

**THE PERCEIVED ROLE OF COMMUNITY BASED MEDICAL
EDUCATION AMONG KENYAN-TRAINED DOCTORS' CHOICE OF
RURAL PRACTICE AND SPECIALTY**

BY

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DECLARATION

CANDIDATE

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DEDICATION

I dedicate this work to my mother, Agnes Wanjiku, my wife Agnes Kabithe and my children Jude Max Githuuri Chege and Claire Tatiana Wanjiku Chege

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ABSTRACT

Background: The recruitment and retention of healthcare professionals, especially doctors, in rural and remote areas remains a major challenge and a contributor to inequity that favors urban populations worldwide. Sub-Saharan Africa (SSA) suffers major challenges related to doctors not working in rural areas where over 60% of the population lives. Community based medical education (CBME) during undergraduate medical training plays a positive role in attracting medical doctors to rural practice. The CBME influence on medical doctors' choice of specialty and rural practice has been documented in a few countries but not in Kenya.

Objective: To determine the perceived role of CBME in the choice of rural practice and specialty by Kenyan-trained doctors.

Methods: An analytical cross-sectional study design was used to simultaneously study both the exposure and outcome of CBME in medical training. All consenting medical graduates of the years 2000, 2001 and 2002 from Moi University School of Medicine (MUSOM) and University of Nairobi School of Medicine (UNSOM) were interviewed. These cohorts were selected as those that had gone through more innovative training and also had significant career stability.

Data collection forms were emailed to the study participants using email addresses obtained from the Medical Practitioners and Dentists Board secretariat. The data collected included medical school attended, rating of the CBME during medical training. Also collected were data on the rating of the perceived role of CBME on choice of rural practice and specialty. Data received were stored in MS Excel database. Bivariate analysis was used for simple descriptive data. Fisher's exact formula was used in the analysis of the categorical data as the sample size and expected values were small. Chi-square was used to determine association. Multivariate analysis was used for confounders. Results were presented in tables.

Results: The Study was conducted between February and September 2018. The eligible number in each cohort was 96, 83 and 90 for UNSOM and 49, 40 and 41 for MUSOM in the years 2000, 2001 and 2002 respectively. The average response rates were 35.8% and 38.0 % for UNSOM and MUSOM participants. Both groups rated CBME high (80% UNSOM vs. 93% MUSOM). Factors found to be associated with a positive perception for rural posting included, the medical school, rural upbringing, parents' level of education and early rural posting. MUSOM graduates rated the perceived role of CBME in the choice of rural practice and specialty higher than UNSOM ones [73.5 (95% CI: 60.6, 86.3)] vs. [45.9 (95%CI: 35.9, 56.0)] for rural practice and [65.3 (95% CI: 51.5, 79.1)] vs. [34.7 (95%CI: 25.1, 44.3)] for specialty. After multivariate analysis for confounding it was observed that the medical school the participant graduated from was statistically significant associated with a positive perception on the role of CBME in the choice of rural practice [OR 7.315; (95%CI: 2.497,21.428) p-value 0.000]

Conclusions: Graduates of a community based education and service (COBES) program were seven times more likely to perceive CBME as having played a role in their choice of rural practice and specialty than those of community oriented program.

Recommendations: Harmonization of CBME in favor of COBES will improve attraction of doctors to rural practice and specialties that comply with rural practice in Kenya

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ABBREVIATIONS AND ACRONYMS

- AAMC**- Association of American Medical Colleges
- AHWO**- African Health Workforce Observatory
- CAQDAS**- Computer Assisted Data Analysis
- CBME**- Community Based Education
- CBME/L**- Community Based Medical Education/Learning
- CHR**- Community Health Rotation
- COBES**- Community Based Education and Service
- COE**- Community Oriented Education
- Dr.** – Doctor of Philosophy or medical/dental/pharmacy graduates
- GMC UK**- General Medical Council of the United Kingdom
- GNI**-Gross National Income
- GP**- General Practitioner
- GPEP**-General Professional Education of the Physician College Preparation for
Medicine
- IBM**- International Business Machines is an American Multinational Technology
Company
- IREC**- Institutional Research and Ethics Committee
- KNBS**- Kenya National Bureau of Statistics
- Ksh** – Kenya shilling
- MBChB**- Bachelor of Medicine and Bachelor of Surgery
- ME**- Medical Education
- MEPI**- Medical Education Partnership Initiative
- MP&DB**- Medical Practitioners and Dentists Board
- MUSOM**- Moi University School of Medicine

UNSONM - University of Nairobi School of Medicine

PBL – Problem Based Learning

PHC- Primary Health Care

PhD- Doctor of Philosophy

PI- Primary Investigator

Prof - Professor

SOM- School of Medicine

SPICES- Student Centered Problem Based Integrated Community Based Electives

Systematic

SPSS–Scientific Package for Social Sciences

SSA- Sub-Saharan Africa

TUFH- Towards Unity for Health

UK- United Kingdom

USA- United States of America

WHO- World Health Organization

WHR- World Health Report

DEFINITION OF OPERATIONAL TERMS

Community

A community is defined as “a group of inhabitants living in a localized area under the same general regulations and having common norms, values, and organizations” (Green & Ottoson, (1999).

Community Health

“Community health refers to the health status of a defined group of people and the actions and conditions, both private and public (governmental), to promote, protect, and preserve their health” (McKenzie, Pinger & Kotecki, 2005; Goodman, Bunnell & Posner, 2014).

Community Based Medical Education/Learning (CBME/L)

Community Based Medical Education (CBME) is a form of instruction where students learn professional competencies in a community setting to help them build a sense of connection with their communities. Community based education is a popular approach for all forms of education and for all age groups especially at higher education levels where the primary purpose is to foster interdependence between education and communities for enhancing the capacity of individuals and groups for improving their quality of life. CBME involves partnership of the learning institution with the community to offer the student learning beyond cognition. This format also encompasses social and emotional aspects of learning as the learner gains ability to gain understanding, use knowledge and solve problems while developing a sense of self. The community may be rural, suburban or urban depending on how the population in a country is distributed and organized (Villani & Atkins, 2000).

Community-based learning activity (CBLA)/Community based Education and Service (COBES): A learning activity that takes place within a community or in any of a variety of health service settings (Bollag, et al 1982).

Community-oriented medical education (COME) or Community Oriented Education (COE): medical education activities that address topics in community health but still take place in traditional academic settings (Strasser, 2012).

Community-Engaged Medical Education (CEME): medical education activities that directly engage members of a community in their design, conduct and or evaluation so as to meet the needs of the community in some way and to enhance the experience or outcomes of the learners involved (Strasser, 2012).

Medical doctor rained in Kenya: A physician who has had medical training and graduated as a holder of the degree of Bachelor of Medicine and Bachelor of Surgery in Kenya among other qualifications.

Evaluation: The systematic application of scientific methods to assess the design, implementation, improvement or outcomes of a program (Rossi & Freeman 1993).

Rural practice: Clinical service in a setting located at least 50 kilometers from an urban center (Crandall, 2005). According to the Kenya National Bureau of Statistics (KNBS), “rural Kenya is a large and isolated area of an open country (in reference to open fields and not forests, etc.), often with low population density.” (*Source: <https://www.knbs.or.ke/Aug, 2010>*)

Urban practice: Clinical service in a setting identified as urban in the Kenya National Bureau of Standards (KNBS) as “an area with an increased density of human-created structures in comparison to the areas surrounding it and has a population density of more than 2,000 persons per kilometer square. In this definition urban areas in Kenya

include the following: cities, Town Councils and Urban Councils.” (*Source:*
<https://www.knbs.or.ke/Aug, 2010>)

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Overview

This chapter covers background of the study topic, the problem statement, the purpose of the study; research questions; the significance of the study; study justification; study limitations and the conceptual framework.

1.1 Background

The recruitment and retention of healthcare professionals, especially doctors, in rural and remote areas remains a major challenge and a contributor to inequity in healthcare services provision that favors urban populations worldwide. Also skewed, in favor of the urban centers, is the distribution of health facilities. This is particularly worrying in developing countries especially in Sub-Saharan Africa. Governments and global healthcare leaders have developed initiatives and strategies to improve attraction and retention healthcare workers to underserved areas in different countries globally with notable mixed results of some success and failure (Mbemba et al, 2016; Wilson et al, 2009; Dussault & Franceschini, 2006; WHR, 2003).

The cited studies review the ongoing global challenges on recruitment and retention of health professional in rural and remote areas. Though this is shared across the globe, the impact varies according to the national economy of individual states and the degree of investment in primary health care. This is also directly influenced by the patient to health work ratio in the particular country

Over the years the government of Thailand has used various strategies towards increasing the number of doctors serving in rural underserved areas. These strategies have involved coercion, financial and non-financial incentives. The Thailand coercion involves compulsory three year service in rural Thailand after medical training. Financial incentives include supplemented income with hardship and non-private practice and professional allowances. The non-financial incentives include preferential consideration in promotion and increased opportunity for specialist training. Another initiative in Thailand that was started in 1994 is selecting cohorts of medical students that spend their clinical years of training in the rural health facilities where they would be posted after graduating. This initiative was through a collaborative effort between the Thailand medical schools and the Ministry of Health (Wibulpolprasert & Penpaibon, 2003;Pagaiya et al, 2012).

The positive outcomes of these Thailand initiatives that are aimed at enhancing attraction and retention of doctors in rural Thailand have been published (Arora, et al, 2017).

Thailand is a monarchy under military dictatorship that tends to use significant military force to enforce policy implementation across the government departments.

Sub-Saharan African countries experience huge challenges that result from non-availability of doctors among other health workers in rural areas where over 60% of the population lives. A significant number of African doctors trained in their countries also leave their native countries to go and work in Europe, United States of America, Canada and other developed countries that pay better salaries and provide more favorable working environments. This problem is compounded by the fact that medical schools

in SSA are few and with limited capacity for enrolment of trainees. The number of doctors from outside Africa that show interest in working in Africa is very small (Chen, et al., 2012).

Chen, et, al interviewed mainly deans of medical schools across SSA countries on different aspects that influence training of doctors in this region and published revealing but consistent challenges experienced in training manpower to address the manpower shortages. The factors were not significantly different across nations.

Strategies employed to retain doctors in rural in some SSA countries include coercion that involves bonding medical graduates to serve in underserved areas for at least two years after medical training. Other means used involve financial incentives that include higher salaries and allowances.

The other strategy in SSA countries has been in line with the World Health Organization (WHO) guided policy that has been implemented by ministries of education and health (WHR, 2003). This has made CBME a core course in the medical curriculum for both undergraduate and postgraduate programs (Mariamet et al. 2014; Chen, et al., 2012; Wilson, et al, 2009).

Mariam et, al reviewed the impact of the Medical Education Partnership initiative (MEPI) of 2010 which benefited twelve African countries in enhancing training of health professionals in these African countries while Wilson et al reviewed the impact of interventions by the stakeholders in health care in South Africa. The results of these interventions were positive but still minimal in addressing the continuing problem or attraction and retention of health professions in rural and remote parts of Africa.

There is evidence, in some countries, that CBME during undergraduate medical training plays a positive role in attracting more medical doctors to rural posting and practice.

In Australia offering medical education and training that has important insights into factors affecting preference for future rural practice has resulted in increased recruitment and retention in these areas (Walker, et al., 2012).

In this Australian approach deliberate effort is made during the interviews for places in the medical training that individual applicants are asked about their interest in future rural practice. Qualified applicants who demonstrate future interest in rural practice are given scores that give them advantage over those with none. (Walker et al., 2012) have documented significant impact from this approach.

In Uganda medical graduates of the Makerere College of Health Sciences, whose medical training involved community based education and service (COBES) component, spiraled at all levels of the medical training program were positively identified as confident health workers in primary healthcare especially when serving rural communities. The positive feedback was by their supervisors and peers (Mwanika et al., 2011).

In this study, (Mwanika et al., 2011) interviews Makerere University medical graduates and their supervisors working in rural Uganda. The supervisors reported the doctors' knowledge, skills and attitude to managing patients in primary care settings while the medical graduates reported to be competent and well prepared for managing patients in primary care settings in both rural and urban areas in Uganda

In Kenya, health workers in three different underserved contexts were interviewed about the challenges they faced and what made it difficult for facilities in these areas to attract and retain workers. The different facilities were in Turkana (arid part of northern Kenya), Machakos (borders Nairobi but has a large semi-arid portion) and Kibera (the largest slum in Nairobi, the capital city of Kenya). The factors attributed to poor attraction and low retention in these Kenyan facilities included low salaries, female workers finding it difficult to work there, level of training (because highly trained personnel avoided these areas), suboptimal working environment (due to poor allocation of resources), work overload among the few available workers, insecurity, among many others(Ojaka, Olango & Jarvis, 2014).

In the Ojaka publication, medical graduates were minimally represented because they were scanty in these poorly served settings. The health professionals felt as marginalized as the communities that they were serving. This informs the need for the Kenya government to direct more infrastructural and resource to these marginalized facilities and communities. This would be a major incentive towards addressing the persistent poor attraction and retention.

Multiple factors have been associated with the preference and choice of specialty lines by medical students and young graduates in different parts of the globe. These include parental level of education, where those with more educated parents preferred specialties that resulted in practice in highly specialized health facilities in urban areas (Kawamoto et al, 2016). It has been reported that most female doctors have tended to choose specialties that make it easier for them to work in non-demanding practices in urban areas (Kawamoto et al, 2016; Wimsatt, et al., 2016).

In developed countries such as Japan and United States of America where Kwamoto and Wimsatt came from and where students come from well-to-do socio-economic backgrounds, choice of specialty is likely to be influenced by none economic matters. In LMICs, economic considerations tend to overwhelm others as education remains a weapon to fight poverty and marginalization.

Some medical schools in the developed economies lay specific emphasis on implementation of medical curricula that favor particular medical specialty lines that are traditionally associated with these schools. This has resulted in most graduates of these schools pursuing specialty in these disciplines (Woolf, Elton & Newport, 2015).

Wool & Newport reported on choices among graduate cohorts within in the British Medical schools of Sussex and Brighton and noted the trend of preparing medical students within these schools to identify which specialties they would prefer very early during medical training. The young students are assisted to work realizing their career choices throughout the medical training.

In medical schools in developing countries, departments that have vibrant global collaborative clinical and research activities tend to attract more applicants for specialist training than those that do not have similar packages for staff and students (Lima de Souza et al, 2015). It has also been observed that optimal supervision and mentoring during training that gives a student or young graduate opportunity to learn and enjoy a specific specialty during internship also played a major role in choice of a specialty (Lima de Souza et al, 2015). Also rated high is career guidance during training and after graduation from medical school (Lima de Souza et al, 2015).

Studies on factors that mostly influenced choice of specialty among medical students and young graduates in SSA have documented that gender, prestige associated with certain specialties and the presence of role models were main determinants of choice of specialty (George, Gow, & Bachoo, 2013; Yeganeh-Arani, et al., 2012; Mwachaka & Mbugua, 2010).

The three articles are from South Africa, Malawi and Kenya and involved interviews of senior medical students and young medical graduates in these SSA countries. What is remarkable is the similarity in the perception that academic and professional achievement remains a ladder to improved social status of the individual and not the society one grows in

The perceived favorable incomes and prestige associated with some specialties positively influences young medical graduates to choose them (Newton, Grayson & Thompson, 2005). This article is from the USA where stiff competition drives perception on academic and career achievement.

A survey of medical doctors who had benefitted from spiral courses on community based education and service (COBES) and problem based learning (PBL) in all the years of training in Ghana reported that the majority felt that the COBES may have significantly influenced their choice of specialty and also their willingness to serve in rural Ghana (Amalba, et al., 2016). Amalba interviewed a cohort of only 56 doctors and the results are not likely to be generalizable even within Ghana

The University of Nairobi and Moi University medical schools are the oldest in Kenya having been started in 1967 and 1989/90 respectively. The other approved public medical schools are the Universities of Kenyatta, Maseno, Egerton and Jomo Kenyatta

University of Agriculture & Technology. The approved private medical schools are Kenya Methodist University, Uzima University and Mount Kenya University. Except for Nairobi and Moi University medical schools the rest have developed within the last decade. The Aga Khan University Hospital in Nairobi offers Masters of Medicine (MMed) programs as a private university but does not have a medical school.

Nairobi and Moi Universities offer MMed and clinical fellowship programs.

The University of Nairobi School of Medicine (UNSOM) and Moi University School of Medicine (MUSOM) both offer medical training curricula that have CBME as core courses in their medical training curricula. The CMBE courses structured to facilitate community based health training and exposure to medical students.

Moi University offers CBME courses as community based education and service (COBES) in years one to five of the medical training. Since mid-2000s the University of Nairobi started offering CBME during level two and five of the six levels of training. The courses are taught as community oriented education (COE) which involves didactic classroom teaching on CBME with several arranged day visits to rural communities. Between 1967 and mid 2000s CBME was offered as a block 12 week course during the fourth year of medical training.

My study explored the perceived role of CBME on the individual doctor's choice of area of specialization and rural practice.

1.2 Problem Statement

Inequitable distribution of health workers in Kenya, that favors urban areas, persists despite medical curricula with CBME as core courses has been adopted in the last two to three decades

Available literature from other parts of the world report that CBME influences rural attraction and retention of health workers, including doctors

My literature search yielded very scanty work on the role of community based medical education (CBME) on medical doctors' choice to serve in rural areas and choice of specialty in SSA and Kenya.

The initiators of community based medical education as core curriculum in the training of health workers presented it as a significant tool to address attraction and retention of health workers in rural and remote parts of different countries across the globe.

The Kenyan medical training has offered community based medical education for more than two decades. Though the mode of delivery varies in different medical schools, the core ideology of sensitizing health professional trainees is remains intact.

Kenya had an estimated Gross National Income per capita in purchasing power parity (GNI per capita in dollars) of 1,160 and has a physician population ratio of 1.8 per 10,000 persons (World Bank Report, 2015). In 2009, it was estimated that over 90% of Kenyan doctors worked in big urban and suburban areas while less than 10% of the physicians serve in rural and remote areas (Human Resources for Health Country Profile-Kenya - African Health Workforce Observatory (AHWO), 2009).

Studies in countries within and outside Africa have reported a positive impact of community based medical education (CBME), as taught in these countries' medical curriculum, on medical doctors' choice to serve in rural areas (Pagaiya, Sriratana, Wongwinyou, Lapkom, & Worarat, 2012; Mwanika, et al, 2011; Amalba, et al., 2016).

In Kenya, Dossajee studied and reported specialty choices and choice of where to practice by a group of final year medical students in the University of Nairobi School of Medicine (Dossajee, Obonyo & Ahmed, 2016).

Ojaka documented factors that affected retention of various primary healthcare workers from three diverse regions (Ojaka, Olango & Jarvis, 2014).

My literatures search on the role of CBME on choice of specialty and rural practice for doctors' yielded data very few countries but none for Kenya.

I explored the perceived role of CBME on the choice of rural practice and specialty by medical doctor trained in Nairobi and Moi universities. These schools have over the years contributed to the training of the bulk of the practicing doctors in Kenya.

1.3 Purpose of the Study

To determine the perceived role of community based medical education, in medical training, in the choice of rural practice and specialty among Kenyan trained medical doctors.

1.4 Specific Objectives of the Study

1. To appraise the perceived role of community based medical education, taught during medical training, in the choice of rural practice among medical graduates of Nairobi and Moi Universities.
2. To evaluate the perceived role of community based medical education, taught during medical training, in the choice of specialization among medical graduates of Nairobi and Moi Universities.
3. To identify the factors associated with choice of rural practice and specialty after medical training

1.5 Research Questions

1. What is the perceived role of Community Based Medical Education (CBME) in the choice of rural practice among Kenyan-trained medical doctors?
2. What is the perceived role of Community Based Medical Education (CBME) in the choice of specialty among Kenyan-trained medical doctors?
3. What are the factors associated with choice of rural practice and specialty after medical training

1.6 Significance of the Study

This study gathered data from medical doctors who had been out of medical school for more than fifteen years. These are doctors who are most likely to have:

- Undergone more innovative medical education that had CBME as core courses

- Significant career growth and stability.
- Opportunity to reflect on their choices of specialty and areas of practice.

