valli Jayanthi et al, 2014) report which indicates that mature students embrace self-directed learning seek a deeper understanding of their academic work hence performing better than the younger students.(Amankwaa, et al,2015) disagreed with the findings stating there was no associations between age, gender and academic performance of the students.

Gender had no significance relationship with performance in the COC licensure examination (OR: 1.059, 95% C.I 0.475- 1.773, p=0.798). However, Valli Jayanthi et al, (2014)reported on the contrary that females exhibit higher Grade Point Average (GPA) scores than their male counterparts. Other studies, (Farooq et al, 2016), showed that female students were performing better academically than males.

Employment relationship to performance showed that most of the students employed performed better in the COC examinations and especially those above 30 years old who

did not fail.(OR 0.074 95%CI 0.074 – 0.543, p=0.010). This is contrary to a report by Stevens (2018) who avers that upgrading students have a lot of commitment related to family and work, thus good performance is reported to be held by those who are not employed.

5.2.2 Institutional Factors and Performance

There was high significant relationship in performance among students in government and private institutions unlike in faith-based institutions. In the government institution the OR 5.211, 95% C1: 2.414 – 11.250 p<0.001) verses private institutions (OR 0.15895&CI: 0.077-0.328 p<0.001). Government institutions were five (5) times likely to perform better than the private institutions this supports similar studies reported by (Kumwenda et al, 2017), that students in public institutions outperformed students in private institutions. Other studies identified strong relationships between type of institutions and performance such as reported by (Ondo State School of Nursing, 2013) here private schools performed best followed by Faith-based (mission) with least performance in Government (state). In as much as percentages in faith based were higher than private institutions, the p value demonstrated no significance (p=0.292).

There was a significant relationship between mode of study and performance, part-time students performed better than direct students (OR: 0.105, 95%C.I: 0.0132-0.345. p<0.000) showing there is a significant mode of study meaning there is a likelihood that part-time students preformed much better than direct students. These results agrees with the findings of (Shachar & Neumann, 2003)who indicates that part-time learners perform better.

A study done in Moi and Egerton Universities provided information that a Kenya Certificate of Secondary Education aggregate grade at admission has no influence on students' performance in preclinical and clinical courses (Obwoge et al, 2017). There is a significant relationship between higher grades and performance in that students with higher KCSE grades performed correspondingly better than those with lower grades. However, it was noted that significantly high numbers of students with grades B and below were awarded less than 50% in their examination results. For part time students who mostly had a grade of C none of them scored below the pass mark (50%).

There was a significant relationship between lecturer's qualifications and experience and performance. The Government institutions had lecturers who were more qualified and experienced, their students had the highest mean scores and performed better. This agreed with finding of Idowu (2016) who attributed lecturer's qualifications to better student performance, while shortage of qualified lecturers in any discipline lead to poor performance. This also matches with Darling (2010) who found that long serving lecturers improved learners' outcomes. World Bank report also showed a positive correlation between lecturer experience in years and learners' academic achievements.

There was a significant relationship between school polices and performance. Institutions that mixed teaching performed better than only face to face lecture as their teaching method with an (OR: of 0.192, 95%CI: 0.089-0.414, $p<0.000$). This study support (Låg & Sæle, 2019) report which states flipping the classroom enables the student to integrate theory into clinical practice. There was also a significant relationship between class attendance and performance, for those that had class attendance of 80% they were more likely to perform better than those below 80%. (OR 0.158 95%CI: 0.077-0.328, $p<0.000$).It supports study

by (Rawlani et al, 2018) that reports poor class attendance hinders student academic performance.

5.2.3 Regulatory Body Factors and Performance

Key informant gave reports indicating that COC licensure examination had threat to its content validity. Concerns pointed to questionable valid exams that could have affected the performance of the examinations. It was felt by one respondent that the exam did not really cover the content and competencies it was supposed to.

Taking a PANCE whose objective is to test competence of Physician associates a blue print that guides on the conduct and content of the exam is used to attain the highest level of validity and reliability. An examination blue print is a set of specifications that describe the relative proportion of questions from each content category and task area that should be included on a test form. The blueprint is the output of a practice analysis which is an analysis of various diseases and disorders physician associates encounter and skills they use in practice. It is categorized in two domains knowledge and skills (NCCPA, 2019).

Comparing COC examination and PANCE clearly shows that the process used is different. To ensure that PANCE is valid exam, a blueprint which provides a concise summary of the content and scope of the licensing examination is used .The content experts in PANCE engage a standard setting process known as Angoff method which review individual test question's and decide whether someone who qualifies will be able to answer correctly. This is clear that the two exams are different. To ensure that an exam has content validity, a blueprint is key where competence are accorded a percentage and blooms taxonomy levels are used.