The scanty available Kenya data on this subject are of medical students. This

overlooks the:

- Twelve months of medical internship immediately after medical training
- Medical officer period when young doctors undergo mentoring by senior colleagues who supervise them in public and private health sectors. This mentoring in most cases results in:
 - Hands-on competency based learning in specific specialties
 - Effective mentoring opportunities in the areas they rotate
 - Decisions made on specialty choice and where to practice based on practical experience and role-modeling

Kenya receives 600 -700 new medical graduates annually from Kenyan medical schools and other medical schools outside Kenya. The available opportunities for clinical specialty training are about half this number. This has resulted in an ever growing pool of competitors for these limited specialty training opportunities.

In Kenya clinical specialty training in most disciplines is currently available in Nairobi and Moi public medical schools. Since 2015 Maseno and Kenyatta Universities offer clinical specialty training only in Family Medicine. Among the private universities, the Aga Khan University Hospital in Nairobi admits two to three applicants for each clinical specialty area for each of common specialty lines while the Kabarak University admits doctors for specialist training in Family Medicine since 2015.

1.7 Justification of the Study

Community based medical education (CBME) has been supported and advocated for advocates of primary health care as the route to universal health coverage and equity to health service provision. The World Health organization has guided ministries of education and health in nurturing CBME over the last three decades. This followed published work that not only demonstrated CBME as core to preparing doctors and other health professionals for the changing medical practice that would make health professionals relevant to the changes population health dynamics (WHO, Doctors for Health, 1996).

Though all Kenyan medical schools offer medical curricula that have significant CBME as core courses, the implementation of CBME varies significantly among schools. Data are needed on the Kenyan medical graduates' perception on the role of this WHO-guided initiative that is meant to impact healthcare delivery and enhance social accountability for the under-served of Kenya.

My study will inform medical educators, medical students, and offer opportunity for graduates to share their experiences. It will also inform parents of current and future medical students.

The data will also inform stakeholders in healthcare on the role of CBME on choice of area of specialty and area in which to practice and be used to lobby for more support on CBME by policy makers.

The results of the study will be disseminated through presentations in workshops, scientific conferences and publications in peer reviewed journals.

1.8 Assumptions of the Study

Self-administered questionnaires were used to collect the data. It was assumed that the respondents were forthright and honest with nothing to gain by offering inaccurate responses.

1.9 Constructivism Learning Theory

(Jean Piaget, 1896 -1980) presented that humans learned through the construction of one logical structure after another. The modern day constructivism learning theory is based on observation and scientific study about how people learn by constructing their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. That is when one experiences something new; they have to reconcile the new knowledge with previous ideas and experience. This may result in changing what they believe or may choose to ignore or discard the new knowledge or information as not relevant. In summary the constructivism learning theory put the learner in the driver's seat where they actively create their own knowledge by exploring, asking questions and assessing the depth of what they know. Teachers who apply the constructivism view tend to give general overviews and encourage the learners to use active techniques such as problem solving and experimenting to create more knowledge on the subject and then reflect through sharing the by making presentations. The presentations maybe in small group discussions, power point presentations to bigger groups. This way the learner demonstrates what they are learning and how this is changing their knowledge and understanding of the subject matter. Through moderated tutorials, the teacher is able to grasp the learner's

pre-existing knowledge and concepts and guides the activity to build on it or discard what may not be relevant.

Critics of the constructivism theory present it as elitist and favor those from privileged backgrounds. They also criticize social constructivism as founded by (Lev Vygotsky, 1896 -1934) as one that leads to domination of the majority average learners by the few bright ones.

The Moi University College of Health Sciences (MUCHS) was founded on the **SPICES** model (**S**tudent centered learning; **P**roblem based learning; **I**ntegrated or Inter-professional teaching; **C**ommunity Based Education; **E**lective studies and **S**ystematic or planned approach) while University of Nairobi remains largely on traditional methods of teaching and learning.

The SPICES Model is anchored on constructivism learning and teaching approach and is fundamentally different from the traditional model of learning and teaching.

Harden et al presented the SPICES model as educational strategies in curriculum development (Harden, Sowden & Dunn, 1984).

Student centered approach allows the learner more responsibility for their learning while in teacher centered approach, the teacher controls what and how much the student learns through lectures and other controlled activities like laboratory practical. The learner is more of a receptacle of whatever the teacher decides. The student centered approach places emphasis on what the student learns compared to what the teacher teaches; this motivates the student to learn and lays ground for continuing own education and taking responsibility for it (Harden, Sowden & Dunn, 1984).

The traditional medical education offers biomedical sciences in the early part of medical training and expects the student to tie this together with clinical cases during the clinical years of training. The problem based learning presents significant clinical challenges to the learner as they undergo training in biomedical sciences in early training. This stimulates the student to learn more biomedical science as they grapple with appraising clinical scenarios by integrating knowledge to develop problem solving skills. In this approach students manage patient problems, health delivery challenges, and medical science questions and develop research oriented question asking. The absorption of both basic sciences and clinical medicine is simultaneously enhanced (Barrows & Tamblyn, 1980).

Integration of learning in the SPICES model backs up the problem based learning in that the different disciplines are integrated early in the training unlike in the traditional methods where the clinical training came towards the end of the medical training in individual disciplines. Horizontal integration involves bringing together basic sciences and clinical disciplines by teaching anatomy, physiology and biochemistry and medicine, surgery therapeutics to be taught on the same phase of the curriculum. This is done by teachers from disciplines teaching around systems of the body such as urogenital, gastrointestinal, respiratory, cardiovascular systems. During this the anatomy, physiology, biochemistry and clinical experts teach their different areas of specialty around the same period. Those who support this approach argue that it eliminates fragmentation of medical courses; motivates the students and shapes attitudes; improves the educational effectiveness of teaching; results in setting higher teaching and learning objectives and learning objectives; promotes staff communication and collaboration as they are brought together by their common interests in the task to

be delivered; brings about a rationalization of teaching resources (Harden, Sowden & Dunn, 1984).

Community based education is meant to move students from the tertiary teaching hospital to communities during their training. This is meant to prepare them for their work place after living the training programs. The level of engagement with the community that the students rotate in is determined by the students' level of training.

Those who support the community based education approach present that it provides community orientation in preparation to serve effectively; the community rotation provides useful learning experiences especially in aspects that can only be taught within the community which include continuity of care, early signs of disease and the spectrum of health problems not normally seen in the teaching hospital; the community rotation makes use of untapped resources within the community and away from the congested learning environment in the medical school; the community rotation enhances active learning as the student applies what has been learned; the student gets an opportunity to be part of the health care system away from the teaching hospital and also learn how resources are allocated and used at that level (Harden, Sowden & Dunn, 1984).

Electives in the SPICES model provide a way of coping with an overcrowded curriculum as new areas continue to present growing challenges in how much the regular curriculum can effectively cover. The electives are meant to fill in some of the gaps in the regular curriculum especially in areas that the student has interest (Harden, Sowden & Dunn, 1984).

The systematic approach in the SPICES model embraces a programmed approach that eliminates experimentation or opportunistic approach to medical education (Harden, Sowden & Dunn, 1984).

1.10 Conceptual Framework

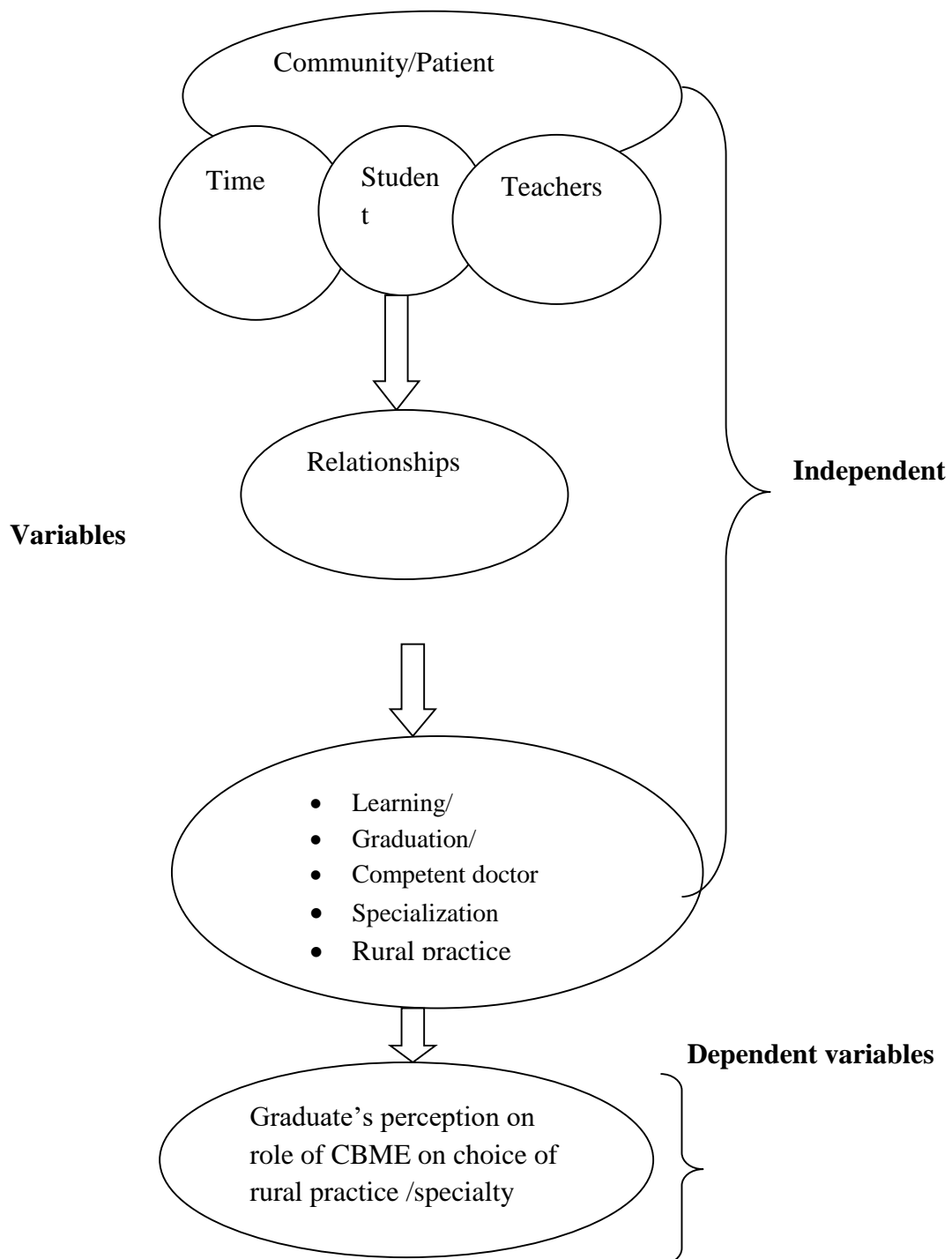


Figure1: CBME Learning/Teaching Model (Borrowed from Kelly, Walters & Rosenthal, 2014)

Time, Teacher and Community experience: A small group of students rotating in small health facilities or community practices away from the tertiary care teaching hospital enhances focused learning and teaching for the students.

Relationships: The community gets an opportunity to interact with the students and even involve them in community social activities. The smaller groups learning activities enhance student/teacher relationship. This exposes the student to the actual practicing environment away from the teaching and referral medical school hospital

Learning: The students learn about the social determinants of health of the community they rotate in; clinical skills and management of resources. This is a more superior method compared to didactic classroom teaching

Graduation/competency as a doctor/specialization/rural or urban practice: These are the outcomes of the medical training programs

Independent variables ranges

- i. **Pre-university education:** Preparation for university education that starts in early school as does many other aspects of socialization. A significant number of students may attend school in rural or urban or part rural and part urban depending on where the parents reside or where the parents decide to take their child to school.
- ii. **University Education:** On admission to medical school (in urban centers), all medical students in Kenya are taught using the Bachelor of Medicine and Bachelor of Surgery (MBChB) curriculum that is approved by the Kenya Medical Practitioners' and Dentists Board (MP&DB) and the Commission for Higher Education (CUE).

iii. **Implementation of the medical curriculum in different medical schools:**

Moi University School of Medicine uses the problem based learning/teaching (PBL) approach and offers spiral courses on community based education courses as core in the curriculum. The Moi university students training involves community based education and service (COBES) during five of the six years of training. The students spend significant periods of their medical training within the communities.

University of Nairobi School of Medicine mostly uses the traditional (lectures) learning/teaching approach as guide to implementing the medical curriculum. Community health is hosted by the University of Nairobi School of Public Health and courses offered in the second and fifth levels of six levels of medical training. Most of the courses are didactic with well-organized several one-day visits to rural communities.

It is noted that the University of Nairobi medical graduates who participated in my study had CBME courses during only during the fourth level of training.

The CBME may give the student a positive or negative experience that depends on the student's personal interest, the way the course is implemented and supported.

The student has to do well and pass all the courses offered in the school for them to graduate as a doctor.

There is a postulate that doctors who go through a gratifying community health experience during training tend to choose and work with ease in rural health facilities, choose specialties that place them nearer communities and also grow faster in community based specialties (Mwanika, et al., 2011; Amalba, et al., 2016).

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Guided by the study objectives, this section reviews available literature on community based medical education (CBME) as follows:

A. The community based medical education in medical training

- The historical perspective before 1978 and after 1993 as presented in the World Health Report as policy direction in enhancing the role of the health worker from mainly curative to one that included being advocates of health promotion, disease prevention and health equity. Progress made in the development of CBME is also reviewed
- The rationale of the CBME in the health professionals' education
- Approaches to Community-Based Education (CBE)
- CBME and its integration in the medical curriculum : the progress made in different parts of the globe
- Challenges and constraints in implementing CBME programs as part of the medical curriculum

B. Community Based Medical Education in medical practice

- The different ways community based medical education (CBME) courses are offered during training,
- The implementation challenges
- The influence of CBME to medical students' and young graduates' choice of specialty and where to practice (rural or urban).

2.1 Development CBME course as part of the medical training curriculum

This section presents the historical perspective of CBME from inception to the current. The foundation of biomedical model as proposed by stakeholders in the turn of the nineteenth century

2.1.1 Historical perspective of Community Based Medical Education (CBME) and progress made

By the turn of the nineteenth century medical education as envisaged by the fathers had been significantly corrupted by nepotism and commercialization. This had resulted in groups of doctors starting medical training as a business enterprise that admitted only those who could afford to procure the training. The suboptimal training and exposure resulted in poorly trained physicians who put patients' life at risk (Flexner, 1910).

A group of medical educators and stakeholders realized this folly and together came up with the Flexner report. This report identified the decay in standards of training of doctors around the globe and made recommendations that included streamlining of medical training. It directed that medical training and medical schools in Canada, USA and Germany adopt standards that guided what were the minimal requirements for admitting and training doctors. This included raising the level of qualification of applicants; the expected standards that teaching hospitals were expected to achieve to be allowed to admit medical student (Flexner, 1910).

Flexner laid down the medical curriculum that guided the German-American model. This was anchored on the biomedical model that used nearly all the resources on training and practice to perfect care for the episodic individual patient visits to health facilities. The model laid emphasis on the role of biomedical sciences as core before

clinical rotations for the learners. The training hospital had to ensure that the laboratories, imaging, pathology and other clinical support infrastructure were provided and maintained (Flexner, 1910).

The biomedical model resulted in health care resources and funding was being channeled towards mainly enhancing the health facilities, the physicians' teachers and the basic sciences. Limited or no resources were spared for health promotion, disease prevention and surveillance and rehabilitation of patients who suffered consequences of debilitating disease (Ryle, 1948). Ryle who was a physician trainer in Britain realized that doctors were sitting in their consulting rooms waiting for patients who had conditions that related to social habits that could be controlled and thus interrupt their flow to the doctors' consulting rooms and wards (Ryle, 1948).

The idea of training of health professionals that prepared them to care for populations, that were mainly healthy and small proportion of whom were unwell, by visiting them at their homes and neighborhoods, that promoted maintenance of health, proper sanitation and clean water started in the late 1940s in Britain (Ryle, 1948).

It has been documented that by early 1960s twenty health professional education institutions structured community based education had taken root. These institutions were mixed and included medical schools, schools of dentistry, schools of nursing and midwifery and some in public health. These institutions were noted to have revised their programs to offer significant courses and rotations in the communities away from the main training institutions (Katz & Fulop, 1978; Katz & Fulop, 1980; Richard & Fulup, 1987).

The out of hospital visits by Dr. Ryle that was published in the mid-1950s appealed to a significant number of both trainers and practicing physicians globally and by early-1960s more than twenty health professional training institutions had started to offer some form of community guided practice and training across the globe as was documented in the WHO meeting of 1988 (Sze, Szeming, 1988).

The 1978 assembly of global stakeholders of healthcare services was one of the most remarkable ones on the twentieth century. The meeting was guided by the realization that after the second world war recovery of the affected nations had resulted tremendous growth in wealth and socio-economic status. This very competitive three decades had resulted in significant inequity in wealth and healthcare services that favored the rich economies. It was noted that even within nations, huge disparities in access to healthcare existed. Unanimity was achieved in that this disparity had to be addressed. To address the inequity, ten points that addressed deliberate efforts to make primary healthcare the core business of governments in healthcare policies. The participants declared primary healthcare (PHC) as the vehicle for improving healthcare and health equity of populations and also set the goal for “health for all by the year 2000”. (http://www.who.int/publications/almaata_declaration_en.pdf, September 1978).

The Alma Ata declaration was underscored by ten points that included:

1. “Affirmation of health as not only the absence of disease or injury but the complete physical, mental and social well-being of the individual and declared it as a fundamental human right that has to be ensured by governments
2. The assembly acknowledged the unacceptable existing health inequality among nations and within nations

3. That people had the right and duty to participate in the planning and implementation of their health care to ensure attainment of health for all.
4. Governments were obligated to ensure the health of the people they led
5. Governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures.
6. Governments should aspire to provide primary health care as essential health care based on practical, scientifically sound and socially acceptable methods. of a continuing health care process.
7. Primary health care provision should involve not only health care professions but all sectors in private and public services
8. Governments should ensure sustainable funding for primary health care through deliberate policy as part national health systems.
9. The need for global partnership in supporting primary health care for all nations
10. Set the goal for achievement of health for all by the year 2000”

In 1979, some medical schools from across the globe had already reformed their curricula to include more CBME approach in order to meet community needs and become more socially relevant. The academic leaders in these schools got together and created a network named -“Towards Unity for Health (TUFH).” The TUFH holds two years meets to date the aim of sharing ongoing development in primary health care by stakeholders in medical education and health practice. The members lobby wealthy organizations and governments to support primary health care in low and middle income countries. (<https://thenetworktufh.org/wp-content/uploads/2019/09/TUFH-40th-Anniversary-Booklet-Website-Ver.pdf>).

The Edinburgh conference of world federation of medical education in August 1988 made a harsh declaration on the then state of health services where thousands suffered and died from preventable and curable or self-inflicted diseases due to lack of access to care. The conference noted with concern that medical education was not focused on addressing equity in health care and humane delivery of health services to the society. The conference declaration was harsh on the need ensure that doctors were well trained to promote health for all people and not merely deliver curative services to those who could afford it. The declaration presented the following as ways to achieve this:

1. Medical schools to include significant parts of community rotations for the medical students
2. Medical schools to enhance more innovative teaching and learning that involved a shift from didactic methods to self-directed and independent study with tutorials
3. Medical curricula and examination to enhance for professional competence and social values
4. Medical curricula content must reflect national health priorities and availability of affordable resources
5. Medical teachers to be more of all round educators not of medical content alone but well-grounded in research and clinical practice
6. Instructions on management of patients must be complemented with emphasis about health promotion and disease prevention
7. Integration of medical education to include problem for patients, families and communities
8. Personal qualities to be examined for in applicants for medical training

9. Multi-sector involvement in enhancing facilities for community based education

A decade after the Alma Ata declaration, strategies to achieve the goals set at the Alma Ata, included deliberate changes in medical educational curricula for healthcare professionals in favor of including community based medical education courses as core courses

(Edinburgh Declaration, World Conference on Medical Education, 1988).

In the 1990s stakeholders in healthcare around the globe realized that the implementation of the Alma Ata declaration was facing challenges. These challenges resulted from selective implementation of the set primary health care elements by governments and funding agents. This selective approach by these agencies and governments occurred after realization that implementing primary health care as envisaged was expensive and time consuming. The selective approach offered quicker results at less cost (Newell, 1988; Cueto, 2005).

The introduction of community based medical education in training of health professionals was one of the strategies that the majority of stakeholders in health agreed to be a step in the right direction to enhancing primary health care but to also in training health professionals who were relevant to the growing emerging needs on the health systems across the globe. On this matter, the World Health Forum, 1993 concurred that doctors who the society considers to be leaders in health systems were responsible for the then poor state of health services. The most prominent of this failure was inequity

in accessing of health care services among members of the society that the doctors served. The statement urged doctors to strive to remain relevant and play influential role in health policy-making and continue to be held in respect by the society. This could only happen if the doctors understood the communities they served as much as they understood the diseases that afflicted the members (Boelen, 1993).

This statement put more focus on the need for health professionals' training institutions, especially medical schools, to work towards including community based medical education as core curriculum for training. The policy makers expected that this approach would result in change of practice among medical graduates in favor of the paradigm shift in healthcare demands.

Following the above 1993 World Health Forum statement, that quoted the Boelen publication extensively, on the need for change in medical education accompanied by global lobbying by community based medical education advocates, schools have made progressive change towards making CBME courses core in the medical curriculum. All health professionals' training institutions were directed to move towards this paradigm across the globe (Boelen, 1993).

Community or public health was until the 1990s set aside as the domain of non-clinician public health practitioners with little or no collaboration from physicians. Lane highlighted this in a report that was published remarked that "As recent as the year 2000, less than one-percent of all physicians working in the United States of America had training in both clinical and public health disciplines" (Lane, 2000). More effort has subsequently resulted in more physicians rolling in Masters in public health (MPH) studying different areas that enhance health services management, teaching and research.

The implementation of community based education curriculum by the introduction of CBME courses that spiral over four years of medical training in the University of Toronto medical School in 1999 was documented to have remarkable impact on the graduates of that school. The impact was determined by studying and documenting student satisfaction and was also evident by improved national ranking of the Toronto School of Medicine. The ranking of this school rose from mediocre to first among sixteen Canadian medical schools. The graduates also reported great satisfaction in the new approach (Johnson, et al., 2011).

The Medical Education Partnership Initiative (MEPI) was funded of one hundred and thirty United States million dollars (\$130) million through the Presidential Emergency Plan for AIDS Relief (PEPFAR) and National Institutes of Health (NIH) in 2010. Through a collaborative research and service competitive grant thirteen universities from twelve African countries were awarded the grant but through enhanced collaboration of the sixty medical schools from Africa, USA and Europe (Omaswa, et al, 2018).

The original winners of the grant developed a network that involved collaboration of sixty universities with Africa. The terms of the grant included:

- Curricula review to competency based models
- Creation of medical education units that promoted institutional and collaborative research
- Increased admission capacity for more students

➤ Enhanced faculty recruitment and retention

These goals were achieved through enlisting of support of ministries of education and universities (Omaswa, et al, 2018)

Mariam et al, having surveyed twelve medical schools across Africa that had benefitted from the MEPI and concluded that all offered community based medical education and that there was good uptake of the CBME courses as part of the medical curriculum in these schools. They pointed out that there was significant variation in the mode of implementation of the CBME part of the medical curriculum among the twelve schools. For predictable output from medical graduates, they proposed for standardization in the implementation of the CBME part of the medical curriculum in the different medical schools in Africa (Mariam, et al, 2014).

A study on South African medical students' perspectives on the CBME courses documented positive impact on personal growth, exposure to diversity of patients, gaining of practical clinical skills with inter and intrapersonal skills. The reported negative or inadequate experiences were on the way the program was organized, availability of resources and the not so positive attitude of the health workers in these community health facilities (Kruger, Nel, & van Zyl, 2015).

Mwanika et al studied the efficiency and management of the community based education and service (COBES) that was offered in the Makerere College of Health Sciences. They also studied the impact of COBES on the graduates of the program. The findings were that the first three years of the training had very well run COBES courses

that impacted positively on the graduates' confidence as health workers, team work, communication skills and competence in primary health care. It also positively influenced their willingness to work in under-served, remote and rural parts of Uganda (Mwanika, et al, 2011).

Pemba and Kang'ethe, who described the challenges that then faced the Moi University Faculty of Health Sciences in optimal running community based education and service using public health facilities at primary health care levels for rotations by trainees, urged for collaboration by all stakeholder sectors for sustainability of CBME in medical training in Kenya if optimal implementation was to occur for improved output. They noted that support by the national government was not up to the expected implementation of innovative teaching and learning methods by the training institutions that would respond to a globally competitive knowledge and skills market. They published the growing trend that institutions have embraced for support. This included links with service systems and establishment of collaborations with local and international institutions and agencies. The sustainability of the linkages presents significant challenges and so does it for the CBME programs (Pemba & Kang'ethe, 2007).

In Egypt Tallat and El-Wazir published the positive impact of multi-sector involvement in enhancing and improving primary health care facilities. This involved major participation of the members of the community in the planning and implementation of their health care interventions. The university medical schools were also involved. This approach significantly improved primary health care services and impacted CBME

positively (Talaat & El-Wazir, 2012). With the increased support and interest in the CBME paradigm shift for training of health professionals, many countries, including some in Africa have adopted varying CBME implementation models that are context specific depending on individual medical school, regional and national health needs and challenges (Talaat & El-Wazir, 2012; Hamad, 2000).

Ahmed and Shaikh appraised the primary health care facilities in Pakistan and published the state of neglect through inadequate provision of resources. The article highlights the struggle that those who work in these facilities go through to offer basic services. One can only imagine what would happen if students were referred to such facilities as part of medical training (Ahmed & Shaikh, 2011; Asad, 2009).

It is also noted that continued resistance by faculty and half-hearted interest among trainees and graduate health professionals continue to hinder realization of the goals set by the initiators of CBME (Bloom, 1988).

The number of students admitted to the Kenyan medical schools every year has increased significantly in the last decade as demand for medical training continues to rise due to the increasing need for health professionals to address the double burden of communicable and rising non-communicable diseases. More medical schools (public and private) have been started since 2010 that offer curricula that have CBME as core curriculum. It is crucial to conduct some evaluation of the impact of CBME to career development of the graduates of the programs.

2.1.2 Rationale for Community Based Medical Education in the Health Professionals' Education

The purpose of establishing institutions for training of health professionals can be summarized as that of educating healthcare providers; advancing knowledge through research and providing care to the patients and communities these institutions serve.

In the last century medical education has become very dynamic and educators have had no option but to find ways and means of remaining relevant. This has included adopting innovative teaching methods that are founded on problem based learning (PBL) and community based medical education (Alausa et al, 1987).

A health professional training institution that offers community based education as core courses in the curriculum for its trainees has to ensure that; for the duration of the program, appropriate number of learning activities occur in the community and that the rotations in the community are accorded optimal periods to allow experience of a diversity of healthcare services. This should be appropriated in a way that exposes the learners to opportunities that are supported for the different levels of training. The rotations should also ensure that the learners are exposed to services all levels of healthcare services that include community to tertiary care hospitals. This should be well balanced with the biomedical sciences taught (Alausa et al., 1987).

For community based medical programs to offer relevant knowledge, skills and attitude opportunities that address priority health problems that afflict communities they serve or will serve after graduating, innovative strategies that foster collaboration among the traditionally separate realms of public health, academic medicine and the healthcare delivery systems. To improve the health of all members of the community, stakeholders in healthcare must develop new community and academic partnerships that redirect

community resources to creating an environment that supports healthy behavior and access to healthcare services (Andrus & Bennet, 2006)

Healthcare delivery systems, as traditionally structured, had limited capacity to address disease prevention and health promotion activities. To address these crucial aspects of health service to populations, stakeholders were compelled to revise both training and practice of healthcare workers with the aim of bridging the gap between the practice of purely biomedical science that was disease oriented and public health that was more focused on the environmental aspects (Reiser, 1996; Brill, Ohly & Stearns, 2002).

In Britain, Professor Amanda Howe, who is a leading teacher in general and community practice published twelve tips making CBME more workable for the students, teachers and the communities they served in. In summary these very useful tips for all stakeholders include:

The need for planning on the best way to communicate the objectives of the CBME to the community in which the rotation occurs. A well prepared community accommodates the students, the teachers and also appreciates their role in the CBME

The members of the community and the student need to appreciate that the staff working in the community facilities are alternate role models for the learners away from the medical school

The rotation in the community away from the regular training institution could provide significant shock to the learner who is likely to be trained in a different way of approaching patients and teachers in the training institution away from fellow students.

Thorough preparation of the students by those managing the CBME at the training institution works well in minimizing this.

The university teachers and the students should be appraised on the curriculum implementation requirements for an optimal CBME rotation. This should occur before the rotation starts

The CBME rotations should also include significant protected teaching time by assigned tutors from the learning institution and the community. The teaching activities should also include consenting patients within the facility

The students should enjoy the advantage of closure teaching and learning as small groups compared to larger groups in the learning institution

The students and the teachers are expected to understand that assessment done during the CBME rotation are core and should be held as seriously as the ones in the learning institution

The training institution is expected to work with the CBME rotation facilities to ensure that the necessary tools required for optimal learning are in place. Where the lower facilities and the community have difficulties, the institution should provide.

The staff who supervise the students during CBME should be well prepared and even certified as capable for the task

The CBME rotation is expected to give the student exposure to the multidisciplinary primary health care teams that run the facility

The team working in the CBME need to be celebrated for role they play in teaching students and preparing to be effective health workers. It notable that traditionally CBME continues to be viewed as not as important as the courses taught within the main teaching facility

CBME should be elevated as the driver of social accountability for the medical school to the communities in which they are located (Howe, 2002)

Role modeling is a recognized aspect of teaching and learning (Bandura, 1997). Christopher Matthews, a teacher of family medicine and primary care in Saudi Arabia identified and published that learners associated positive role modeling of medical students and young doctors by their seniors in positive behavior towards patients, demonstration of depth in knowledge in content of a subject and encouragement in empathetic patient care. The learners associated negative role modeling with negative behavior towards junior colleagues, suboptimal depth of knowledge and skills and insufficient encouragement for trainees to actively participate in patient care. This applied equally for medical school teachers and those in the communities they trained in (Matthews, 2000).

Howe et al evaluated the impact of biomedical teaching in medical schools and CBME on the kind of doctor a trainee became. Though this was a difficult study to carry out, it answered part of the questions the influence of tertiary teaching hospital on how a doctor performs in lower level health facilities. The other aspect that the authors questioned was the balance that should be developed in delivery of biomedical model of medical training to the CBME (Howe, Billingham, & Walters, 2002).

Participation in CBME learning activities and rotations within communities gives students the sense of social responsibility by enabling them to obtain a clear understanding of the needs of a local community and the problems it faces. The students

also get to understand how health and other factors that contribute to community development are interrelated (Mennin & Mennin, 2006).

CBME also enables the students to relate theoretical knowledge to practical training and makes them better prepared for career growth and their future integration into their working environment. It also helps to break down barriers between trained professionals and the lay public and makes the student to be more integrated in life (Mennin & Mennin, 2006).

CBME helps to keep the educational process up to date by continuously confronting the students with reality. It also gives the learner the opportunity to play part in clarifying and finding solutions to problems that contribute to growth and development in the communities they serve. This results in acquisition of competency in areas relevant to addressing community health needs while utilizing the limited resources available in small health facilities found within communities living away from the medical school. These students also evolve into efficient health workers in better equipped and bigger health facilities (Howe, Billingham, & Walters, 2002; Mennin & Mennin, 2006).

2.1.3 The Different Approaches to the Implementation Community Based

Medical Education Courses

Community-based education is defined as an approach aimed at achieving relevance to community where the learning activities utilize the community as a learning environment in which the students, teachers, members of the community and

representatives of other sectors are actively engaged throughout the educational process. This approach contributes to minimizing inequity in service delivery by producing doctors who are willing and able to work in the underserved areas. It also enhances learning in the same way that problem-based learning (PBL) does (Schmidt, 1983; Erney, et al., 1991; Starfield, 1991; Abdelrahim, Mustafa & Ahmed, 1992; Hamad, 2000;).

Magzoub & Schmidt reviewed literature in reports on implementation of CBME in thirty-one programs across the globe. From this made attempts at creating taxonomy of CBME. What was fundamentally the same in all programs was that CBME programs were carried out away from the academic hospitals and in a community. The variation was in the activities that different CBME programs were involved in; some offered services to under-served communities, others focused on research and used the communities for clinical training for learners. The creation of this taxonomy was to ensure a systematic way for investigating and reporting the CBME programs. This would also make it possible for upcoming programs to choose the approaches that filled their educational and community goals (Magzoub & Schmidt, 2000).

The planning and implementation of CBME may vary depending on the medical school, the characteristics of community in which it is implemented, the structure of health services in the region and the national educational system within which the particular school functions. That is, while some communities may be quite open to outsiders, others may be reluctant to accept visitors (Magzoub & Schmidt, 2000).

Different approaches to community based medical education include:

Service-oriented CBME: This focuses on service delivery to the community that involves medical students and their teachers. The services may range from only offering clinical services to broader community development services based on identified community health needs. The students and their teachers utilize the available resources. This approach is mainly found in developing countries (Kelly, Walters & Rosenthal, 2014)

Research oriented: This approach has the students and their teachers involved mainly in studying the health problems of the community. This approach is found in developed countries (Kelly, Walters & Rosenthal, 2014)

Training oriented: This approach has the students acquiring clinical training in the community setting. The objective of this approach is to produce physicians who are able to work in underserved areas. This approach can be found in both developing and developed countries (Walters, Worley & Mugford, 2003; Walters et al, 2012, Strasser, 2012)

Other varieties of these include: community development programs; health intervention programs and community exposure programs (Magzoub & Schmidt, 2000).

It is noted that the implementation of the CBME and its integration in the medical curriculum differs in parts of the globe.

2.1.4 CBME and its integration in the medical curriculum: the progress made in different parts of the globe

The report by General Professional Education of the Physician and College Preparation for Medicine (GPEP) that was published by the Association of American Medical

Colleges (AAMC) in 1984 stressed the importance of teaching medical students on how to help the patients and communities to prevent and ameliorate disease (Muller, 1984). Steven Muller was the chairman and president of the Association of American Medical Colleges then and wrote on behalf of the members. The message focused on what the physician of the twenty-first century needed in order to be in sync with the expected responsibility in society. This included: 1) To be a physician one needed the optimal common foundation of knowledge, skills, values and attitudes that must be provided during medical training. Following the laying of this foundation, competence was to be acquired through mentoring and supervision in the methods and spirit of scientific inquiry and devotion to growth in education, research and practice. 2) The vast growth of the biomedical science and technology that left no choice but for the physicians to divide labor through specialization in medical practice. This would lead to focus in specific areas compared to the expectation in less specialized practice. The medical specialist would be expected to not only acquire full knowledge in their areas of specialty but to sustain it through continuity professional development. 3) Optimal preparation of physicians should be anchored on the physician's responsibility to work with individual patients and communities to promote health and prevent disease. This would only become a reality if it was made possible for students to spend significant periods of their training doing community based medical education (CBME). During CBME the students would gain hands on experience on community health needs by working within and with members towards finding immediate and long term solutions (Muller, 1984). Progressively schools reacted to this report and challenge and by 1994; it was documented that significant progress had been made though more needed to be done. The implication of this was that medical schools moved significantly from the

traditional Flexnerian methods to more blended methods that gave both biomedical, preventive, community and public health and (McClary, Marantz & Taylor, 2000).

The AAMC 1994 report on Academic Medicine and Healthcare Reform charged medical educators to “make more explicit and visible in the curriculum, an emphasis on prevention, public health and community medicine.”

Following this charge, USA medical schools embarked on curricula review that incorporated the proposed changes. The results of this initiative have been documented in a survey of medical schools in the USA and Canada that outlined a four-part plan for a four-year curriculum in preventive medicine that developed the desired objectives and competencies relevant to the practice of medicine in that context (McClary, Marantz & Taylor, 2000)

In 2000, Dismuke & McClary presented a blended four year curriculum with biomedical and the preventive, public health and community medicine. They also presented proposals on its implementation in the United States of America and Canada (Dismuke & McClary, 2000). Being non-experts in preventive medicine, they left the details of that part of the curriculum as a challenge the experts to develop and market the ideals and ideas

In 2004, the American Association of Teachers of Preventive Medicine and the Association of Academic Health Centers developed the first Clinical Prevention and Population Health Curriculum that had four components that included: evidence-based practice; clinical preventive services and health promotion; health systems and health policy and community aspects of practice. The Clinical Prevention and Population

Health Curriculum Framework was the product of the Healthy People Curriculum Task Force and had representatives of allopathic and osteopathic medicine, nursing and nurse practitioners, dentistry, pharmacy and physician assistants with an ambitious aim of accomplishing the goal of making the American population by 2010 by increasing the prevention content of health professional education. This acted as a template on which medical schools in the USA developed and reviewed their curricula for training health professionals. It encompasses individual and population-oriented preventive medicine (Allan et al. 2004).

In a letter to the editor, the public health reports journal of 2012, Finkel acknowledged the inclusion of aspects of public health in the medical curriculum but expressed the need to integrate public health training within the four year curriculum. This would improve the learners' growth in understanding the essential part that social determinants of health played in the causation and management of disease among human beings (Finkel, 2012)

Integrating of public health courses into the four-year medical curriculum resulted in well-trained physicians with firm understanding and appreciation of the socio-medical aspects of medicine. This approach played a major role in improving the health of the individual patient and the health and wellbeing of the populations (Finkel, 2012).

Innovations that helped integrate public health into medical education in the University of Arizona College of Medicine and medical school curriculum respectively is well documented (Campos-Outcalt, 2011; McNeal & Blumenthal, 2011).

The British General Medical Council (GMC) is the body that regulates the curriculum that trains medical students to make doctors that are responsible for the health of the people of Britain. This body keeps tab of the guidelines of the global stakeholders in healthcare services and health professional training. From the mid-1990s after the World Health Report of 1993, the council starting sensitizing members on the paradigm change that was expected in training and practice.

The entrenching of public health in undergraduate training was increasingly advocated for by the United Kingdom's General Medical Council between (GMC) 1993 and 2003 through regular publications in the "Tomorrow's Doctor" that culminated in a white paper in 2004 emphasizing the importance of training clinicians in this area (Department of Health, 2004). Substantive progress has since been made in the medical schools' curricula and their implementation to ensure uniformity of the UK medical doctors from the different medical schools.

The World Health Organization and global health leaders expressed concern over the health workforce needs in rural and underserved areas of Africa and called on health professionals' training institutions to scale up the production of health workers with curricula that were community, competency and team-based (WHO Global Health Final REPORT, 2003). In this report the gap that existed between the rich and the poorest nations was pointed out as was the need to address that gap. Also underscored were the social determinants of health such as poverty, armed conflict, institutional stability and the state of infrastructure were identifies as factors that the health system did not have direct control over. There was consensus that governments that were

committed to funding primary health care services were more effective in ensuring health for the vulnerable members of their people.

African medical schools have significantly embraced these changes in the medical curriculum that has CBME as core courses. This also includes other health professionals training curricula. Many of the sub-Saharan medical schools are young and are faced the persistent challenges that continue to confront the African continent (Chen, et al, 2012).

The Medical Education Partnership Initiative (MEPI) of 2010 was a one hundred and thirty million United States dollars' (\$130 million) program funded by the United States government through the presidential fund (as a competitive academic grant) that supported thirteen African medical schools in twelve countries. The aim was to increase the quantity, quality, and retention of physicians in underserved areas. It was launched in 2010. The MEPI supported schools undertook a spectrum of activities that included revision of training curricula, strengthening of faculty development programs, establishment of e-learning, and strengthening of community based education to meet the health workforce goals proposed during the grant application. A study conducted to evaluate the impact of the MEPI guided changes documented significant improvement in implementation of the CBME curriculum in three of these African countries. It was also noted that there was significant variation in implementation of the curriculum in the individual medical schools of the three countries that were evaluated (Talib & El-Wazir, 2013).