In this study, though some are not contended with COC examination to an extent of having concerns on the integrity of marking duration, all was not lost as some key informant reported that the examination was okay but can be improved by notifying lecturers who set sub-standard questions and incorporating practical examinations.

There were minimal malpractices on the examination, but a respondent observed a setback that contributed to malpractice in COC examinations, the respondent indicated that having the candidates examined at the same time could leave loopholes for exam cheating and repeating of some questions many times. He stated that COC examinations should have different questions testing similar concepts and COC should allow institutions to participate in setting questions.

Institutional participants in the Key informant interviews had an opinion that the longer the duration a student takes before sitting for the Clinical Officer Council licensure examination, the higher the chances of failing the same examination. This agreed with (Nyangena, et al, 2013) who found that students performed better when they sat for their exams immediately they completed and passed the basic training from their institutions. Other key informants reported on the timings of the examinations indicating that it should be made fair to all institutions despite the examinations schedule's for COC. One reported that COC should first verify the readiness of each institution before fixing the licensure examination dates.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introductions

The chapter covers conclusions and recommendations of the study. This is done systematically starting with the conclusions on student's factors and performance, followed by institutions factors and their performance and finally regulatory factors and their relationship with performance.

6.2 Summary

The main aim of the study was to investigate factors that influence performance of BScCM students in COC licensure examination. Data was collected and analyzed giving a significant relationship between the independent and dependent factors.

6.3 Conclusions

The study found out that age had a significant relationship with performance. Students aged 30 years and above performed better than those aged 30 years and below. There was a statically significant relationship with performance with a $p=0.018$. With regard to gender, the study concludes that there was no significant association.

The study established that employment had a significant relationship with performance where those employed performed better than the unemployed with a $p=0.010$.

Type of institution had a significant relationship with performance, in government institution, where students were found to perform five (5) times better than those in other institutions (Private and Faith Based) with a $p<0.001$.

The study found that mode of study had a significant relationship with performance, $p<0.000$, where part-time students performed better than direct entry student.

The study established that government institution had lecturers that were highly qualified, and majority had experiences of above six (6), giving a highest mean of 61.56. The type of institution had therefore an influence on performance

School policies had significant relationship with performance whereby those using mixed teaching methods performed better than those using face to face method only, giving a $p<0.000$ while those with class attendance of 80% and above also performed well with $p<0.000$.

Key informants expressed their concerns on lack of content validity of COC examination and effects on performance. With right structures and process, content validity of exam could be enhanced. Timing was also reported to influence performance. The longer students stayed before taking licensure examinations, the higher the chances of failure regardless of the mode of study.

The study found that there was a statistically significant relationship among predictors and actual performance of the candidates and the null hypothesis was therefore rejected.

6.4 Recommendations

Based on significant relationship among the various predictors and actual performance of the candidates, the study recommends:

Student's Demographic Factors

The study found that students who passed and were above 30 years performed better than those below 30 years, while those employed performed much better than those unemployed.

Recommendations: Students to enroll in up-grading program (degree program after completion of internship at diploma level) and COC to ensure the rHRIS captures data of all students.

Institutional Factors

Government institutions were performing better than private and faith based institutions. Institutions embracing mixed teaching methods (flip classrooms) and student's class attendance of above 80% performed better. Lecturers who were qualified and experienced influenced performance.

Recommendations: Institutions to implement and uphold policies on teaching methodology, class attendance and mode of study during training, recruit lecturers who have adequate qualifications and experience. COC to review policies and advise institutions to embrace new innovative technologies on teaching methodology and part-time mode of study.

Regulatory body Factors

Key informants concerns pointed to questionable content validity of the COC licensure examination, integrity of marking duration and timing of examination which affected performance**.**

Recommendations: COC to develop an examination blue print, which defines the knowledge and skills to be assessed and thus build a purpose-driven successful assessment, embrace new technologies in area of online examination and marking, benchmark with other regulatory bodies on area of examination process and review/update her examination policy to ensure timelines for taking

Licensure examination is well documented (immediately they qualify from their pre-requisite basic trainings).

6.5 Suggestions of further studies

Further study to be done on relationship between academic final qualifying examination and licensure examination.

REFERENCES

Adjase, E. T. (2015). Physician assistants in Ghana. *Journal of the American Academy of Physician Assistants*, *28*(4), 15. https://doi.org/10.1097/01.JAA.0000462393.36053.13

Amankwaa, I., Agyemang-Dankwah, A., & Boateng, D. (2015a). Previous education, sociodemographic characteristics, and nursing cumulative grade point average as predictors of success in nursing licensure examinations. *Nursing Research and Practice*, *2015*, 1–8. https://doi.org/10.1155/2015/682479

Amanonce, J. T., & Maramag, A. M. (2020a). Licensure examination performance and academic achievement of teacher education graduates. *International Journal of Evaluation and Research in Education (IJERE)*, *9*(3), 510–516. https://doi.org/10.11591/ijere.v9i3.20614

Anderson, L., Krathwohl, D., Airasian, P., Cruikshank, K., Mayer, R., Pintrich, P., Raths, J., & Wittrock, M. (2000). *Taxonomy for learning, teaching, and assessing, a: A revision of bloom's taxonomy of educational objectives, abridged edition* (1st edition). Pearson.

Arulampalam, W., Naylor, R. A., & Smith, J. (2012a). Am I missing something? The effects of absence from class on student performance. *Economics of Education Review*, *31*(4), 363–375. https://doi.org/10.1016/j.econedurev.2011.12.002

Beck, K. (2020). Ensuring content validity of psychological and educational tests – the role of experts. *Frontline Learning Research*, 1–37. https://doi.org/10.14786/flr.v8i6.517

Botma, Y., & Labuschagne, M. (2019). Application of the Donabedian quality assurance approach in developing an educational programme. *Innovations in Education and Teaching International*, *56*(3), 363–372. https://doi.org/10.1080/14703297.2017.1378587

Carter, R. D., Ballweg, R., & Konopka-Sauer, L. (2017). Preserving 50 years of physician assistant history. *Journal of Physician Assistant Education*, *28*(Supplement 1), S85–S89. https://doi.org/10.1097/JPA.0000000000000158

Christopher, M. S., & Redempta, K. M. (2016). Influence of demographic factors on academic performance among primary teacher trainees: A case study of Machakos teachers college. *International Journal of Educational Studies*, *3*(1), 07–11.

COC. (2018). Clinical Officers Council. Retrieved May 2, 2022, from https://portal.clinicalofficerscouncil.org/rhris/mainpage#

Coons, I. (n.d.). *Use of standardized tests within nursing education programs* [University of Nevada, Las Vegas]. https://doi.org/10.34917/5836090

Couper, I., Ray, S., Blaauw, D., Ng'wena, G., Muchiri, L., Oyungu, E., Omigbodun, A., Morhason-Bello, I., Ibingira, C., Tumwine, J., Conco, D., & Fonn, S. (2018). Curriculum and training needs of mid-level health workers in Africa: A situational review from Kenya, Nigeria, South Africa and Uganda. *BMC Health Services Research*, *18*(1), 553. https://doi.org/10.1186/s12913-018-3362-9

Darling-Hammond, L. (2006). Assessing teacher education: The usefulness of multiple measures for assessing program outcomes. *Journal of Teacher Education*, *57*(2), 120–138. https://doi.org/10.1177/0022487105283796

Emmakd. (2019, April 2). Nursing and midwifery council releases licensing examination results. Retrieved August 12, 2019, from Ghana Business News website: https://www.ghanabusinessnews.com/2019/04/02/nursing-and-midwifery-council-releases-licensing-examination-results/

Examination Policy_2016.pdf. (n.d.). Retrieved from http://clinicalofficerscouncil.org/resources/downloads/Examination.

Eyal, N., Cancedda, C., Kyamanywa, P., & Hurst, S. A. (2015). Non-physician clinicians in sub-saharan Africa and the evolving role of physicians. *International Journal of Health Policy and Management*, *5*(3), 149–153. https://doi.org/10.15171/ijhpm.2015.215

Farooq, M. S., Chaudhry, A. H., Shafiq, M., & Berhanu, G. (2016). *Factors Affecting Students' Quality of Academic Performance: A Case of Secondary*. *7*, 1–14.

Graham, L. J., White, S. L. J., Cologon, K., & Pianta, R. C. (2020a). Do teachers' years of experience make a difference in the quality of teaching? *Teaching and Teacher Education*, *96*, 103190. https://doi.org/10.1016/j.tate.2020.103190

Hooker, R. S., & Everett, C. M. (2012). The contributions of physician assistants in primary care systems: The primary care contributions of physical assistants. *Health & Social Care in the Community*, *20*(1), 20–31. https://doi.org/10.1111/j.1365-2524.2011.01021.x

Hooker, R. S., & Kuilman, L. (2011). Physician assistant education: Five countries: *The Journal of Physician Assistant Education*, *22*(1), 53–58. https://doi.org/10.1097/01367895-201122010-00010

Idowu, O. O. (2016). An investigation of mathematics performance of high school students in Lagos state, Nigeria: external factors. *Urban Education Research & Policy Annuals*, *4*(1). Retrieved from https://journals.uncc.edu/urbaned/article/view/431

Kenner, C., & Weinerman, J. (2011). Adult learning theory: Applications to non-traditional college students. *Journal of College Reading and Learning*, *41*(2), 87–96. https://doi.org/10.1080/10790195.2011.10850344