Another survey that examined various models, challenges and evaluative efforts of community based medical education in the twelve schools that were part of the MEPI, documented that though the CBME programs had similar goals, the strategies to achieve these goals in the different medical schools that were evaluated varied significantly. The authors recommended that medical schools should develop common structured models and tools for evaluating the processes, outcomes and impacts of the programs. This must also be accompanied by appropriate training of faculty on community based education. Embracing technology, improving curricula and using global and regional networking opportunities was also proposed as a way of enhancing uniform CBME part of the medical curriculum implementation strategies (Mariam et al, 2014).

2.1.5 Challenges encountered in the implementing the CBME courses

The challenges and constraints in CBME program implementation in the community have been put in three categories:

Institution related: The small facilities in which students rotate away from the teaching and referral hospital where the medical school is located are noted to inherently have inadequately developed infrastructure. The training and teaching infrastructure that are worst of in these smaller health facilities include library, skills laboratories and tutorial rooms.

Inadequate numbers of teachers to stay and supervise students in the smaller facility that is away from the medical school because the core business comes before the community rotation. In most cases those available to supervise the students in the community are usually inadequately prepared for these roles.

Those available to teach in the community health facilities sometimes lack skills in crucial topics for optimal teaching. This has been reported to disadvantage students who miss opportunities to maximize on the wide variety of clinical and other health challenges that they encounter during the community rotation (Ali & Baig, 2012, Kaye et al, 2011; Lee, et al., 2014).

Program related: Programs that are managed away from the medical schools present logistical challenges to faculty members whose primary responsibilities are within the medical school. This results in suboptimal performance in organization and coordination of community rotations for the students. Financial support by the school is also a challenge because of other competing needs especially in poorly funded medical schools in developing countries. Senior managers and policy makers in many cases fail to demonstrate as much support as they do for other programs run within the mainstream medical school (Ali & Baig, 2012 ; Kaye et al, 2011 ; Lee, et al., 2014).

Curricular related: Students and faculty members seem to rank CBME inferior to biomedical related courses that they consider to be more crucial in the training of a health professional. The students complain of being poorly sensitized and prepared for what they are expected to do in community. For optimal learning and maximum utilization of time spent in the community, the students feel more time should be spent preparing them than what happens now. Many schools assume that graduate training automatically prepares those taking up teaching jobs in medical schools for teaching CBME among other courses. Many of the faculty members complained of being poorly sensitized and prepared for what they are expected to do in community (Ali & Baig, 2012; Kaye et al, 2011; Lee, et al., 2014).

In Medical School: Medical school teachers find it inconveniencing to give up part of the curriculum time devoted to their particular specialty areas. This contributes to some of the challenges in the implementation of CBME courses as these teachers are part of the team that is expected to enable the students to obtain an appropriate balance of supervised community-based learning experience (Rosser & Beaulieu, 1984). Moving students from their regular learning environment to the community costs money which increases the cost of medical education to the institutions and the parents/guardians of the learners. In institutions that have staff shortages, supervision in the community may exacerbate existing strain on the limited number of staff. Discord may also arise from the educational purpose of the CBME program and the responsibility to the community as the regular staff at the community health facility, who are not university employees spend time teaching the students at the expense of their regular duties (Richardson, 1983). It normally would be expected that if given clinical or other duties, students at the lower levels of training may negatively affect the quality of healthcare due to their inexperience. Though, on the contrary, it has been documented that students evaluated on their experience rate CBME highly and there has not been evidence that the quality of patient care was negatively affected. There are significant logistical challenges related to managing CBME by educators based in the medical school and not in the community (Richardson, 1983).

2.1.6 Community involvement in CBME programs

Community engaged medical education (CEME) has been used to emphasize the role the community plays in this format of CBME. These programs directly engage members of the community in the design, conduct and or evaluation so as to meet the needs of the community and also enhance the learning outcomes of the students. The

community actively contributes to the planning and implementation of hosting the learners away from their institutions of learning and ensures optimal learning experiences during the rotation. Successful community engagement depends on empowering the community to be a partner in the academic program by formal affiliation agreements, collaboration agreements and memoranda of understanding that set out the roles and functions of the partners. These include the local steering committee which coordinates medical school activities in the community (Strasser, 2012).

The benefits of CEME include the community making it possible for the program to share the best of the community human and other resources through professional cooperation and health team functioning that improves access to the community members in service and research participation (Strasser, 2012)

Studies have documented significant difference in outcomes of CBME programs that involved active participants when compared to those that had passive community participation. The outcomes that improved significantly were student satisfaction in the community rotations and high compliance and appreciation were registered in these communities. The health interventions also had higher impact (Kristina, et al., 2006; Calleson, Seifer & Maurana, 2002).

Involving local communities when planning for community rotations by students is essential as part of a close working collaboration between the teachers, students and the community within which CBME takes place. This should involve most of the educational process that includes setting of objectives, community diagnosis, selection of methods and formulation of plans, preparation of teaching materials, implementation

of planned activities and time management. It also involves administration of staff and students. The students also need to be assessed to ensure that actual learning has occurred. Program monitoring and evaluation is core to ensuring sustainability of CBME (Jinadu, 1992).

How the community benefits from the partnership depends on shared objectives and the implementation of the objectives. The agreed objectives do not necessarily translate to service or education for the learners. They may also be on needed understanding of the community in matters that require investigation in research. Cited below are a number of articles on community participation in CBME in many developed countries that are mainly on community based research with minimal education and service (Minkler, & Wallerstein, 2003; Green & Mercer, 2001; Lasker, Weis & Miller, 2001; O'Fallon & Dearry, 2002; Travers & Flicker, 2004; Minkler, 2004).

2.1.7 Strategies to effective CBME curriculum

Unlike the biomedical based clinical disciplines for which teaching and learning is almost uniform, community based medical education is more complex with varying implementation strategies across the globe.

Various models of CBME have been developed in different contexts. Some of the models include early clinical exposure of medical students through rotations in primary care facilities, running of parallel community-based clinical programs to family case studies.

Early exposure of learners to clinical practice in communities: This involves sending pre-clinical year students to the community to learn basic clinical skills as they

learn the basic sciences. Hampshire documented this initiative in the Nottingham medical school in the 1990 where medical students were taught basic clinical skills in primary care as a pre-clinical course as part of an integrated curriculum. The students and the tutors perceived the course useful in helping them understand and motivated to learn their basic science courses. The tutors in primary care settings found the course useful and supported it. The challenges of sustaining the course was appreciated by the medical school and the tutors in primary care (Hampshire, 1998)

According to Habbick & Leeder the goals of CBME can be considered in relation to medical education and also in relation to the society in which the medical school is located. They divide it into:

In relation to medical education- the students must be well orientated to the area they rotate for them get optimal exposure and experience to the diversity health problems that are usually not seen in the teaching hospital. Make use of the available resources in the community setting that maybe more accessible to them in the community set up than in the teaching hospital. The students should be encouraged to carry out clinical and other tasks, relevant to their training, but not as accessible to them within the training hospital. The students should take this opportunity take this opportunity to understand their national health system and identify the role of the primary care facility they find themselves in. The tutors should ensure that the learners development an understanding of social factors in illness causation, prognosis and the utilization of healthcare services

In relation to the community and society: the community must realize maximum benefit through collaboration among all professionals in the community and the

teaching institution to meet the health needs of the community. The teams must ensure the provision of appropriate health promotion, disease prevention as well as curative services. The team should conduct population based research and apply the results to improving healthcare.

Most medical training programs that offer CBME follow the proposal by Habbick & Leeder that emphasizes on balancing the university hospital teaching and learning with use of community rotations (Habbick & Leeder, 1996).

Evaluation of community based medical education (CBME) programs has demonstrated significant success in many schools across the globe. These successes could be used to guide implementation in schools that may not be doing well. The successful implementation would be easier to copy by schools within the same context. The success in CBMEs in the medical schools of high income countries would be good guides in the western world while those in growing economies would guide schools in their contexts. The learning and teaching style preferences for CBME are not significantly different between schools that offer medical courses through blending traditional and innovative methods. The blending has been found to work best for all medical courses (Piane, Rydman & Rubens, 1996).

There are two options that schools choose in teaching CBME courses. The courses in CBME may be integrated horizontally (across disciplines) or vertically (between preclinical and clinical courses). Most medical schools are noted to prefer the vertical approach for pre-clinical years of training but horizontal for senior classes (Taylor & Moore, 1994).

The integrated horizontal CBME courses run concurrently with other courses or rotations.

This may translate to one afternoon per week of overviews followed by small group tutorials that are supervised by faculty. The weekly tutorial is assigned one session on a time agreed by the tutorial group and the tutor (Taylor & Moore, 1994). This works best in senior clinical years where students spend protected time in communities during which they review intervention projects started during pre-clinical rotations or reviewing continuing chronic disease cases of members of the community

The vertical approach involves a period of several weeks away from other courses or rotations when the students do little else but the CBME. This works best for CBME in pre-clinical years where students are away in the community (Taylor & Moore, 1994).

An online survey and systematic review on the provision of community-based teaching in United Kingdom medical schools in 2013 reported that over 90% of the schools offered some form of CBME. It was reported that though there was significant variation in implementation of CBME in these schools, the CBME part of the medical training was beneficial to the students, teachers and the communities where the CBME rotations occurred (Lee, et al., 2014).

2.1.8 Staffing of health facilities in remote and rural areas

The reason why major global initiatives aimed at tackling health and inequalities in accessing health are not achieving targets in low and middle income countries (LMICs) remains the shortage of the health workforce (World Health Report, 2006). In this report the WHO appraises the key issues affecting the global health work force; the various

facts that explain the disparity in attracting and retaining health workers and the continuing brain-drain from the countries with critical shortage to those without critical shortage of health workers. The report offered workable solutions to political leadership of the affected countries (WHR, 2006). What is remarkable is that little has changed more than a decade after this report.

The LMICs are faced with the huge challenges of severely weakened and under-resourced health systems that are unable to effectively produce, recruit and retain health professionals. This is compounded by the governments' inability to offer attractive wages provide optimal working conditions, proper supervision, equipment and infrastructure to handle the double burden of communicable and non-communicable diseases that are rampant. The few healthcare personnel in these countries easily take up favorable opportunities that come their way in more developed economies (Lehmann, Dieleman & Martineau, 2008).

In the low income countries, inequitable distribution of health professionals that favors urban areas at the expense of rural areas results in serious disparities between levels of care and between urban and rural areas with some rural primary care facilities being run by untrained staff (WHR, 2006)

In Zambia, Gow et, al noted that the disparity between urban and rural attraction of health workers persisted. The interviewed health workers gave reasons that included, poor housing, low salaries with no allowances (for retention and hardship) for working in adversity and lack of social amenities. It was clear that the public service human resource recruitment body in Zambia lacked practical and effective strategies to address

factors affecting the motivation of health workers in remote and rural Zambia (Gow, et al., 2013). The picture in Zambia is likely replicated all over Sub-Saharan Africa.

Strategies used by different health systems in different countries have yielded some fruits with some degree of success in high economy countries. The narrative is significantly different in low and middle income countries (LMICs) where either the governments have ignored the problem or given it insignificant attention (Lehmann, Dieleman & Martineau, 2008).

Lehmann, Dieleman & Martineau, 2008, reviewed available literature on strategies used more than a decade in LMICs proposed some strategies that they observed to have had some positive impact in some countries. These strategies included the following:

- 1) Targeted recruitment and selection for remote and under-served areas- this would involve training learners and offering content that addressed specific under-served areas or regions. The learners would be informed ahead of joining the program that they were and work in these areas. Though the training curriculum would be standard, more emphasis would be laid on health matters prevalent in the area. This was guided by significant success in this approach in Thailand (Nitayaruphong, Srivanichakom, & Pongsupap, 2000; Wibulpolpraser, & Pengpibon, 2003).
- 2) Use of incentives and compulsory service where incentives would be higher salaries for those who offered to work in under-served areas; preferential consideration for specialist training opportunities. The success of this had been observed in Indonesia and Thailand (Chomitz, 1997; Nitayaruphong, Srivanichakom, & Pongsupap, 2000; Wibulpolpraser, & Pengpibon, 2003). Compulsory service in the remote and underserved has been observed in South Africa who also offers financial incentives (Reid, 2003).
- 3)

Improving working conditions-Improved working environment that provides optimal resources for effective performance together with enhanced supportive supervision is well known to improve motivation for all cadres of workers. Deliberate effort by governments in LMICs to improve working conditions would go a long way in the under-served regions (Buchan & Calman, 2004).⁴ Improving living conditions-improved housing and social amenities attracts workers. Most infrastructural development in most LMICs continues to be in the urban areas. In Thailand where government improved housing and social amenities for not only those working in rural Thailand but the residents has attracted more workers and reduced rural to urban migration (Nitayaruphong, Srivanichakom, & Pongsupap, 2000).

2.1.9 Evidence that CBME positively impacted attraction and retention of doctors in the under-served health facilities?

The skewed distribution of doctors in favor of urban areas continues to present challenges globally. This has presented recurring problems related to attraction and retention of doctors and other health workers in areas perceived as rural and remote. Stakeholders and policy makers in health at the global, regional and local levels continue to grapple with these challenges by using different strategies in attempts to overcome them (Wibulpolprasert & Pengpaibon, 2003; Pagaiya, Satriratana, Wongwinyou, Lapkom&Worarat, 2012).

Initiatives that have been reported to improve chances of medical doctors choosing to serve in rural and remote areas include the presence of a role model within the rural health facility, having been brought up in a rural environment, pre-medical school admission interviews that select those who demonstrated interest in rural service and

general practice (Kawamoto et al, 2014; Matsumoto, Inoue, Kajii et al, 2008, Matsumoto & Kajii, 2009).

Other factors associated with choice of rural or urban practice in medical doctors and new specialists were that female doctors were more likely to prefer urban practice than male ones. Medical doctors brought up in rural areas were more likely to choose rural practice than those brought up in urban areas (Keley, et al., 2016; Syahmar, et al., 2015).

A study of almost 3000 specialist doctors, five years after graduating from the programs in Iran, documented that doctors who were brought up in underserved, remote and rural areas were nine times more likely to choose to practice in similar or same areas compared with those from better served areas. It was also documented that those who had never lived in such areas were least likely to choose to practice in them. The researchers recommended to policy makers to use the evidence of the study findings as they select candidates for rural compliant specialties. The impact of this is not yet documented (Keley, et al., 2016).

In Indonesia new graduates of medical schools reported that they failed to select rural posting due to spouse influence and foreseen reduced chances of career advancement for those who worked in rural Indonesia (Syahmar, et al., 2015).

Royston et al studied final year medical students in Arizona, USA. The study was to characterize medical students and graduates who were more inclined to choosing rural practice. The study reported the characteristics to include being born and brought up in a rural USA, having a spouse of rural upbringing and the extroverted personality type based on Myer Briggs Type Indicator (Royston et al, 2012).

Community based medical education courses with well managed community rotations for medical students resulted in doctors who demonstrated better skills and commitment towards patient care compared to those who had none or only had classroom oriented community health education without rotations in communities (Shahid, 2013; Tambylyn, et al. 2005).

The medical schools in the USA that had campuses out of the main training hospitals, in rural regions were reported to have a significant positive impact on the long-term local and regional physician workforce. This impact favored attraction and retention of doctors in rural areas (Phillips, et al., 2016).

A survey of medical graduates with CBME trained implemented by community based education and service (COBES) and problem based learning (PBL) curriculum in Ghana documented that the majority of these graduates reported that COBES had influenced their choice of specialty and also their choice to serve in rural Ghana (Amalba, et al., 2016).

The positive impact of COBES on medical graduates has also been documented in Uganda. The Uganda medical graduates reported that the training endeared students and later as doctors to rural communities. The positive relation between learners and the communities that they ultimately resulted in the medical graduates being attracted to work in rural Uganda. The graduates reported that the training prepared the students well for clinical and administrative duties in smaller health facilities away from the medical school by making them competent in the needed skills. They also identified with the logistic challenges because they had gone through them as trainees (Mwanika, et al. 2011).

In Kenya, Muthaura studied the perceived preparedness of medical officer interns to work in Kenyan district hospitals after graduating. The documented that the new graduates reported that the training they had received in the medical school hospitals, which were also tertiary referral health facilities did not prepare them adequately for the clinical and other challenges encountered during internship in lower level health facilities. They reported that there was need to revise the medical curriculum and its implementation to prepare them better for internship in facilities with few or no senior clinicians. It was noted that all these students were not products of CBME courses that were offered as community based education and service (COBES) offered as spiraled in the medical curriculum (Muthaura, et al., 2015).

2.1.10 CBME experience as a positive factor for choice of specialty

The choice of specialty by individual doctors has future implications for both the doctor, the healthcare system that they work in and the society. This is more significant in low and middle income countries that continue to experience huge deficits in their health professionals' workforce. Though the choice of specialty is an individual decision, the process that leads to this decision is usually complex and influenced by many factors. These factors include the individual doctor characteristics such as one's personality and demographic factors such as marital status. Unpleasant experiences by individuals during medical training have been associated with complete loss of interest in a discipline or specialty. The presence of specialties in the health facilities where the community based medical education is accorded significant regard in implementing of the medical training curriculum is associated with positive influence on the choice of the specialties and choice of where to practice. Also noted to have significant influence

was how one was socialized with teachers, colleagues and patients during medical training

A study on a graduating class of medical students in Taiwan medical schools reported that their choice of specialty was mainly determined by their perceived personal capabilities and intelligence and the competition for available specialty opportunities (Chang, et al., 2006).

Graduating British medical students' specialty choice was reported to be determined by perceived work-life balance where specialties that had favored more socialization than just work were more popular. The most popular courses were medicine and general practice at the expense of surgical oriented specialties. This was attributed to the "Generation Y strong social time preference" compared to the earlier generation of doctors (Cleland, et al., 2014). Ibrahim et al, studied a different group of British graduating medical students and brought out that the same factors with Cleland but also found that the experience of individual medical students during clinical rotations was a significant factor (Ibrahim, et al, 2014).

Woolf & Newport studied medical students in British schools at different levels of training and early years of practice to determine the factors that determined choice of specialty. The factors differed significantly from junior to senior years of training and even after graduation. The conclusion was that it was crucial to allow students to mature before making this very crucial career decision and that mentoring was crucial (Woolf & Newport, 2015).

Saigal et al studied the factors that influenced the choice of specialty among graduating Japanese medical students and documented that role models during training and even

before medical training, preclinical and clinical experiences as major factors. This was a qualitative study that interviewed a small number of students (Saigal, et al., 2007).

Takeda et al conducted a nationwide quantitative study and compared the influence of different factors on senior medical students and junior doctors' choice of specialty in Japan. The five factors that they documented were: 1) A specialty should be fulfilling and ensure job security for the doctor. This applied was identified with those who chose radiology, ophthalmology, anesthesiology, dermatology and psychiatry 2) A specialty that reflected on the individual doctor's bio-scientific depth and orientation. This was seen among those who chose internal medicine subspecialties, surgery, obstetrics and gynecology, emergency medicine, urology and neurosurgery 3) Personal reasons was identified with those who chose pediatrics and orthopedics 4) Advice from others and 5) educational experience was seen with those who chose general medicine, family medicine and otolaryngology (Takeda, et al., 2013).

A study on the factors influencing the choice of family medicine by graduating Canadian medical students reported that being female, being older, having previously lived in a rural location and the desire for a short residency program as major factors. It is noted that in Canada, family medicine is a very competitive residency program and takes two years (Gill, et al., 2012).

On investigating the factors that attracted medical students to general practice (GP) in the Scandinavian countries, Deutsch documented that a practice-oriented GP curriculum when offered both at earlier and later stages of undergraduate curriculum raised the output of GPs. In the Scandinavian countries more GPs than the other physicians choose to practice in rural areas (Deutsch, et al., 2015).

A survey conducted on final year medical students, on the factors that favored choice of specialty in one of the Kenyan public medical schools reported that more males than females favored surgical and those specialties considered prestigious; females had an increased likelihood of choosing controllable lifestyle specialties like pediatrics and internal medicine (Mwachaka & Mbugua, 2010).

2.1.11 Characteristic profiles among students and junior doctors with specific career preferences

Some factors have been documented to affect career choices among senior medical students and junior doctors across the globe were documented by Goldacre et al. The factors identified as to why doctors considered but never got to choosing specialty lines in the United Kingdom. Some of the factors identified included the perceived job content in not pursuing general practice, psychiatry and pathology. Work-life balance was more crucial for female doctors while married doctors preferred specialties that were friendly to the raising of young families (Goldacre, Goldacre, & Lambert, 2012) Svirko et al noted a newer trend in UK graduating students' choice of specialty. They reported the tendency to select more than one specialty and that application for surgical specialties had decreased significantly (Svirko, Goldacre, & Lambert, 2013).