Kleeman, J. (2017, August 9). Increase content validity in competence tests. Retrieved May 26, 2022, from Questionmark website: https://www.questionmark.com/six-tips-to-increase-content-validity-in-competence-tests-and-exams/

Kleeman, J. (2018, June 21). Six tips to increase reliability in exams. Retrieved May 26, 2022, from Questionmark website: https://www.questionmark.com/six-tips-to-increase-reliability-in-competence-tests-and-exams/

Kreutzberg, A., Reichebner, C., Maier, C. B., Destrebecq, F., & Panteli, D. (2019). *Regulating the input: Health professions*. European Observatory on Health Systems and Policies. https://www.ncbi.nlm.nih.gov/books/NBK549267/

Kumwenda, B., Cleland, J. A., Walker, K., Lee, A. J., & Greatrix, R. (2017). The relationship between school type and academic performance at medical school: A national, multi-cohort study. *BMJ Open*, *7*(8), e016291. https://doi.org/10.1136/bmjopen-2017-016291

Låg, T., & Sæle, R. G. (2019). Does the flipped classroom improve student learning and satisfaction? A systematic review and meta-analysis. *AERA Open*, *5*(3), 233285841987048. https://doi.org/10.1177/2332858419870489

Linda, H. (2015, May). An exploration of first-time NCLEX takers' lived experience of preparing to attempt the national council licensure exam—ProQuest [3706262]. Retrieved May 13, 2022, from https://www.proquest.com/open-view/26b3edb84f0523430850e29cedbd4a47/1?pq-origsite=gscholar&cbl=18750

Marie, M. (2017, January 31). Clinical officers improve health care in Kenya. Retrieved May 11, 2021, from Clinical Advisor website: https://www.clinicaladvisor.com/home/multimedia/global-health-rounds/clinical-officers-improve-health-care-in-kenya/

Marie, M. (n.d). Marie Meckel. Retrieved May 11, 2021, from Bay Path University website: https://www.baypath.edu/academics/faculty-directory/biography/marie-meckel/

Momanyi, G. O., Adoyo, M. A., Mwangi, E. M., & Mokua, D. O. (2016). Value of training on motivation among health workers in Narok County, Kenya. *Pan African Medical Journal*, *23*. https://doi.org/10.11604/pamj.2016.23.261.8414

Norcini, J., Anderson, B., Bollela, V., Burch, V., Costa, M. J., Duvivier, R., Galbraith, R., Hays, R., Kent, A., Perrott, V., & Roberts, T. (2011). Criteria for good assessment: Consensus statement and recommendations from the Ottawa 2010 Conference. *Medical Teacher*, *33*(3), 206–214. https://doi.org/10.3109/0142159X.2011.551559

Nyangena, E., Getanda, A., & Ngugi, S. (2013). Factors influencing success of Bachelor of Science in nursing graduates in Nursing Council of Kenya licensure examinations. *Baraton University Press*, *3*(1), 11–21.

Okanga, A. A., Ogur, J. O., & Arudo, J. (2017). Institutional characteristics influencing Bachelor of Science nursing student performance in the nursing council of Kenya licensure examinations in Kenya. *Journal of Education and E-Learning Research*, *4*(1), 28–36. https://doi.org/10.20448/journal.509.2017.41.28.36

Ombasa, E. A. (2017). Setting, Moderating and marking university examinations*: A Comparative Review of Policies from Universities in East Africa and United Kingdom*. *7*(4), 11.

Omenge Obwoge, R. (2017). Medical students' kcse grade and their relationship to academic performance: A case of Egerton and Moi universities, Kenya. *Science Journal of Education*, *5*(2), 34. https://doi.org/10.11648/j.sjedu.20170502.11

Ondo State School of Nursing, Igbatoro Road, Akure, Ondo State., & Edward, M. I. (2013a). Relationship between school quality and students' performance in selected schools of nursing in south-western Nigeria. *IOSR Journal of Nursing and Health Science*, *3*(1), 37–46. https://doi.org/10.9790/1959-03113746

PANCE Blueprint. (2019, January). Retrieved May 26, 2022, from NCCPA website: https://www.nccpa.net/become-certified/pance-blueprint/

Pasia, J. S., Garzon, M. U., & Bauyot, M. M. (2012b). Determinants of performance of graduates in the medical technologist licensure examination. *Asian Journal of Health*, *2*(1). https://doi.org/10.7828/ajoh.v2i1.116

Pearson. (2022, March 9). National Commission on Certification of Physician Assistants (NCCPA): Pearson VUE. Retrieved May 26, 2022, from https://home.pearson-vue.com/nccpa

Rawlani, S. S., Rawlani, S. M., Lohe, V., Bhowate, R., Khubchandani, M. R., & Chandak, R. (2018). Perception of dental faculty and student regarding class attendance and final performance. *Journal of Education and Health Promotion*, *7*, 153. https://doi.org/10.4103/jehp.jehp_128_18

Sadler, P. M., Sonnert, G., Coyle, H. P., Cook-Smith, N., & Miller, J. L. (2013a). The influence of teachers' knowledge on student learning in middle school physical science classrooms. *American Educational Research Journal*, *50*(5), 1020–1049. https://doi.org/10.3102/0002831213477680

Shachar, M., & Neumann, Y. (2003). Differences between traditional and distance education academic performances: A meta-analytic approach. *The International Review of Research in Open and Distributed Learning*, *4*(2). https://doi.org/10.19173/irrodl.v4i2.153

Sifris, D., & Myhre, J. (2020, April 29). The 5 Signs of Medical Quackery. Retrieved May 26, 2022, from Very well Health website: https://www.verywellhealth.com/signs-of-medical-quackery-49505

Stevens, E. (2018, March 26). The Challenges of Being an Adult Learner and How to Overcome Them. Retrieved August 12, 2019, from https://careerfoundry.com/en/blog/career-change/the-challenges-of-being-an-adult-learner-and-how-to-overcome-them/

Taylor, D. C. M., & Hamdy, H. (2013). Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. *Medical Teacher*, *35*(11), e1561–e1572. https://doi.org/10.3109/0142159X.2013.828153

Valli Jayanthi, S., Balakrishnan, S., Lim Siok Ching, A., Aaqilah Abdul Latiff, N., & Nasirudeen, A. M. A. (2014). Factors contributing to academic performance of students in a tertiary institution in Singapore. *American Journal of Educational Research*, *2*(9), 752–758. https://doi.org/10.12691/education-2-9-8

Young, M., St-Onge, C., Xiao, J., Vachon Lachiver, E., & Torabi, N. (2018). Characterizing the literature on validity and assessment in medical education: A bibliometric study. *Perspectives on Medical Education*, *7*(3), 182–191. https://doi.org/10.1007/s40037-018-0433-x

Zach. (2021, February 19). What is Content Validity? (Definition & Example). Retrieved May 4, 2022, from Statology website: https://www.statology.org/content-validity/

APPENDICIES

Data collection tools

Appendix 1: Transcription Form (Checklist) for student Demographic Factors

1. Index No……
2. Mode of study (1) Direct entry (2) Part time
3. Age (in numbers) …….
4. Gender (1) Male (2) Female
5. Employment
6. Employer (1) GoK (2) Mission (3) Private (4) Other
7. Mean Score in KCSE (1) A (2) B (3) C (4) Other
8. Date of entry into training
9. Type of training institution (1) GoK (2) Faith Based (3) Private
10. Date of completion of training…….
11. Dates of examination……..

Appendix 2: Key Informant Guide for Clinical Officers' Staff (COC Chairman of Examination Department)

1. What is the format of the examination: (1) Oral (2) Multiple Choice Questions (3) Essays (4) Mixed method (5) Other (Specify)

2. A

What are the qualifications of examination setter	
	Number
Doctorate (Other)	
MScCM	
Masters (Others)	
BScCM	
Bachelor (other)	
Professors	

B

What are the qualifications of an examination marker?	
	Number
Doctorate	
MScCM	

Masters (Other)	
BScCM	
Bachelor (Other)	
Professors	

C

What are the qualifications of an examination moderator?	
	Number
Doctorate	
MScHPE	
Masters (Other)	
BScHPE	
Bachelor (Other)	
Professors	

3. How do you achieve validity?

……

……

……

4. Tell me about the examination process

……

……

……

5. Tell me about incidences of malpractice you experienced if any

……

……

……

6. Given an opportunity, which changes would you wish to implement in your examination organization and conduct

……

……

……

Appendix 3: Transcription Form for Head of Department

1. Type of institution: (1) GoK (2) Mission (3) Private
2. Mode of Study: (1) Direct entry (2) Part-time
3. Number of students graduating during the three-year period …….
4. Number of lecturers (1) Full-time (2) Part-time

Academic preparation of Faculty		Faculty Teaching Experience	
	Number		Number
Doctorate		Less than 1 year	
MScCM		1 – 3 years	
Masters (Other)		4 – 6 years	
BScCM		7 – 9 years	
Bachelor (Other)		10 – 19 years	
Professors		20 years and above	

Faculty rank (Please indicate number)	
	Number
Instructor	
Tutorial fellow	
Assistant lecturer	
Lecturer	
Senior lecturer	
Associate Professor	
Professor	

Appendix 4: Key Interview Guide for Chairman of Clinical Medicine Department

1. What teaching methods do your staff regularly use? …….

   ……

   ……..

2. Describe your selection criteria used by your institution and its relation to Clinical Officers of Kenya and CUE criteria?

   …….....

   …….....

   .....

3. Which policies do your institution hold on pass mark?

   ……..……

   ……

4. What are some of the student's challenges to practical experiences?

   ……

   ……

   …….