In the USA Grayson et al studied the role of foreseen higher income and the urgency to pay student loans after residency programs. They concluded that primary care paid less and tended not to attract residents with affinity to higher paying specialty. This was usually determined by the urgency to clear student loans in individuals. The tendency for this type of resident to transfer from primary care to non-primary care residency

programs was reported (Grayson, Newton & Thompson, 2012; Greysen, Chen, & Mullan, 2011).

Academic performance and individual personality: medical students who are of above average tended to apply for clinical specialties that were intense in biomedical sciences such as cardiology, neurology and pathology (Grayson, Newton, & Thompson, 2012; Chang, et al., 2006).

Controllable lifestyle: this involves choice of a specialty in which the doctor can control work hours. The specialties associated with this include dermatology, emergency medicine, ophthalmology, psychiatry, anesthesiology, pathology and radiology. Non-controllable lifestyle specialties include surgery, medicine, family practice, pediatrics and obstetrics-gynecology (Swartz, et al., 1989).

There is scarcity of data on the perceived and actual effect of CBME on career growth among medical doctors. The Amalba article in Ghana that reported a positive influence of COBES on choice of specialty was one of the few articles found on this subject (Amalba, et al., 2016).

Data on the effect of different ways of CBME curriculum implementation on career growth of medical doctors was not available.

CHAPTER THREE: RESEARCH DESIGN AND METHODS

3.0 Overview

This chapter covers the study design, study site, target population, sampling procedures, data collection methods and data management methods.

3.1 Study Site

The study was carried out in Moi University School of Medicine (MUSOM) which is within Eldoret Town and referred to as the Eldoret Town Campus. The teaching hospital is the Moi Teaching and Referral Hospital (MTRH) which also hosts the teaching and learning infrastructure.

MUSOM was established in 1988 with the initial name as Faculty of Health. In 1990 the first group of students was admitted. The schools of Medicine, Public Health, Dentistry and Nursing were born of the Faculty of Health Sciences in 2005

The Faculty of Health Sciences which transformed to the Moi University College of Health Sciences (MUCHS) in 2011 with the first Principal as Professor Fabian Esamai. MUCHS is made up of the four schools and the Institute of Biomedical Informatics (BME) started in 2016.

The undergraduate curricula are founded on the **Students-centered, Problem based, Integrated, Community based, Electives and Systematic (SPICES)** model. Community Based Medical Education has been offered as COBES since the first lot of students of 1990. COBES is offered in years 1,2,3,4 and 5 for five and six year programs (Bachelors of Dentistry = BDS and Bachelors of Medicine and Bachelors of Surgery =MBChB)

but in years 1-4 for the four year undergraduate programs. The courses are spiraled though all the years of training except for the sixth year of training for medical students.

The undergraduate courses in MUSOM include Bachelor of Medicine and Bachelor of Surgery, BSc in Medical Laboratory Sciences, Physical Therapy and Medical Psychology. There are Master of Medicine programs in Anesthesiology, Child Health & Pediatrics, Family Medicine, Internal Medicine, Psychiatry and Mental Health, Surgery, Orthopedics and Rehabilitation, Reproductive Health

Masters of Science (MSc) programs include: Immunology, Medical Education, Medical laboratory Sciences, Medical Psychology

The school also hosts PhD courses in Medical Education and Immunology.

The University of Nairobi School of Medicine (UNSOM) was established in 1967. It has largely followed and maintained traditional teaching methods. Community based Medical Education is offered in the University of School of Public Health as community health. It was traditionally offered as one term course in year four of five years training for medical students. In the last decade the medical students have two courses in community health in year 2 and year 5 of six years training. The students have one day community visits during the mostly didactic courses

The students in the other undergraduate programs in the University of Nairobi College of Health Sciences get didactic courses on community health with limited exposure to community health

3.2 Study design

An analytical cross-sectional study design was used to study both the exposure and outcome of CBME among these Kenyan trained medical doctors. Six cohorts (three from MUSOM and three from UNSOM) medical graduates from the two medical schools in the years 2000, 2001 and 2002 were selected.

3.3 Target Population

The study population was the MUSOM medical graduate cohorts of 2000, 2001 and 2002 and UNSOM medical graduate cohorts of 2000, 2001 and 2002.

Kenyan medical school graduates were selected because their programs are within access for possible interventions.

The choice of University of Nairobi and Moi Medical Schools was guided by the fact that the other public and private medical schools had graduates only in the last five years.

Data were collected from medical graduates of the years 2000, 2001 and 2002 from Nairobi and Moi University Schools of Medicine. Their contact details were provided by the Kenya Medical Practitioners and Dentists Board (MP&DB) secretariat and other available Kenyan medical directories.

The study targeted MBChB graduate cohorts of years 2000, 2001 and 2002 from Moi and Nairobi schools of Medicine who had been out of medical school for between 16 and 18 years. These cohorts were conveniently selected as medical doctors who were likely to have a significant degree of career stability and also beneficiaries of more innovative medical education teaching and learning methods in Kenya.

A pilot study conducted during the proposal writing stage showed that these cohorts were best placed for the objectives of this study.

The CBME parts of the medical curriculum for the University of Nairobi Community Health courses are available online on the University of Nairobi School of Public Health webpage while the Moi University Community Based Education and Service (COBES) courses were accessed from the School Curriculum Implementation and Evaluation Committee (CIEC) secretariat with the permission of the Deans of both medical schools

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion Criteria:

Medical graduates from Nairobi and Moi University medical schools as provided by the alumni list provided by the then deans and as appeared on alumni lists on the websites of both universities for the MBChB graduates of the years 2000, 2001 and 2002.

3.4.2 Exclusion Criteria

Members of the six cohorts who migrated to other parts of the globe outside Kenya because their choices and experience outside Kenya were not be relevant to the objectives of this study

3.5 Sample size determination and sampling procedures

A feasibility study carried out during the proposal development stage revealed that: 1) the implementation of CBME courses that my study objectives addressed started in the

late 1990s. It took up to the early 2000s for it to take root in the Kenyan medical school

- 2) the pioneering group of medical graduates from Moi University was in 1998/99
- 3) the other medical schools were younger than ten years and their medical graduates were either still in graduate training or still struggling to find footing in their careers
- 4) the MUSOM and UNSOM implementation varied significantly and comparison of the outcomes of each approach was important
- 4) sampling of medical graduates from different cohorts and analysis of the data showed the cohorts of medical graduates whose responses answered my research questions were in the years 2000 to 2002
- 5) the list of doctors on the alumni lists and the record on the medical council's retainer records was different in that only a small percentage were on the current medical council's register
- 6) responses and rate of responding to the questionnaire when administered face to face or posted by email was not significantly different. The doctors preferred an emailed questionnaire.
- 7) the eligible population was small and the consent to participate and even to respond was not predictable. It was decided to make all members of the 2000-2002 of MUSOM and UNSOM eligible to participate for the study. No sampling was needed,

The contact addresses and telephone numbers of the participants were provided by the Kenya Medical Practitioners and Dentists Council (MP&DC) secretariat database. This was complemented by available Kenyan medical directories.

The study population (see table below) was small and all members of the different cohorts were eligible to participate.

Table 1: Illustration of the cohorts

Medical school	MChB Cohort of year 2000	MChB Cohort of year 2001	MChB Cohort of year 2002	Total
MUSOM	49	40	41	130
UNSOM	96	83	90	269
TOTAL	145	123	131	399

3.6 Data collection procedures

3.6.1 Data Collection Tools:

The data were collected using questionnaires from a tool borrowed from the Medical Education Program Initiative (MEPI). The tool had been used to evaluate the impact of the MEPI initiative on medical schools, students, lecturers and graduates. Thus the tool is validated and reliable. The questions were sent to participants using the email addresses and telephone numbers of the participants as provided by the Medical Practitioners and Dentists Council Secretariat in Nairobi.

The cohort members from each group and each university were put different lists and approached individually for their consent to participate

Telephone calls were made to the eligible candidates to inform them about the study and get their consent to participate. After the verbal consent, the questionnaire was sent by email to the consenting members of the cohorts. Reminder telephone calls were made every 48 hours to those who failed to respond. The investigator gave up after ten calls

3.6.2 Data Entry

Responses on the questionnaires were received through my Gmail address. After scrutiny for errors, the data were stored in MS Excel database. The questionnaires with errors were resent to respondents for appropriate actions. At the end of the data collection, the data were coded before exportation to International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) version 21 and Stata version 12 for analysis.

3.6.3 Data Analysis

Univariate analysis was used for simple descriptive data such as demographic and socio-economic data.

Bivariate analysis for factors associated with the perceived role of CBME on choice of rural practice was done.

Fisher's test and Chi-square tests were used in the analysis and tests for association of the categorical variable; p-values of ≤ 0.05 were considered statistically significant

Multivariate analysis was used for multiple variables that had statistical significance. ODDS ratio (OR), p-values ≤ 0.05 and confidence interval of 95% were used to determine significance.

Bivariate analysis for the factors associated with the perceived role of CBME in the choice of specialty was also carried out. Fisher's exact formula was used for the bivariate analysis for association of categorical data in few cells (less than 5). Chi-square (X^2) was used to determine association for categorical data in more than 5 cells.

3.6.4 Presentation of results

Results were presented in word narrative, tables and figures

3.7 Validity and Reliability of the research instruments

3.9.1 Validity: refers to the accuracy and meaningfulness of inferences, which are based on the research findings. It is the degree to which results obtained from the analysis of the data actually represents the phenomena under study.

In my study instruments are borrowed from instruments used by Omaswa, et al, (2018) and Miriam et al (2014) and which have been used in other studies in Sub-Saharan Africa to evaluate the implementation of CBME on the Medical Education Partnership Initiative (MEPI) programs managed under on the collaboration of selected Sub-Saharan African medicals and The United States Government.

3.9.2 Reliability

Refers to the measure of the degree to which a research instrument yields consistent results. A reliable instrument is one that constantly produces the expected results when used more than once to collect data on several trials. For my study, a pilot survey involving forty Kenyan-trained medical doctors (20 UNSOM and 20 MUSOM) who were not members of the six cohorts yielded fairly consistent responses for members of the same cohort.

3.10 Data Dissemination Plans

The findings of this study have been published in two articles on the online peer reviewed journal World Journal of Medical Education and Research (WJMR in Volume 21 in 2019 and Volume 23 in 2020) **See appendix 5.**

Plans are under way to present the findings in the Nairobi and Moi University Colleges of Health Sciences, the Kenya Medical Association Scientific Conferences and international scientific conferences.

3.11 Ethical Considerations

1. Ethical approval was sought and granted by the Institutional Research and Ethics Committee (IREC) of Moi University.
2. A written permission to conduct the study was sought and granted by the Deans of Nairobi and Moi University Medical Schools respectively
3. Informed consent was sought from all the participants. After telephone conversation where the study was explained to the participant, verbal consent was sought. Those that consented to participate confirmed their e-mail addresses and the questionnaire was sent by e-mail. The first part of the questionnaire was the consent where the participant responded yes or no. Those who had a “No” response did not proceed beyond that
4. The names of the interviewees were not revealed on the database and confidentiality has been observed and maintained.
5. Data are stored in password protected folders and will be destroyed as guided by the rules and regulations of IREC.

CHAPTER FOUR

4.0 RESULTS

Overview: The results are presented in narrative and tables. The results are presented according to the study specific objectives

The study was conducted between February and September 2018.

The response rate was calculated against the list provided by the Deans of members of the cohorts from both medical schools.

It was noted that over 50% of the combined total of the names of the alumni provided by the offices of the deans of both medical schools were not on the 2018 medical board retention register. The medical board did keep updates on reasons for nonpayment for annual retention on the medical board register.

Those who did not participate in my study failed to respond to email and telephone communication that was sent every fortnight. After six months the effort to get responses from the non-responders was halted. Lack of response was also translated as failure to consent to participate in the study

Table2 : Response Rate

Cohort Year of Graduation	University of Nairobi Medical School (Response (%))		Moi University Medical School (Response (%))	
	Total number	Response (%)	Total Number	Response (%)
2000	96	44(45.8%)	49	16(32.7%)
2001	83	16 (19.2%)	40	11(27.5%)
2002	90	38(42.2%)	41	22(53.7%)

The eligible number of in each cohort was 96, 83 and 90 for University of Nairobi and 49, 40 and 41 for Moi University in the years 2000, 2001 and 2002 respectively. The response rates were 35.8 % and 38.0 % for Nairobi and Moi University participants.

**OBJECTIVE 1: THE PERCEIVED ROLE OF CBME ON CHOICE OF
RURAL PRACTICE**

Table 3: Population characteristics

Variable	UNSOM Freq(%)	MUSOM Freq(%)	Total Freq(%)
Age in years			
35-40	24 (24.5)	15 (30.6)	39 (26.5)
41-45	55 (56.1)	31 (63.3)	86 (58.5)
>45	19 (19.4)	3 (6.1)	22 (15)
Gender			
Male	67 (68.4)	28 (57.1)	95 (64.6)
Female	31 (31.6)	21 (42.9)	52 (35.4)
Marital status			
Single	5 (5.1)	11 (22.4)	16 (10.9)
Married	90 (91.8)	37 (75.5)	127 (86.4)
Divorced	3 (3.1)	1 (2)	4 (2.7)
Year of graduation			
2000	44 (44.9)	16 (32.7)	60 (40.8)
2001	16 (16.3)	11 (22.4)	27 (18.4)
2002	38 (38.8)	22 (44.9)	60 (40.8)
Employer			
Self	11 (11.2)	7 (14.3)	18 (12.2)
Private institutions	12 (12.2)	8 (16.3)	20 (13.6)
University	27 (27.6)	12 (24.5)	39 (26.5)
MOH	48 (49)	21 (42.9)	69 (46.9)
Research Institute	0 (0)	1 (2)	1 (0.7)
Position			
Medical Officer	10 (10.2)	15 (30.6)	25 (17)
Specialist Consultant	48 (49)	18 (36.7)	66 (44.9)
Faculty and Consultant	24 (24.5)	7 (14.3)	31 (21.1)
Admin and Consultant	4 (4.1)	4 (8.2)	8 (5.4)
Faculty (tutorial Fellow)	2 (2)	2 (4.1)	4 (2.7)
Administrator	10 (10.2)	2 (4.1)	12 (8.2)
Research Institute	0 (0)	1 (2)	1 (0.7)
Post Medical School Training.			
None	9 (9.2)	15 (30.6)	24 (16.3)
MMed.	73 (74.5)	27 (55.1)	100 (68)
MPH	11 (11.2)	2 (4.1)	13 (8.8)
MSc	3 (3.1)	1 (2)	4 (2.7)
PhD	0 (0)	1 (2)	1 (0.7)
MMedplus (Clinical Fellowship/PhD)	2 (2)	3 (6.1)	5 (3.4)

Where spouse grew up			
Rural	68 (69.4)	28 (57.1)	96 (65.3)
Urban	24 (24.5)	8 (16.3)	32 (21.8)
Both	2 (2)	2 (4.1)	4 (2.7)
Other	4 (4.1)	11 (22.4)	15 (10.2)

Where you grew up			
Rural	78 (79.6)	29 (59.2)	107 (72.8)
Urban	18 (18.4)	19 (38.8)	37 (25.2)
Both	2 (2.0)	1 (2.0)	3 (2.0)

Mothers education level

None	13 (13.3)	6 (12.2)	19 (12.9)
Primary	37 (37.8)	16 (32.7)	53 (36.1)
Secondary	30 (30.6)	9 (18.4)	39 (26.5)
College	18 (18.4)	18 (36.7)	36(24.5)

Fathers education level

None	13 (13.3)	5 (10.2)	18 (12.2)
Primary	18 (18.4)	14 (28.6)	32 (21.8)
Secondary	35 (35.7)	14 (28.6)	49 (33.3)
College	32 (32.7)	16 (32.7)	48 (32.7)

The study population was youthful with 58.5 % of the population aged 41-45 years.

Sixty-eight percent of the respondents were MMed graduates majority of who worked in public service. Seventy- three percent reported growing up in rural Kenya.

Table 4: Early career posting and early rural working experience in rural Kenya

Variable	University of Nairobi Freq (%)	Moi University Freq (%)	Total Freq (%)	p-value
Early Rural experience				
No	81 (82.7)	33 (67.3)	114 (77.6)	
Yes	17 (17.3)	16 (32.7)	33 (22.4)	0.036
Duration early rural posting				
1 month -2.9 years	30 (30.6)	9 (18.4)	39 (26.5)	
3-5 years	16 (16.3)	9 (18.4)	25 (17)	0.329
More than 5 years	37 (37.8)	19 (38.8)	56 (38.1)	
Never reported to rural posting	15 (15.3)	12 (24.5)	27 (18.4)	
Rating of early rural experience				
Poor	15 (15.3)	0 (0)	15 (10.2)	
Good	29 (29.6)	8 (16.3)	37 (25.2)	0.000
Very good	34 (34.7)	15 (30.6)	49 (33.3)	
Excellent	4 (4.1)	10 (20.4)	14 (9.5)	
Not applicable	16 (16.3)	16 (32.7)	32 (21.8)	
What enhanced early rural experience				
None	2 (2)	1 (2)	3 (2)	
CBME	53 (54.1)	24 (49)	77 (52.4)	
Mentoring	14 (14.3)	4 (8.2)	18 (12.2)	0.334
Personal fulfillment	13 (13.3)	5 (10.2)	18 (12.2)	
Not applicable	16 (16.3)	15 (30.6)	31 (21.1)	
What discouraged early rural experience				
Challenges related to poor preparation	58 (59.2)	28 (57.1)	86 (58.5)	
Never posted rural	16 (16.3)	16 (32.7)	32 (21.8)	
Personal	7 (7.1)	0 (0)	7 (4.8)	
Poor preparation	17 (17.3)	5 (10.2)	22 (15)	0.035

Over 75% of the doctors reported to have had early rural experience (internship and post internship posting) where 68% rated the experience favorably. Early rural experience and a positive rating of early rural experience were associated with positive perception of the role of CBME

Table 5: Rating the role of the CBME course during the Medical training and good skills in early practice

Variable	University of Nairobi Freq(%)	Moi University Freq(%)	Total Freq(%)	p-value
Rate CBME year1				
Poor	0 (0)	5 (10.2)	5 (3.4)	
Good	0 (0)	21 (42.9)	21 (14.3)	
Very good	0 (0)	11 (22.4)	11 (7.5)	a
Excellent	0 (0)	12 (24.5)	12 (8.2)	
Not applicable	98 (100)	0 (0)	98 (66.7)	
Rate CBME year2				
Poor	0 (0)	2 (4.1)	2 (1.4)	
Good	0 (0)	15 (30.6)	15 (10.2)	
Very good	1 (1)	19 (38.8)	20 (13.6)	a
Excellent	0 (0)	13 (26.5)	13 (8.8)	
Not applicable	97 (99)	0 (0)	97 (66)	
Rate CBME year3				
Poor	0 (0)	5 (10.2)	5 (3.4)	
Good	0 (0)	22 (44.9)	22 (15)	a
Very good	0 (0)	17 (34.7)	17 (11.6)	
Excellent	0 (0)	5 (10.2)	5 (3.4)	
Not applicable	98 (100)	0 (0)	98 (66.7)	
Rate CBME year4				
Poor	20 (20.4)	3 (6.1)	23 (15.6)	
Good	30 (30.6)	24 (49)	54 (36.7)	
Very good	42 (42.9)	15 (30.6)	57 (38.8)	0.017
Excellent	6 (6.1)	6 (12.2)	12 (8.2)	
Not applicable	0 (0)	1 (2)	1 (0.7)	
Rate CBME year5				
Poor	1 (1)	5 (10.2)	6 (4.1)	
Good	1 (1)	17 (34.7)	18 (12.2)	a
Very good	1 (1)	17 (34.7)	18 (12.2)	
Excellent	0 (0)	8 (16.3)	8 (5.4)	
Not applicable	95 (96.9)	2 (4.1)	97 (66)	

a- association not assessed since CBME not offered in University of Nairobi during these years

Eighty percent of the University of Nairobi graduates rated the CBME experience favorably. In Moi University Community Based Education and Service (COBES) was

offered in years one to five of the training program. The rating of COBES was favorable by 90% of the Moi University medical graduates for all the years except year five (82%). The highest rating was for second year (96%).