5. Tell me your perceptions on COC examination process

   ……

   …….

6. Kindly give any comment in regard to COC examination malpractices.

   …….....……

   ……..

7. Any other comments you may have on performance of students in the COC examinations.

   ……

   ……..…….

Appendix 5: Transcription Form for Individual Lecturers

Transcription Form for Individual Lecturers in Institutions Offering BSc in Clinical Medicine Programme.

TRANSCRIPTION FORM FOR INDIVIDUAL LECTURERS IN INSTITUIONS OFFERING BSc IN CLINICAL MEDICINE PROGRAMME.

Since the information in this form is confidential, you are not required to write your name.

Tick where appropriate or document in space provided, where applicable.

* Required

Email address *

Your email

Type of Institution *

- GOK
- Private
- Mission

Mode of Study in the institution. *

- Direct entry
- Part-time entry

Academic preparation of Faculty *

- Doctorate
- Masters
- Bachelors

Faculty teaching experience *

- Less than one (1) year
- 1-3 years
- 4-6 years
- 7-9 years
- 10-19 years
- 20 years and above

Faculty rank in your institution *

- ○ Professor
- ○ Associate Professor
- ○ Senior lecturer
- ○ Lecturer
- ○ Assistant lecturer
- ○ Tutorial fellow
- ○ Clinical instructor

12/21/2020 TRANSCRIPTION FORM FOR INDIVIDUAL LECTURERS IN INSTITUIONS OFFERING BSc IN CLINICAL MEDICINE PROGRAMME.

What teaching methods do you regularly use? *

Your answer

Which policies des your institution hold on the pass mark? *

Your answer

What policies does your institution hold on class attendance? *

Your answer

What is your view on validity of COC examination? *

Your answer

Tell me your perceptions on COC examination process *

Your answer

Kindly give any comments in regards to COC examination malpractices? *

Your answer

What is your perception on COC examination timing and performance? *

Your answer

Any comments you may have on performance of BSc students in the COC examinations? *

Your answer

Given an opportunity what changes would you wish to implement in COC examination organization and conduct? *

Your answer

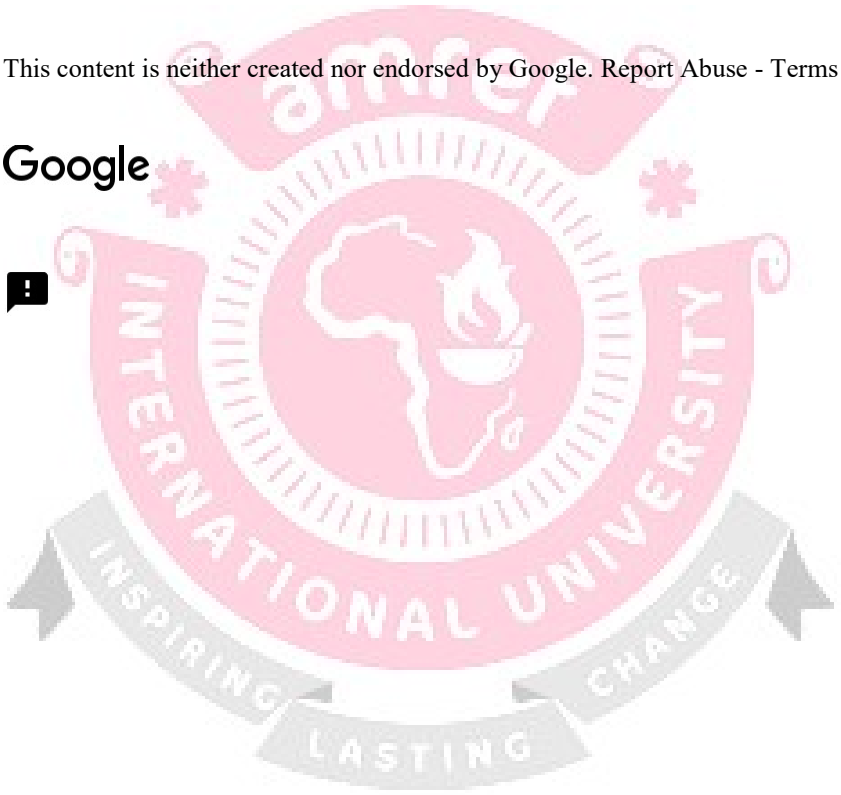
Send me a copy of my responses.

Submit

Never submit passwords through Google Forms.

Captcha

Privacy Terms



Appendix 6: Informed Consent Form for Lecturers

My name is Eunice Muthoni Kuria

I am currently involved in a research study in investigating factors influencing the performance of BScCM students in the COC licensure examination in Kenya... The study is performed as a partial fulfilment of the requirement for my Master of Science degree of AMREF International University under supervision of Dr. Margaret Nyongesa, Dr.Joseph Choge and Mr. Norbert Boruett. Department of Health Professional Education.

Your participation in this study will provide useful information and enhance understanding of this topic. You qualify to participate because you are the head of the department in the institution and thus the Key informant. You will be required to answer oral questions asked by the interviewee and partly fill the questionnaire. The total time involved in the participation will be approximately 45 minutes. Participation of this study is voluntary. You may withdraw from the study at any point without penalty. Participation is not associated with the performance of your institution.

All data from this project will be confidential and will be used for research purposes only. There is minimal to no risk to participants in this study. If you have questions any time during your participation in this study, please contact me or AMREF International University. If you have concerns please free feel to decline from the participation at any point in this project. By signing this consent form, you are agreeing that you read, or it has been read to you, and you fully understand the content of this document and are openly willing consent to take part in this study. Thanks you for your assistance in this research study.

Name and signature of the participant (please print)……

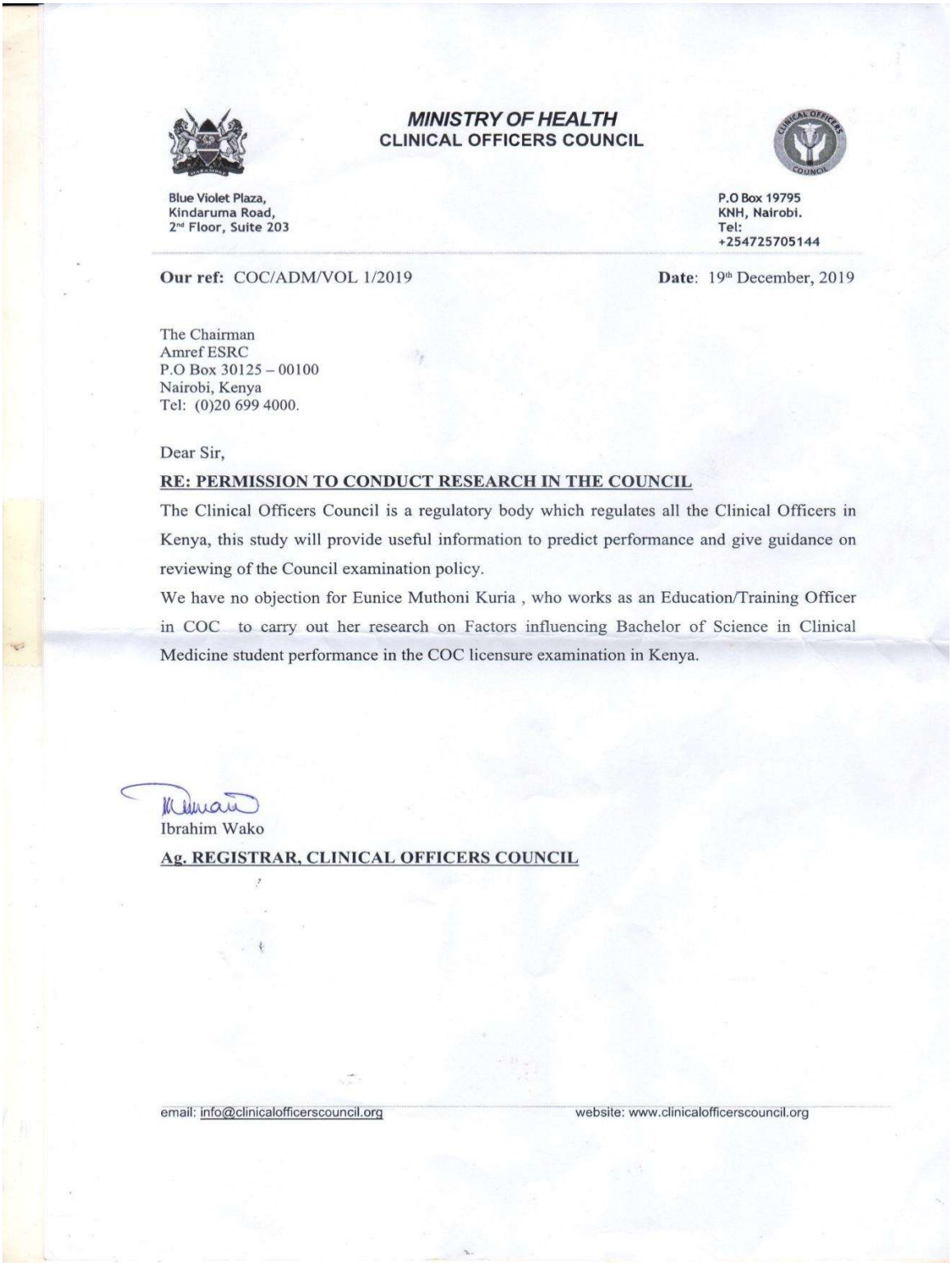
Signature …….