Positive rating of the CBME in year 4 of training was associated with a positive perception on the role of CBME in the choice of rural practice

Table 6: Rating of the perceived role of CBME in choice of early posting, competence, settling in rural practice

Variable	University of Nairobi Freq(%)	Moi University Freq(%)	Total Freq(%)	p-value
Rate CBME in choice early posting to rural hospital as an intern				
Poor	49 (50)	9 (18.4)	58 (39.5)	0.001
Good	32 (32.7)	24 (49)	56 (38.1)	
Very good	17 (17.3)	16 (32.7)	33 (22.4)	
Rate the role of CBME in your choice of rural hospital as a medical officer				
Poor	53 (54.1)	13 (26.5)	66 (44.9)	0.002
Good	19 (19.4)	13 (26.5)	32 (21.8)	
Very good	26 (26.5)	20 (40.8)	46 (31.3)	
Excellent	0 (0)	3 (6.1)	3 (2)	
CBME played role in your clinical competence				
Strongly disagree	5 (5.1)	2 (4.1)	7 (4.8)	0.719
Disagree	7 (7.1)	4 (8.2)	11 (7.5)	
Neutral	28 (28.6)	9 (18.4)	37 (25.2)	
Agree	29 (29.6)	16 (32.7)	45 (30.6)	
Strongly agree	29 (29.6)	18 (36.7)	47 (32)	
CBME played a role in choice of current rural practice				
Strongly disagree	6 (6.1)	2 (4.1)	8 (5.4)	0.033
Disagree	19 (19.4)	12 (24.5)	31 (21.1)	
Neutral	40 (40.8)	8 (16.3)	48 (32.7)	
Agree	20 (20.4)	15 (30.6)	35 (23.8)	
Strongly agree	13 (13.3)	12 (24.5)	25 (17)	

CBME was positively associated with choice of posting to rural hospital during internship, choice of posting of a rural hospital as medical officers and choice of rural practice

Table 7: Factors associated with positive rating of the role CMBE on choice of rural practice

	Poor Freq(%)	Good Freq(%)	p-value
Medical school			
University of Nairobi	53 (54.1)	45 (45.9)	0.002
Moi University	13 (26.5)	36 (73.5)	
Age in years			
35-40	15 (38.5)	24 (61.5)	0.17
41-45	44 (51.2)	42 (48.8)	
>45	7 (31.8)	15 (68.2)	
Sex			
Male	43 (45.3)	52 (54.7)	0.904
Female	23 (44.2)	29 (55.8)	
Marital status			
Single/ divorced	6 (30.0)	14 (70.0)	0.150
Married	60 (47.2)	67 (52.8)	
Year of graduation			
2000	28 (46.7)	32 (53.3)	0.876
2001	11 (40.7)	16 (59.3)	
2002	27 (45)	33 (55)	
Where spouse grew up			
Rural	40 (41.7)	56 (58.3)	0.056
Urban	20 (62.5)	12 (37.5)	
Both/Other	6 (31.6)	13 (68.4)	
Where the doctor grew up			
Rural	46 (43)	61 (57)	0.624
Urban	19 (51.4)	18 (48.6)	
Both	1 (33.3)	2 (66.7)	
Mothers education			
None	3 (15.8)	16 (84.2)	0.004
Primary	30 (56.6)	23 (43.4)	
Secondary	13 (33.3)	26 (66.7)	
College	20 (55.6)	16 (44.4)	
Fathers education			
None	2 (11.1)	16 (88.9)	0.003
Primary	20 (62.5)	12 (37.5)	
Secondary	19 (38.8)	30 (61.2)	
College	25 (52.1)	23 (47.9)	
Rating of rural experience			

Poor	11 (73.3)	4 (26.7)	
Good	36 (36)	64 (64)	0.004
No rural	19 (59.4)	13 (40.6)	
Rate CBME yr4			
Poor	18 (75)	6 (25)	
Good	48 (39)	75 (61)	0.001

Factors associated with positive perception of the role of CBME on the choice of rural practice were the medical school the doctor was trained in, the mother's level of education, the father's level of education, rating of early rural experience and rating of CBME in the fourth year of medical training

Table 8: Multivariate analysis of factors associated with rating of the perceived role of CMBE on choice of rural practice

Variable	Odds Ratio	P-value	95% Confidence Interval	
MUSOM vs. UNSOM	7.315	0.000	2.497	21.428
Mother's education level				
Primary vs. None	0.347	0.262	0.055	2.204
Secondary vs. None	1.178	0.873	0.157	8.855
College vs. None	0.372	0.389	0.039	3.525
Fathers education level				
Primary vs. None	0.049	0.005	0.006	0.407
Secondary vs. None	0.378	0.372	0.045	3.204
College vs. None	0.227	0.193	0.024	2.119
Rate rural experience				
Good vs. Poor	3.390	0.087	0.839	13.695
No rural vs. Poor	0.723	0.707	0.134	3.918
Rate CBME yr4				
Good vs. Poor	1.865	0.337	0.523	6.649

After multivariate analysis, controlling for confounders, the medical school the participant graduated from was significantly associated with positive perception of the role of community based medical education in choice of rural practice

Summary of findings of objective 1

We considered the rating of CBME in the choice of practicing in the rural area. For Moi University medical graduates the proportion who rated CBME favorably was 73.5 (95%CI: 60.6, 86.3) while for University of Nairobi medical graduates it was 45.9 (95%CI: 35.9, 56.0). There was a statistically significant association between the medical school and the rating of role of CBME chi-square p-value=0.002.

It was observed that there were factors associated with a positive perception that Community based medical education, that is taught during medical training, has a positive role in choice of rural practice. The factors were:

1. The medical school where a doctor trained,
2. The doctor's mother level of education
3. The doctor's father level of education
4. Good rating of early career rural experience
5. Good rating of the CBME experience in year four of medical training.

After multivariate analysis (controlling for confounders) for the five factors it was observed that the medical school in which a doctor trained was found to have statistically significant association with positive perception of the role of community based medical education on the choice of rural to practice.

OBJECTIVE 2: THE PERCEIVED ROLE OF CBME ON CHOICE OF SPECIALTY

Table 9: Perceived role of CBME on choice of specialty

Variable	Poor Freq(%)	Good Freq(%)	p-value
Medical school			
University of Nairobi	64 (65.3)	34 (34.7)	0.000
Moi University	17 (34.7)	32 (65.3)	
Age in years			
35-40	24 (61.5)	15 (38.5)	0.63
41-45	45 (52.3)	41 (47.7)	
>45	12 (54.5)	10 (45.5)	
Sex			
Male	48 (50.5)	47 (49.5)	0.132
Female	33 (63.5)	19 (36.5)	
Marital status			
Single/Divorced	13 (65)	7 (35)	0.338
Married	68 (53.5)	59 (46.5)	
Year of graduation			
2000	29 (48.3)	31 (51.7)	0.134
2001	13 (48.1)	14 (51.9)	
2002	39 (65)	21 (35)	
Where spouse grew up			
Rural	45 (46.9)	51 (53.1)	0.022
Urban	23 (71.9)	9 (28.1)	
Both/Other	13 (68.4)	6 (31.6)	
Where the doctor grew up			
Rural	54 (50.5)	53 (49.5)	0.091
Urban	24 (64.9)	13 (35.1)	
Both	3 (100)	0 (0)	
Mothers education			
None	5 (26.3)	14 (73.7)	0.02
Primary	31 (58.5)	22 (41.5)	
Secondary	20 (51.3)	19 (48.7)	
College	25 (69.4)	11 (30.6)	
Fathers education			
None	6 (33.3)	12 (66.7)	

Primary	16 (50)	16 (50)	
Secondary	21 (42.9)	28 (57.1)	0.000
College	38 (79.2)	10 (20.8)	
Rating of rural experience			
Poor	11 (73.3)	4 (26.7)	
Good	47 (47)	53 (53)	0.016
No rural	23 (71.9)	9 (28.1)	
Rate CBME yr4			
Poor	18 (75)	6 (25)	0.032
Good	63 (51.2)	60 (48.8)	

CBME was rated as positively influencing the choice of specialty by MUSOM graduates (65% vs. 35%)

Factors associated with a positive perception on the role of CBME in the choice of specialty were the medical school the doctor trained in, the doctor's mother and father's level of education, where the spouse grew up, rating of rural experience and rating of CBME during the fourth year of medical training

Table 10: Multivariate analysis of factors associated with rating of the perceived role of CMBE on specialty choice

Variable	Odds Ratio	P>z	[95% Conf.	Interval]
MUSOM vs. UNSOM	9.999	0.000	3.293	30.360
Where spouse grew up				
Urban vs. Rural	0.400	0.122	0.125	1.276
Both/other vs. Rural	0.166	0.024	0.035	0.787
Doctor's Mother education level				
Primary vs. None	0.227	0.126	0.034	1.514
Secondary vs. None	0.509	0.518	0.066	3.948
College vs. None	0.455	0.523	0.041	5.099
Doctor's Father education level				
Primary vs. None	0.678	0.689	0.101	4.546
Secondary vs. None	3.073	0.271	0.416	22.711
College vs. None	0.412	0.414	0.049	3.469
Rating rural experience				

Good vs. Poor	1.682	0.481	0.396	7.150
No rural vs. Poor	0.363	0.296	0.054	2.433
Rate CBME yr4				
Good vs. Poor	1.281	0.717	0.337	4.866

Summary of findings in objective 2

We considered the rating of the role community based medical education (CBME) in the choice of specialty. For Moi University medical graduates the proportion who rated the role of CBME in the choice of specialty favorably was 65.3 (95%CI: 51.5, 79.1) while for University of Nairobi medical graduates it was 34.7 (95%CI: 25.1, 44.3). There was a statistically significant association between the medical school and the rating of role of CBME chi-square p-value=0.000.

The factors that rated the perceived role of CBME in choice of specialty positively were where the doctor's spouse grew up; the doctor's mother level of education; the doctor's father level of education and good rating of previous rural experience in early practice.

Multivariate analysis controlling for confounders for the five factors it was observed that the medical school in which a doctor trained was found to have (statistically) significant association with the positive perception of the role of CBME in the choice of choice specialty. MUSOM [65.3 (95% CI: 51.5, 79.1)] vs. UNSOM[34.7 (95%CI: 25.1, 44.3); chi-square, p-value = 0.000].

4.1 Study Limitations and Minimizing of Bias

Dependence on recall by participants was foreseen as a limitation. This was minimized by limiting the questions to those of major events and avoiding questioning details on specific CBME rotations. The tool for the study was pretested on medical graduates from as long as four decades before my study and compared with those of the last decade. No significant variation was noted in the responses within members of the same cohort members.

The response rate of less than 50% of the study was a limitation. My study did not sample but aimed to have all members of the six cohorts participate. We used the most recent available contact details as provided by the Kenya Medical Practitioners and Dentists Board. The contact details provided by the Medical Practitioners and Dentists Board secretariat dependent on individual doctor's updating their contact details where necessary but lacked the capacity to do more than that. It is acknowledged that there were no regular updates those who had died, deserted medical practice or migrated out of Kenya. The study had no control over who participated and considered the consent to participate as random for all members of the six cohorts.

Use of online self-administered questionnaires may have the disadvantage of the respondents' controlling their responses without the researcher involvement. During the pretest, responses of interviewer administered interviews were compared to the online responses. There was no significant variation between the two that could affect the objectives of this study.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Overview

This section summarizes the conclusions of the study findings as guided by the study objectives and reviews the study findings as compared to those of similar studies around the world. Though the scope of my study did not include interviewing medical students as participants due to logistical and financial challenges, it is appreciated that medical students provide the pool from which doctors are nurtured and eventually released for service to society.

The Kenyan post-medical school training is not a direct progress from medical school training. After leaving medical school, the graduate is posted to work as a medical officer intern, away from the medical school, under the supervision of specialists in the four core specialty areas of medicine, child health, general surgery and reproductive health. A minimum of 12 weeks per rotation in the four areas is expected during this internship period. On satisfying the supervisors in these four areas the medical officer intern is signed off for registration by the Kenya Medical Practitioners and Dentists Board. During these rotations, significant mentoring and deliberate attempts are made by the different specialists to influence the new graduate's interest in each these specialties.

After registration, a doctor may choose to pursue specialty training or practice without further training. This implies that an individual who may have, as a medical student, imagined, for example that child health was his specialty of interest could be won over by the mentoring of a skillful and well committed specialist in another field.

I also chose to study doctors who had being been doctors for least 15 years. This was decided on in order to get insight from cohorts of doctors who were most likely to have significant career stability and were also likely to have evaluated their choices of specialty and the areas they had decided to set up their practice bases as employees, in private practice or part time private practice for those in public service.

This discussion is anchored on study objectives on the perceived role of community based medical education (CBME) courses and rotations, taught during medical training, on choice of specialty and rural practice. This discussion also draws the attention of the reader to the many other factors that influence decision making on which career line to pursue and where doctors settle to work.

Literature search informs that community based medical education is not one of the major influences on the choice of specialty and where doctors practice. What is worth noting is that the traditional influencing factors to the choice of specialty and where to practice have continued to contribute to the current inequity in patient-doctor ratios and obvious disparity between urban and rural areas in both Low and Middle Income Countries (LMICs) and even in the established economies.

5.2 The Perceived Role of Community Based Medical Education in Choice of Rural Practice

The rating of community based medical education by medical students and new medical graduates: In my study, the participating medical graduates from Nairobi and Moi Universities rated community based medical education courses during their training very favorably. The Moi University participants rated it much higher than their University of Nairobi counterparts (93 vs. 80%).

Most of the available data are on medical students who have rated community based medical education positively too. The positive rating of CBME has been attributed to perceived benefit of clinical and communication skills of small groups of students that enhanced the teaching and learning in small health facilities away from the highly specialized tertiary hospital within medical school environment (Arja, et al, 2018).

The factors that lead to students having a positive perception on the community based medical education rotation included; the learning environment being favorable and the contact time with the teachers comparing favorably or being better than that in the teaching hospital (Unnikrishnan, et al., 2012).

Community-based education enables medical students to understand the societal needs and social factors influencing the health and illnesses. Participation in outside-classroom teaching and involvement in community services with the population who lack health literacy in the pre-clerkship years increases the confidence and better communication skills (Milford, et al., 2016).

Jones et al of the University of Manchester Medical School in 2002 conducted a study to determine the perceptions of medical graduates and their supervisors on their competence as house officers. The study corresponded to three years after the school had started the implementation of a problem based medical curriculum which also had courses and rotations in CBME. The medical graduates were reported to be well prepared for their clinical roles immediately after leaving medical school. This was in comparison with their counterparts who had not had CBME courses and rotations during their medical training curriculum. This perceived positive impact was as

reported by the medical graduates themselves and also by those who supervised their clinical work during medical internship (Jones, McArdle & O'Neill, 2002).

Reeve et al reviewed literature on the medical school graduates from medical school that proactively promoted and practiced social responsibility. The literature showed that students, graduates and members of staff from these schools were more likely to choose to work in remote and rural areas. These schools also had CBME as part of their medical training were found to demonstrate more social accountability and better skills to serve disadvantaged and rural communities than those who did not have CBME courses and rotations during medical training (Reeve, et al, 2017).

Greenhill et al evaluated the perception and impact of the ongoing Australian rural clinic schools that prepared medical students to serve in remote and rural Australia since the 1990s. Those interviewed included the medical students, the program directors and the rural clinical teacher. The findings were positive from all the stakeholders (Greenhill, Walker & Playford, 2015).

The Australian rural school policy initiative has been reported to have vastly increased opportunities for medical students to have long-term clinical placements in rural health services. The implementation of this has resulted in graduates being attracted to rural practice. The graduates attribute this to positive learning experiences, good infrastructure and support within the rural areas. These attributes are directly related to policy change that promoted this initiative (Greenhill, Walker & Playford, 2015). The Australian success story should be emulated by other health systems around the globe.

Reeve, at al, documented the impact of CBME globally on medical students and new graduates in their systematic review of the literature on the subject. The review showed

that students and teachers viewed the CBME community rotations very positively. Many of these medical students chose to be posed to serve in rural and remote parts of Australia (Reeve, et al, 2017).

Surveys on faculty members involved in teaching medical students are documented to rate CBME positively. The doctors practicing in primary care settings who were not university employees but were involved in supervising the CBME rotations have also been reported to rate CBME positively. These doctors that work in the smaller health facilities are documented to support CBME. These doctors appreciate the opportunity the CBME rotations provided for them to recharge and enhance their individual skills and appreciated the opportunity it offered them towards achieving educational relevance to community needs (Greenhill, Walker & Playford, 2015).

Kelly et al of Northern Ontario School of Medicine in Canada studied the CBME in their context. In their school CBME is offered as longitudinal yearlong student and teacher placement in communities. They concluded that this approach provided wider experience that enhanced learning through development of rich relationships among the preceptors from the university, health workers within the community facilities, patients and the general community. This made learning for the student better than in the larger medical school (Kelly, Walters, & Rosenthal, 2017).

Mahrous from Iran reported the challenges that faced students during community rotations. He particularly highlighted unpredictable and usually erratic availability of university academic preceptors who claimed that the medical school did not adequately provide financial support for the community rotation supervision (Mahrous, 2018).

Amalba et al in Ghana highlighted the importance of role models during the CBME rotations in medical graduates' career decisions and also in the choice of rural practice (Amalba, et al., 2017).

Mwanika et al studied the perceived impact of COBES by the graduates of Makerere University College of Health Sciences and documented positive impact on communication, clinical skills needed in working in remote and rural Uganda where infrastructural support was poor. They also documented challenges that were encountered by the students and their supervisors during the rotations. These were related mainly to limited resources that involved funding, staffing and infrastructural state of the community health facilities. The students rated the CBME courses and the community rotations above average (Mwanika et al, 2016).

From the cited studies, CBME plays a significant role in medical graduates' decision on choice of rural practice. The articles also highlight the challenges that maybe diluting this perception. The above is a sample of the challenges of managing CBME and nearly all were in agreement that more resources were needed in order to provide a breadth of experience which enhanced the learning and teaching environment in these primary care settings. More resources would mean that the students spend more time in the communities and increasing the number of teachers from the teaching and community health facilities

5.3 Community Based Education and Service (COBES) versus Community Oriented Education (COE)

My study observed that although medical graduates of both Nairobi and Moi Universities rated CBME high, there was a significant difference on the rating of the

CBME between the medical graduates of University of Nairobi and those of Moi University where Moi University medical graduates rated CBME higher than University of Nairobi medical graduates.

Though my study scope did not include a detailed evaluation of the CBME courses within the medical curriculum in Nairobi and Moi Universities, examination of the general structure of the courses was carried out. It was observed that Moi University offered Community Based Education and Service (COBES) program which was in the form of courses spiraled on the implementation from level one to five of the six levels of medical training. It had up to six weeks student rotations within communities that the students would potentially serve after graduating from medical school (See Appendix 5).

University of Nairobi offered didactic courses in community medicine with several day visits to designated rural communities. The courses were offered in level two and five as one term courses by the University Of Nairobi School Of Public Health. This approach fits in the community oriented (medical) education (COE/COME) – ([https://med-school.uonbi.ac.ke/.](https://med-school.uonbi.ac.ke/))

Note that my study population participants were offered community health as a one term rotation in the University Of Nairobi School Of Public health during the fourth year of their medical training.

Hamad in the year 2000 documented significant differences in the perceived benefits of CBME between medical graduates who had community based medical education (CBME) and Community Oriented (Medical) Education (COE/COME). Hamad pointed out that community based medical education programs have medical students

rotating and getting significant experiences within the community but also spent the major portion of the training in medical school where training in basic sciences and clinical clerkship along clinical specialties takes place. Hamad contrasted it with community oriented (medical) education programs that had medical students spend the all the medical training time in the medical school. The occasional one day arranged visit the communities was of insignificant benefit to the learner and the community. Hamad remarked the significant outcome difference between the outcomes of these two implementation approaches. The notable differences were in the medical students' clinical and communication skills at the end of the medical training where students who went through community rotations had superior clinical and communication skills compared to those who had minimal or none community rotations(Hamad, 2000).