Investigator Statement

I, the undersigned have explained to the volunteer in a language s/he understands the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer…….Date ……..

Appendix 7: Letter of Permission to Conduct Research from Clinical Officers Council



MINISTRY OF HEALTH
CLINICAL OFFICERS COUNCIL

Blue Violet Plaza,
Kindaruma Road,
2nd Floor, Suite 203

P.O Box 19795
KNH, Nairobi.
Tel:
+254725705144

Our ref: COC/ADM/VOL 1/2019 **Date**: 19th December, 2019

The Chairman
Amref ESRC
P.O Box 30125 – 00100
Nairobi, Kenya
Tel: (0)20 699 4000.

Dear Sir,

RE: PERMISSION TO CONDUCT RESEARCH IN THE COUNCIL

The Clinical Officers Council is a regulatory body which regulates all the Clinical Officers in Kenya, this study will provide useful information to predict performance and give guidance on reviewing of the Council examination policy.

We have no objection for Eunice Muthoni Kuria , who works as an Education/Training Officer in COC to carry out her research on Factors influencing Bachelor of Science in Clinical Medicine student performance in the COC licensure examination in Kenya.

Ibrahim Wako

Ag. REGISTRAR, CLINICAL OFFICERS COUNCIL

email: info@clinicalofficerscouncil.org website: www.clinicalofficerscouncil.org

Appendix 8: Ethical Clearance /Research License from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **321637**

Date of Issue: **18/March/2020**

RESEARCH LICENSE

This is to Certify that Ms.. EUNICE MUTHONI KURIA of Amref International University, has been licensed to conduct research in Kericho, Kiambu, Kisii, Kisumu, Nairobi, Nakuru on the topic: FACTORS INFLUENCING BACHELORS OF SCIENCE IN CLINICAL MEDICINE STUDENT PERFORMANCE IN CLINICAL OFFICERS COUNCIL LICENSURE EXAMINATION, KENYA for the period ending : 18/March/2021.

License No: **NACOSTI/P/20/4250**

321637

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix 9: ESRC Amref Health Africa Approval

amref health africa

Amref Health Africa in Kenya

REF: AMREF – ESRC P710/2019

January 23, 2020

Eunice Kuria
Amref International University
P.O. Box 27691 00506
Nairobi, Kenya
Tel: 0723098880
Email: kuriaeunice5@gmail.com

Dear Eunice Kuria,

RESEARCH PROTOCOL: FACTORS INFLUENCING BACHELORS OF SCIENCE IN CLINICAL MEDICINE STUDENT PERFORMANCE IN CLINICAL OFFICERS COUNCIL LICENSURE EXAMINATION, KENYA

Thank you for submitting your protocol to the Amref Ethics and Scientific Review Committee (ESRC).

This is to inform you that the ESRC has reviewed and approved your protocol. Your application approval number is P710/2019. The approval period is from January 23, 2020, to January 22, 2021, and is subject to compliance with the following requirements:

a) Only approved documents (including informed consents, study instruments, advertising materials, material transfer agreements etc.) will be used.
b) All changes including (amendments, deviations, violations etc.) are submitted for review and approval by Amref ESRC before implementation.
c) Death and life-threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the Amref ESRC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to Amref ESRC within 72 hours.
e) Clearance for export of biological specimen must be obtained from the relevant government authorities for each batch of shipment/export.
f) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
g) Submission of an executive summary report within 90 days upon completion of the study to the Amref ESRC.

Prior to commencing your study, you will be expected to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke/ and obtain other clearances needed.

Please do not hesitate to contact the ESRC Secretariat (esrc.kenya@amref.org) for any clarification or query.

Yours sincerely,

AMREF ESRC P.O. Box 30125 - 00100, NAIROBI

Prof. Mohamed K[illegible]
Chair, Amref ESRC

CC: Samuel Muhula, Monitoring & Evaluation and Research Manager, Amref Health Africa in Kenya

Board Members: Mr P Kasimu | Mrs E Mathu | Prof P Kiama | Mrs M Kuyoh | Prof Z Qureshi | Prof J Wang'ombe | Dr D Soti | Dr G Gitahi

P O Box 30125-00100 Nairobi, Tel: +254 (0)20 699 4000, Fax: +254 (0)20 699 2531, www.amref.org

Winner of the Gates Award for Global Health

Appendix 10: Publication

Kuria, E. M., Nyongesa, M. W., Choge, J. K., & Boruett, N. (2021). Factors influencing Bachelor of Science in clinical medicine students' performance in clinical officer council licensure examination, Kenya. *International Journal of Community Medicine and Public Health*, *8*(12), 5676. https://doi.org/10.18203/2394-6040.ijcmph20214552.