In Malaysia, Shahid reported variance in implementation of CBME and CO(M)E by noting that medical students in community based medical education programs that implemented community based education and service that had medical students rotating in the community for significant periods resulted in graduates who understood the communities well and also demonstrated competence in clinical skills. Graduates of community education that were mainly in courses offered in classrooms were noted not to have as good skills (Shahid, 2013).

Robyn Tambylyn et al compared performance of medical graduates from three universities in Quebec Canada. The graduates of these three medical schools had not gone through a problem based medical curriculum because their schools were still following Flexinerain traditional biomedical model. The performance of the graduates of these schools were compared with those of Sherbrook University Medical School.

In historical cohort comparison graduates of three traditional medical schools in Quebec, Canada, that offered the traditional biomedical curriculum that did not have CBME courses were to those of Sherbrook which with community based education. The four cohorts of medical graduates were assessed skills in preventive care, continuity of care appropriate use of diagnostic investigations.

The emphatic conclusion was that graduates of medical curricula with CBME courses from Sherbrook University medical school demonstrated improved skills and practice on disease prevention and emphasis on continuity of care and appropriate use of diagnostic support services. The findings perplexed many in the medical teaching profession. Presentation of these findings in medical forums these findings were used to influence the introduction of CBME courses in Canadian medical schools (Tamblyn, et al, 2005).

The Medical Education Partnership Initiative (MEPI) a \$130 million grant awarded by the USA President's Emergency Plan for AIDS Relief (PEPFAR) and the National Institutes of Health (NIH) to 13 medical schools in 12 Sub-Saharan African countries between September 2010 and August 2015. The goals of the initiative were to increase capacity of the beneficiaries to produce more and better doctors, strengthen local research, promote retention of the graduates within their countries and ensure sustainability. It has been noted that in the selected countries the initiative has impacted positively on improved skills and interest among medical graduates to serve in rural and underserved populations (Talib, et al, 2013; Wilson et al, 2008).

5.4 Factors associated with doctors' choice of rural posting and rural practice

My study findings were that a significant number of the participants positively identified community based medical education as one of the factors that positively influenced their choice of rural posting as new medical graduates and later in settling for rural practice, employment or both.

The persistent global problem of attracting and retaining doctors to serve in rural underserved populations is well documented. This problem is worse in low and middle income countries (LMICs) where it has been attributed to many factors that include poor working conditions, lack of supervision, under-resourced health systems and low wages. Global and national health policy makers and health managers continue to grapple with possible ways of dealing with this problem (Lehmann, Marjolein & Martineau, 2008).

Health educators and policy makers have supported community based medical education courses, as a major component of the medical training curriculum as some of the many interventions to address the persistent global problem of attracting and retaining doctors to serve in rural underserved populations (Hamad, 2000).

Duffrin et al studied the factors that influenced primary care physicians to choose rural practice locations in North Carolina, USA. They interviewed primary care physicians in the State of North Carolina. Their findings were that the major factors influencing the choice of rural practice in that state included: those who preferred to run solo practice, those who wanted to work in a critical access hospital and those who preferred to work in a community health center. Those who chose working rural practice for financial reasons gave them as: working in a hospital that offered financial support and

also medical school loan repayment. The majority of those in rural practice reported to have been brought up in rural areas or small urban centers (Duffrin, et al, 2014).

Budhathoki et al conducted a systematic review that aimed at identifying factors that influenced the choice of rural practice among graduating medical students in low and middle income countries. They also studied factors that did not motivate choice of rural practice in the same study population. The factors reported in the articles that met the inclusion criteria included: being brought up in rural areas; training in rural areas that implemented the CBME part of the medical training curriculum; early exposure to the rural communities during medical training and rural location of the medical school. The factors that demotivated the graduating students from rural practice included: perceived lack of infrastructure; high workload; poor hospital management and marginalization of health workers working in rural and remote areas in LMICs (Budhathoki, et al., 2017).

5.5. Factors associated with perceived positive role of CBME in the choice of specialty

I studied the perceived role of CBME in the choice of specialty by the participating cohorts of doctors. The factors reported to influence the perceived positive role of CBME in the choice of specialty by the study population included:

1. Mentoring during and after medical school: The role of mentoring in medical training cannot be overemphasized. Students are assigned mentors by the medical school they train in but the most effective mentoring results from mutual choice of mentee and mentor. An effective mentoring experience is associated with guidance on management of time and other

resources during and after training (Sutkin, Wagner, Harris, & Schiffer, 2008);

2. Doctors who were brought up in rural Kenya perceived CBME more favorably compared to those brought in urban centers. Those from urban residents sometimes have culture shock when exposed to the challenges confronting those who reside in rural and remote areas which in many cases results in resentment of life in such areas (Royston, et al., 2012).
3. The parents' level of education: More educated parents especially those that have professional career lines are of immense influence to their children on the choice of career lines. Highly paid professional or business parents influence their children as mentors or through unfair influence in decision making (Newton, Grayson, & Thompson, 2005).
4. Being a graduate of the Moi University School of Medicine: MUSOM medical graduates were seven times more likely to have a positive perception that CBME influenced their career choice. These Moi University Medical School curriculum has community based education and service (COBES) during five of the six year training program and run horizontal courses with significant periods of community rotations. The medical school of University of Nairobi offers didactic courses in year two and five of the six year training program. The students may have an occasional day visit to a community in neighboring rural counties of Kiambu, Machakos or Kajiado. This may also occur in any of the slum areas of Nairobi (appendix 5)

Studies on medical graduates from the low and middle income countries (LMICs) have documented the main factors associated with choice of specific specialties to be:

1. Medical students in Saudi Arabia stated that their choice of specialty was guided by perceived personal capability. It was rated very high by medical students in Saudi Arabia medical schools. Also rated high by these students were foreseen community needs for a specialty and opportunity for certain specialties (Guraya & Almaramhy, 2018)
2. Potential for higher income and prestige of particular career line like sub-specialties in surgery, sub-specialties in internal medicine, obstetrics and gynecology, and sub-specialties in child health and pediatrics (Alenezi, et al, 2019)
3. Medical students from China, Malaysia and Indonesia were interviewed on factors that influenced their choice of future specialty. The commonest factors identified included potential for these specialties to lead to prestigious and higher paying career lines (Kumar, et al., 2014).

Harris et al studied the factors influencing the choice of specialty among Australian medical graduates. The highest rated factors included appraisal of own skills and aptitudes, perceived intellectual content of the specialty and extrinsic factors such as work culture and flexibility of working arrangements. It was noted that most of these factors were personal and not associated with social accountability. Community based medical education as a factor was not even ranked in the Harris' study (Harris, Gavel & Young, 2005).

A survey on senior medical students and young medical graduates in New Zealand reported that career choice was mostly based on interest in the specialty and that individual doctors favored the specialties that were likely to enhance chances for a doctor to work in Europe and America. Also favored were specialties that were likely to lead to super specialty training (Zarkovic, et al., 2006).

In a medical college in southern India, Subba, et al, conducted a survey on senior medical students. The study enquired about the students' preferred specialty and the factors that influenced the choice. These students rated the following in order of preference were high interest in high paying specialties, job satisfaction (including potential for high prestige) and employment opportunities for the individual doctor. Low interest in primary care specialty that offered low paying working opportunities in rural India were also observed (Subba, et al, 2012).

Medical students at the Jordan University of Science and Technology reported their choice of specialty was influenced by perceived intellectual content of the specialty and the reputation of the specialty (Khader, et al., 2008).

Significant variation in career choices by medical students was documented in United Kingdom (UK) graduates of 1999 and 2000. It was evident in the study findings that some of these UK medical schools had a "culture" that encouraged interest in certain specialties while diminishing interests in others. In these schools the teachers guided career choices for their students (Goldacre, Turner & Lambert, 2004).

In countries where a significant break between medical school and starting of specialty training does not occur, medical students are expected to choose and compete for their choice of specialties by the time they finish medical training. Though this has the

advantage of continuity in medical training and shortening the period it takes for a doctor to become a specialist, Luther documented a significant sense of unpreparedness for UK medical students who were expected to decide on area of specialization by end of medical school (Luther, 2011).

It is worth noting that in Kenya, eligibility for specialty training is at least two years after medical training. The period includes a supervised internship during which the new graduate is taught the process of making a diagnosis, initiate management depending on the patient's state of health. They are also taught about referral systems and how to make appropriate referrals to higher and lower health facilities than the ones they find themselves in. The two to three years spend in practice before specialization in Kenya plays a significant role on the young doctor's choice of specialty.

Studies in Nigeria that studied final year medical students in public universities reported that they chose specialty depending on expected high income and anticipated opportunities for career progression in and outside Nigeria (Asani, Gwarzo & Gambo, 2016; Egbi & Unuigbe, 2014).

In Kenya, Mwachaka and Mbugua attributed role modeling which created enthusiasm in a specialty as one of the major factors determining choice of specialty among medical students and young medical graduates (Mwachaka & Mbugua, 2010).

In all these factors that influence the choice of specialty among medical students and young doctors, it is noted that the influence of CBME is not highly rated

5.6 The perceived role of CBME course in the choice of specialty by doctors

My study results showed a statistically significant difference in the perceived role of community based medical education in choice of specialty between the medical graduates of universities of Nairobi and Moi. It was noted that the study participants had graduated from medical training curricula that had fundamental differences in the two medical schools.

The study participants from Moi University had benefited community based medical education courses which were implemented through community based education and service (COBES) spiraled in levels one to five of the six levels of medical training. These courses had significant periods of rotation in communities and the health facilities away from the medical school.

The study participants from University of Nairobi had benefited from community oriented education in level four of study. The courses were mainly didactic and taught by the University of Nairobi School of Public health for one term. These classroom courses also had some brief periods of community rotations.

The implementation of CBME in MUSOM is COBES while that in UNSOM is COE. As documented by Shahid in Malaysia, the implementation of CBME through COBES results not only with doctors who have superior skills to manage patients in primary care settings in remote and rural setting, but also has significant influence on the choice of specialty. Those who trained with COBES chose primary care oriented specialties while those who trained with COE chose specialties that prepared that could only be practiced in tertiary referral hospitals (Shahid, 2013).

The South Australian Flinders University Parallel Rural Community Curriculum (PRCC) is a government initiative started in 1997 to help address the rural doctor workforce shortage in Australia. The initiative involves a one year clinical rotation in rural Australia as part of medical training in students who enroll for this program. A study on the impact of this initiative on choice of specialty by the graduates of the PRCC showed that it significantly influenced the graduates to choose a rural career path (Stagg, Greenhill & Worley, 2009).

The points to take from this Australian approach are that it involves aggressive profiling of applicants for places in the program. The applicants who score highly in the appraisal for appropriateness for rural oriented practice specialties are awarded bonus points that give them some advantage over the rest

Laven & Wilkinson conducted a systematic literature review to summarize evidence for an association between doctors' choice of rural practice with having a rural upbringing. They reviewed Australian national data together with international data for 1973 to 2001. The conclusions were that there was consistent evidence that the likelihood of working in rural health facilities or practice was more than double in those with rural upbringing (Laven & Wilkinson, 2003).

Harris et al and Worley et al all from Australia have data similar to Laven & Wilkinson but from different studies (Worley, et al 2000; Harris, Gavel, & Young, 2005).

Sub-Saharan African countries, like Kenya, that continue to experience shortage and inequity in distribution of doctors that favors the urban centers will benefit if policy for enhanced enrolment of medical students and training that focus on attracting and retaining doctors and other health professionals in remote and rural areas.

Amalba, Mook, Mogre and Scherpbier studied pioneering graduates of Problem Based Learning/Community Based Education and Service (PBL/COBES) curriculum in a medical school in Ghana.

The study reported that slightly more than half of the doctors reported that COBES had positively influenced their choice of specialty. The participants in the Amalba study were doctors serving in both rural and urban parts of Ghana. The study that reported that even doctors who had been brought up in urban areas agreed that the COBES rotations had changed their perceptions of rural practice positively with a significant number of those brought up in rural Ghana reporting to have chosen career lines and specialties that favored rural practice (Amalba, et al., 2016).

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Conclusions

The findings of this study concur with similar studies done in other contexts in the findings that:

- i. The medical graduates rated community based medical education as an important course in medical training
- ii. The medical graduates perceived community based medical education as having played a positive role in the medical graduate's choice of rural practice
- iii. The medical graduates perceived community based medical education having played a positive role in the medical graduate's choice of specialty
- iv. Medical graduates from Moi University rated community based medical education higher than their counterparts from the University of Nairobi
- v. The medical school doctors trained made a significant difference in the medical graduates' perception on the role of community based medical education on choice of rural practice and specialty

6.1 Recommendations

- i. The community based education mode of delivery of community based medical education (CBME) in the medical curriculum led to more of the medical graduates choosing career lines that favor rural practice. The Kenyan health education policy makers need to consider harmonizing delivery of community based medical education courses for medical schools towards community based

- education and service (COBES). This may work towards improving attraction and retention of medical graduates in rural and underserved parts of the country
- ii. The devolved Kenyan public health services make it crucial for stake holders in health education and services in the different regions of Kenya to collaborate in the implementation of the CBME. The stakeholders include the national Ministries of Health and Higher Education and the County departments of health.
 - iii. The counties within catchment of each medical school are indeed major stakeholders. This will minimize challenges that the schools maybe facing in implementing the CBME. It may also start to the improve attraction and retention of doctors in these counties.
 - iv. Affirmative action in recruitment for medical schools that promotes according of scholarships to those brought up in rural Kenya need to be considered. This can be done through interviewing and offering scholarship for qualified medical degree applicants who demonstrate interest in pursuing a medical career in rural and remote parts of Kenya

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APPENDICES

Appendix I: Informed Consent

Title: The Role of Community Based Medical Education in Determining Kenyan Trained Medical Doctors' Choice of Specialty and Rural Practice

Investigator: Dr Patrick M Chege - PhD Medical Education candidate Department of Medical Education Moi University School of Medicine; a medical doctor trained in Kenya and working in the Moi University School of Medicine as a senior lecturer.

You are invited to participate in this study as a graduate of the MBChB Cohorts of 2000, 2001 and 2002 (Tick which year you graduated)

Please note that:

- a. Your participation is entirely voluntary.
- b. You may withdraw at any time from the study without prejudice.

After you have read the following explanation, please feel free to ask any questions that will allow you to understand the nature of the study.

What This Study Is About?

The study is an evaluation of the effect of Community Based Medical Education (CBME) covered in medical school on your choice of specialty and where you practice (rural or urban). The attached questionnaire on your personal demographic details followed by details on your experience during your community based education and finally whether this experience influenced your choice of specialty and where you practice.

WHY HAVE YOU BEEN INVITED TO PARTICIPATE

The office of the Dean of your Medical School provided us with the names of members of your cohort. We have also used the retainer register of the MP&DB and the medical professionals' directory to locate you.

You are invited to participate as a member of the MBChB classes that graduated in the years 2000, 2001 and 2002 in the Medical Schools of Moi and University of Nairobi.

Your class was selected to represent doctors who have had the opportunity of innovative teaching methods and have been out of medical school long enough to have realized some significant degree of career stability.

HOW THIS STUDY IS DONE

A consent form is attached to the questionnaire

We request you to self-administer the questionnaire and mail it back as soon as possible. This will help us collect data without delay

The findings of our study will be shared with you and all health professionals through direct communication with the participants, presentations in scientific conferences (local and international) and publications in peer reviewed journals.

CONFIDENTIALITY

Your responses will be used only in this study and your identity will be concealed.

Your responses will be aggregated with those of other participants and summarized in a report.

Your confidentiality will be respected. No information that discloses your identity will be released or published without your specific consent to the disclosure.

All the questionnaires and data collected will be stored in password protected folders while all written records and questionnaires will be locked in a filing cabinet for two years post-study. Only the investigators and research assistants on this project will have access to the data.

WITHDRAWAL FROM THE STUDY

You will have six months from the time of your interview to withdraw from the study.

If you communicate your intention to withdraw from the study to the research coordinator, your data will be removed from the data set and excluded from the analysis.

Possible risks & benefits

There are no potential physical, social or legal risks for study participants; however there may be minimal psychological risks. If some learning or professional experiences were unpleasant, then there may be minimal risk associated with their recall.

Potential benefits of this research include having the opportunity to provide your feedback and asking questions to investigators. The results of this research will help to inform training of health professionals in the future. The results will also inform policy and research.

Contact for information about the study

If you have any questions or desire further information with respect to this study, you may contact the PI on the project Dr. Patrick M Chege, mobile phone: +254-728-024-110 or chege200851@yahoo.com or pcmasemiano@mu.ac.ke

Contact for concerns about the rights of research subjects

If you have any concerns about your treatment or rights as a research subject, you may contact the Office of Research Ethics at Moi University College of Health Sciences (www.irec.or.ke)

Note that signing this consent form in no way limits your legal rights against the investigators, or anyone else.

I have been given the opportunity to discuss pertinent aspects of the research study, to ask questions, and hereby consent to participate in the project outlined. I acknowledge receipt of this consent form.

Participant's name:

Signature:

Date:

Witness Name:

Signature:

Date:

Appendix II: Data Collection Form

Question #	Question/field description	Responses
0	Confirm that you have read the consent document and consent to participate	Yes/No
Demographic information		
1.	Gender	0= male; 1=female; 9= other (specify)
2.	Age	0= 35-40 years old; 1= 41- 45 years old; 9= >45 years old
3.	Marital status	0= married; 1=single; 9= other (specify)
4.	Was your spouse brought up in rural or urban Kenya?	0= rural; 1= urban; 9= other (specify)
5.	Were you brought up in rural Kenya	0= YES; 1=NO
6.	What is the level of education of your parents?	Father [0=0-8years; 1= 9-12 years; 9= >12years] Mother [0=0-8years; 1= 9-12 years; 9= >12years]
7.	You are a graduate of Nairobi /Moi University?	0= University of Nairobi 1= Moi University
8.	Which year did you graduate	0= 2000; 1= 2001; 9=2002

9.	List any formal training that resulted in degree(s) or diploma(s) since you graduated with MBChB	0= MMed; 1= MPH; 9= other (specify)
10.	Who is your current employer	0= Ministry of Health; 1= Ministry of Education; 9= Other (Specify)
11.	What is your main role in your place of work	0= Administration (Specify): 1= Clinical services [a= consultant b= medical officer; c= others (specify)] 9= Other(specify):
12.	Have you ever worked in a rural facility?	0= NO; 1=YES If No, move to question #16
13.	If yes to 12, for how long?	0= less than 1 year; 1= 1-5 years; 9= >5 years
14.	Rate your experience in rural practice	1= poor; 2=good; 3= very good; 4 =(Excellent)
15.	What enhanced your confidence in rural practice?	0= COBES experience as a medical student in Moi University

		<p>1= Community Health rotations experience as a medical student in University of Nairobi</p> <p>9= Other (Specify)</p>
16.	<p>What discouraged or would discourage you from rural practice</p>	<p>0= lack of appropriate preparation during medical school training;</p> <p>1= Lack of functional systems for clinical work in the rural facilities;</p> <p>9= Other (Specify):</p>
17.	<p>Please rate your community health rotation/COBES experience as a medical student</p>	<p>Year/level 1: 1= poor; 2=good; 3=very good; 4= Excellent; 9= Not offered</p> <p>Year/Level 2: 1= poor; 2=good; 3=very good; 4= Excellent</p> <p>Year/Level 3: 1=poor; 2= good; 3=very good; 4 =Excellent; 9= Not offered</p> <p>Year 4/level4: 1poor; 2= good; 3=very good; 4=excellent; 9= Not offered</p>

		Year 5/level 5: 1=poor; 2=good; 3=very good; 4 =Excellent
18.	Please rate how your experience in community health rotation /COBES as a medical student prepared you for:	<p>a. Internship: 1= poor; 2=good); 3=very good; 4= Excellent</p> <p>b. Where you chose to be posted early and later in your career: 1= poor=; 2=good; 3= very good; 4= Excellent</p> <p>c. Decision on what career line/specialty to pursue: 1= poor; 2= good; 3= very good; 4= Excellent</p> <p>d. Decision on where to set your practice(rural or urban) in order to realize your full potential as a doctor: 1=poor); 2= good; 3 = very good; 4 Excellent</p>
19.	Community health /COBES training plays a significant role in	1=disagree strongly; 2= disagree; 3=neutral; 4= agree; 5=agree strongly

	the eventual performance in identifying and managing health problems in individuals and communities	
20.	Community health /COBES training plays a significant role in the eventual competence and willingness to work in rural areas	1=disagree strongly; 2= disagree; 3=neutral; 4= agree; 5=agree strongly
We appreciate your taking time to share your views on this important matter in medical education and we hope to communicate our findings to you on a later date		

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Appendix III: Google Forms

CONSENT FORM

...

Hello, I am Dr. Patrick Chege of Moi University School of Medicine, conducting a study the role of Community Based Medical Education (CBME) covered in medical school on your choice of specialty and where you practice (rural or urban). This survey consists of questions on your personal demographic details followed by details on your experience during your community based education and finally whether this experience influenced your choice of specialty and where you practice. I wish to request for your participation in this survey, which is expected to last 15 minutes. Your responses will be used only in this study and your identity will be concealed. Only the investigators and research assistants on this project will have access to the data.

I have read and understood the statement above and i choose TO participate

I have read and understood the statement above and i choose NOT to participate

After section 1 [Continue to next section](#)

Demographic Information

Description (optional)

1. Gender *

Female

Male



Other...

2. Age *

35-40 years old

41- 45 years old

>45 years old

  <https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-UV>

3. Marital Status *

Married

Single

Other...

⋮

4. Was your spouse brought up in rural or urban Kenya

Rural

Urban

Other...

5. Were you brought up in rural Kenya *

Yes

No

The image shows a browser window with several tabs: 'The Role of Community Based...', 'Copy of The Role of Communiti...', and 'tool - Google Drive'. The address bar shows the URL: <https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-UV>. The form content includes two identical questions:

6. What is the level of education of your mother? *

- Primary
- Secondary
- College
- Other...

6. What is the level of education of your father? *

- Primary
- Secondary
- College
- Other...

At the bottom of the form, there is a navigation button: 'After section 2 Continue to next section'.

Section 3 of 7

Educational Hostory and Experience

Description (optional)

7. Are you a graduate of Nairobi University or Moi University? *

 Moi University School of Medicine Nairobi University School of Medicine

8. Which year did you graduate? *

 2000 2001 2002

unread] - chege200851@ya... X The Role of Community Base... X Copy of The Role of Communi... X tool - Google Drive X

https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-UV

9. List any formal training that resulted in degree(s) or diploma(s) since you graduated with MBChB *

MMed

MPH

Other...

After section 3 Continue to next section

Section 4 of 7

The Role of Community Base... X Copy of The Role of Communi... X to

https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-UV

Section 4 of 7

Work Experience

Description (optional)

10. Who is your current employer ? *

Ministry of Health

Ministry of Education

Other...

11. What is your main role at your current place (applies)

Administrator

Specialist Consultant

11. What is your main role at your current place of work? (Tick any that applies) *

Administrator

Specialist Consultant

Medical Officer

Other...

12. Have you worked in a rural facility? (if "No", skip question #13, #14 and #15 and move to question # 16) *

Yes

No

<https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-UV> Search

13. If answered "Yes" to question 12, for how long have you worked in a rural facility?

Less than 1 year

1-5 Years

Over 5 years

14. In a Scale of 1 to 4, rate your experience in a rural health facility (1=poor, 2=good, 3=very good and 4-excellents)

Poor 1 2 3 4 Excellent

2 unread) - chege200851@y... x The Role of Community Bas... x Copy of The Role of Communi... x tool - Google Drive

https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-Uv

Most Visited Getting Started

15. What enhanced your confidence in rural practice?

- COBE experience as a Medical student in Moi University
- Community Health Rotation as a medical student in Nairobi University
- Other...

16. What discouraged or would discourage you from rural practice? *

- Limited preparation to work in rural facilities during medical school training
- Limited resources to provided medical services in rural facilities
- Other...

After section 4 Continue to next section

https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFV0KSnPWWv-Uv

Most Visited Getting Started

Section 5 of 7

Community Rotation/COBES Experience as a Student

In a scale of 1 to 4, please rate your community health rotation/COBES experience as a medical student in years/level 1-5. For Nairobi University graduate, questions 17 a to 17 e may skip levels where the course was not offered.

17. (a) Year 1/Level 1 - Community health rotation/COBES experience as a medical student.

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

17. (b) Year 2/ Level 2 -Community health rotation/COBES experience as a medical student.

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https://docs.google.com/forms/d/1xYdR95AVSvIVKeDeDKzFVOKSnPWWv-UV

17. (b) Year 2/ Level 2 -Community health rotation/COBES experience as a medical student.

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

17. (c) Year 3/ Level 3 - Community health rotation/COBES experience as a medical student.

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

17. (d) Year 4/Level 4 -Community health rotation/COBES experience as a medical student.

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

17. (e) Year 5/Level 5 -Community health rotation/COBES experience as a medical student.

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

18. (a) In a scale of 1 to 4, please rate how your experience in community health rotation /COBES as a medical student prepared you for internship:

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

18. (b) In a scale of 1 to 4, please rate how your experience in community health rotation /COBES as a medical student prepared you for where you chose to be posted early and later in your career:

	1	2	3	4	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

12:52 PM 5/20/2019

18. (b) In a scale of 1 to 4, please rate how your experience in community health rotation /COBES as a medical student prepared you for where you chose to be posted early and later in your career: *

Poor 1 2 3 4 Excellent

○ ○ ○ ○

⋮

18. (c) In a scale of 1 to 4, please rate how your experience in community health rotation /COBES as a medical student influenced your decision on what career line/specialty to pursue: *

Poor 1 2 3 4 Excellent

○ ○ ○ ○

experience in community *

18. (d) In a scale of 1 to 4, please rate how your experience in community health rotation /COBES as a medical student influenced your decision on where to set your practice (rural or urban) in order to realize your full potential as a doctor: *

Poor 1 2 3 4 Good

○ ○ ○ ○

After section 5 Continue to next section

Section 6 of 7

Perception Towards Community Health /COBES training

Description (optional)

...

19. Community health /COBES training plays a significant role in the eventual * performance in identifying and managing health problems in individuals and communities

1 2 3 4 5

Strongly Disagree Strongly Agree

unread - chege200851@y... x The Role of Community Bas... x Copy of The Role of Communi... x tool - Google Drive

https://docs.google.com/forms/d/1xYdR95AVSVVYkEDeDKzFV0K5npWWy-UV/

Most Visited Getting Started

Strongly Disagree Strongly Agree

20. Community health /COBES training plays a significant role in the eventual * competence and willingness to work in rural areas

1 2 3 4 5

Strongly Disagree Strongly Agree

After section 6 Submit form

Section 7 of 7

Thank you

Description (optional)

12:58 PM 7/28/2019

Appendix IV: IREC Approval



MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 334711/2/3

Reference: IREC/2017/89
Approval Number: 0002036

Dr. Patrick Masemiano Chege,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Chege,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee has reviewed your research proposal titled:-

"The Impact of Community Based Medical Education on Kenyan Trained Medical Doctors' Choice of Specialty and Place of Practice".

Your proposal has been granted a Formal Approval Number: **FAN: IREC 2036** on 25th January, 2018. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 24th January, 2019. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

DR. S. NYABERA
DEPUTY-CHAIRMAN

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc	CEO - MTRH	Dean - SOP	Dean - SOM
	Principal - CHS	Dean - SON	Dean - SOD



MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET

25th January, 2018



Appendix V: MBChB Curriculum

BACHELOR OF MEDICINE AND BACHELOR OF SURGERY

(MBChB)

CURRICULUM

SCHOOL OF MEDICINE

P.O. Box 4606 - 30100

ELDORET, Kenya

TELEPHONE: (053) 2061562

FAX: (053) 2033041

EMAIL: deansom@chs.mu.ac.ke

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WEBSITE: www.mu.ac.ke

www.chs.mu.ac.ke

November, 2014

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DEFINITION OF TERMS

A *Core Course* is a course, which is central to the discipline of study which must be taken by all candidates in a given programme.

A *Course* is the smallest unit in which a student can receive an assessment normally taught over a semester, and may comprise one or more units of per semester.

A *Pre-requisite Course* is a course which must be taken and completed successfully before one, can register for a given course.

A *Prescribed Course* is a course which may be designated as core, required, pre-requisite or elective, as specified in a given curriculum as approved by Senate.

A *Required Course* is a course which is supportive of or beneficial to a discipline.

A *Semester* is a period of study of normally not less than 16 weeks or such a period as may be determined by Senate for any academic year.

A *Term*: is a period of study of normally comprises of three equal divisions of between 13 to 15 weeks in an academic year as may be determined by Senate for any academic year.

A *Semester Load* is normally between 21 and 24 units, unless otherwise approved by Senate (also refer to course loading/units in 2.4).

A *Unit of Study* is a one-hour lecture per week per semester or two hours of tutorials/seminars per week per semester or three hours of practical per week per semester.

An Academic Year shall normally consist of three terms or two semesters and may include a third semester to cater for practical attachment, teaching practice and other field courses as may be determined by Senate.

An Elective Course is a course which a student may choose, according to interest, subject to approval by the relevant department, and shall be taken into account for the purpose of Degree Classification.

An Optional Course is a course which a student may choose according to interest, subject to approval by the relevant departments but which may not necessarily be central to a discipline of study and shall not be used for the Degree.

Curriculum: means an organized programme of study for a given degree, diploma or certificate award incorporating all matters including rationale of the programme, purpose, expected learning outcomes, academic resources for the support of the programme, academic organization of the programme, admission requirements, mode of delivery, programme content requirements and assessment process requirements.

Department: means an academic division into which a school is divided for purposes of teaching, examinations and administration.

Elective (E) –A relevant course from a set of courses given to add up to the required course loading for a student.

Elective Period: A period where students are allowed to take an elective area of their choice.

Lecture hour: means a period of time equivalent to one hour and representing one such continuous hour in lecture form, two in a tutorial or open learning session, three in a laboratory practical or practicum and five in farm or similar practice;

Programme of Study: means the prescribed syllabus that students must be taught at each key stage.

BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (M.B.Ch.B.) DEGREE PROGRAMME

1.0: INTRODUCTION

1.1 Background

The vision of the School of medicine (SOM) is to excel internationally in education of health professionals, provision of health services and research. The mission of the school of medicine is to contribute to knowledge, provide service and produce health professionals with practical and intellectual skills able to provide quality health services, create, preserve and disseminate knowledge. The SOM strives to ensure that the students acquire such skills using modalities that encourage active learning in the context in which they will later function as health professionals. It encourages the student to acquire the important skills of self-directed learning, problem solving and effective communication. Moreover, the School emphasizes not only curative, hospital-based medicine, but also, through its community oriented approach, prevention of diseases and promotion of good health.

Research and an inquiring mind are an integral part of the training of a medical student. The school, therefore, also lays emphasis on the acquisition of knowledge and skills in research, so that the graduates from the M.B.Ch.B. programme will be able to carry out research in the health and health related issues in modern day Kenya.

1.2 Moi University Vision

To be the University of choice in nurturing innovation and talent in science, technology and development.

1.3 Moi University Mission

To preserve, create, and disseminate knowledge, conserve and develop scientific, technological and cultural heritage through quality teaching and research; to create conducive work and learning environment; and to work with stakeholders for the betterment of society. To produce graduates with practical and intellectual skills appropriate to the needs of present and future society both nationally and internationally.

1.4 Moi University Core Values

1. Promotion and defence of intellectual and academic freedom, scholarship and relentless search for truth.
2. Fostering teamwork, innovation, networking, tolerance, and a culture of peace.
3. Embracing excellence, transparency & accountability.
4. Practicing professionalism, meritocracy, equality, integrity and social justice.
5. Maintaining self-respect, discipline, responsibility, institutional loyalty, national patriotism & international competitiveness.
6. Continual improvement of services in order to remain competitive and relevant

1.5 School of Medicine

1.5.1 Vision

To excel internationally in education of health professionals, provision of health services and research.

1.5.2 Mission

To contribute to knowledge, provide service and produce health professionals with practical and intellectual skills able to provide quality health services, create, preserve

and disseminate knowledge. The SOM strives to ensure that the students acquire such skills using modalities that encourage active learning in the context in which they will later function as health professionals.

1.5.3 Philosophy

The philosophy of the school also embodied in the curriculum, entails training a doctor in the context of the community, in which he/she will later practice. It encourages the student to acquire the important skills of self-directed learning, problem solving and effective communication. Moreover, the School emphasizes not only curative, hospital-based medicine, but also, through its community oriented approach, prevention of diseases and promotion of good health.

Research and an inquiring mind are an integral part of the training of a medical student. The school, therefore, also lays emphasis on the acquisition of knowledge and skills in research, so that the graduates from the M.B.Ch.B. programme will be able to carry out research in the health and health related issues in modern day Kenya.

The overall orientation of its educational programmes will therefore be population and community based. The teaching and learning strategies have been deliberately chosen to encourage acquisition of an integrated and holistic body of knowledge and skills through self-directed active learning methods. This fulfils the mission of Moi University of producing graduates who are practical in outlook and suited to meet the needs of the present and future Kenyan society.

1.6 Rationale and Justification of the Programme

Kenya has critical gaps in the provision of the medical care services as noted in the Kenya demographic health survey (KDHS) conducted between 2007/08 (KDHS,

2008/2009). Currently, Kenya has an approximate 14 medical doctors per 100,000 inhabitants and produces an approximate 600 doctors per year with only a third of these graduates remaining within the public health care system. To maintain the ratio of 14/100,000, 2100 physicians must have been trained by the year 2020. To improve access to physician services, Kenya requires training of specialists as well as general and community oriented practitioners. To attain a ratio of 16 doctors/100,000 residents by the year 2030, at least 3000 doctors will need to be trained. As the population increases, the medical trainings must also grow inline to meet the needs and demands imposed by new developments at a national and global level.

There is thus need to train more and more doctors. In addition, such doctors need the type of training to make them functionally suitable to face the challenges of the 21st century. More innovative teaching and learning strategies are required to prepare the doctors for the challenges they will face in their professional practice

1.7 Goal of the Programme

To produce Medical practitioners with the knowledge, professional skills, and attitudes in line with the health needs of the Kenyan society and the global environment.

1.8 Programme Objectives

1. Explain the scientific concepts and principles underpinning normal structure and function of the body systems
2. Describe the aetiology and mechanisms of disease, associated risk factors and disease prevention
3. Describe the Pharmacological principles of drug therapy, their efficacy in the treatment and relief of symptoms and associated adverse reactions

4. Recognise the signs and symptoms of commonly presenting diseases.
5. Exhibit oral and written communication skills including the presentation of clinical and scientific information
6. Be aware of the Professional, Ethical and legal principles underpinning the practice of medicine and awareness of the healthcare needs of a diverse population.
7. Evaluate own performance, plan and implement own education for the maintenance and further development of own knowledge, skills and attitudes.
8. Practice medicine in a community/population context and contribute to the prevention of ill health, promotion and maintenance of good health, and rehabilitation.
9. Describe the principles of health systems organization and their economic and legislative foundations and the management of health services.
10. Describe the use of information and communication technology in learning, clinical practice, health information systems and research.
11. Apply critical thinking and principles of research in evaluating, and managing health problems.
12. Provide leadership, plan and implement training/educational programmes for the community and health workers.

1.9 Programme Outcomes

The programme aims at producing graduates who will be able to:

1. Apply the knowledge of core concepts and principles of the basic biomedical and social sciences.

2. Demonstrate proficiency in critical thinking, clinical reasoning, problem solving, and technical skills applicable to the practice of evidence-based medicine.
3. Communicate effectively, in a culturally responsive manner with patients, families, other members of healthcare teams and other stakeholders
4. Demonstrate the highest standards of professional integrity, exemplary behavior, ethical practice, and an understanding of and sensitivity to diversity.
5. Demonstrate habits and skills of scholarship, self-directed and life-long learning, incorporating the practice of evidence-based medicine.
6. Practice medicine in a community/population context and contribute to the prevention of ill health, promotion and maintenance of good health, and rehabilitation.
7. Demonstrate knowledge of the principles of health systems organization and their economic and legislative foundations and also manage health services effectively
8. Apply knowledge of computing and information technology in learning, clinical practice, health information systems and research.
9. Provide leadership and work collaboratively in multi-professional teams to continuously improve the quality of care and advocate for patient's rights.

2.0 Academic Regulations for the Programme

2.1 Design

(a) Integration

Since a human being functions as an integrated whole, the programme has been designed to allow for both horizontal and vertical integration.

Horizontal integration: This stresses the cross relationship between parallel disciplines, such as physiology and anatomy, or at the clinical level, neurology and psychiatry.

Vertical integration: Stresses the inter-relationship between basic medical sciences, and clinical sciences. Vertical integration allows such elements to be taught at every stage with changing emphasis as students' progress through the programme

(b) Community and Research Orientation

In addition to integration, the community oriented approach is designed to enable students acquire an understanding of the health needs of the various Kenyan Communities through Community Based Education and Service (COBES). Thus, students will understand the interplay between factors responsible for both good and ill health in society and learn the important skills of preventive medicine and health promotion. The students will be required to carry out an investigative project during their community attachment.

2.2 Structure

The curriculum is organized in four parts over the six-year duration. These parts form a spiral in which the students revisit all the major systems of the body, with different emphasis each time as they advance in their studies.

Horizontal and vertical integrations have been built into each course. Full integration of knowledge and practice should be reached in part four.

2.2.1 Part 1: Basic Scientific Concepts and Principles

This part consists of four main courses, namely, Basics of Medical Education; Basics of Biomedical Sciences; Cell Biology and Genetics and Behavioral Sciences and Ethics. These courses prepare the student for the study of the subsequent parts of the programme. It starts with the basic scientific concepts and spirals into systems.

2.2.2 Part 2: Normal Tissues and Body Systems

The courses in this part cover the major body systems singly or in combinations. The emphasis will be on basic aspects of biomedical sciences.

2.2.3 Part 3: Pathological processes

In this part, the emphasis is on pathophysiology. Students revisit each body system or region to study the common pathological processes, which may affect them body. Emphasis is on how tissue abnormalities and/or disease processes alter tissue structure and function, leading to the development of signs and symptoms. Knowledge acquired in parts one and two is a pre-requisite for understanding the content of the courses in part three. This ensures integration of pathology with the basic sciences. Integration with the clinical sciences in this part is ensured by use of clinical tutorial problems to study the pathology; and the introduction to clinical techniques (MSC 300) course during which the students will be introduced to the clinical techniques. COBES in this part takes the form of an investigative project.

2.2.4 Part 4: Patient Management Courses

The emphasis at this stage will be to understand how a patient suffering from any of the conditions studied during part 3 courses may be properly managed. This will be

achieved by use of the following complementary approaches: firstly systematically discussing theoretical problems and wherever possible, enriching the discussion by real clinical cases and secondly, through clerkships.

COBES will continue as the investigative project and as an attachment in health services management based in a district hospital.

The competencies to be achieved in each discipline shall be outlined in respective student logbooks.

2.3 Admission Criteria

All candidates admitted to the M.B.Ch.B. degree programme in the School of Medicine must satisfy the following requirements:

- a) They must satisfy the common requirements for entry into the University.
- b) In addition, must obtain at least the minimum cut off points for the year as determined from the following cluster drawn from the Kenya Certificate of Secondary Education structure.
 - i. Biology
 - ii. Chemistry
 - iii. Physics or Maths
 - iv. English or Kiswahili
 - v. Any other subject
- c) Those holding qualifications equivalent to the above from institutions recognized by Moi University Senate may also be admitted.

- d) Candidates with suitable diplomas or University degrees in relevant fields who fulfill all other University entrance requirements may be considered for admission provided the School of Medicine Board recommends, and Senate approves.
- e) KCSE candidates must also satisfy the admission criteria set by the Medical Practitioners and Dentists Board

2.4 Course Requirements

2.4.1 Student Attendance

- i. The student's grade in each course shall be based upon performance and/or participation in class, exercises and tests, assignments, practical experiences and procedures, and final examination.
- ii. A student shall not be allowed to sit for a University Examination in a course, if he/she has missed 20% or more of the required course attendance.
- iii. To be eligible to sit for a University Examination, a student must have attempted the required number of Continuous Assessments on the course being examined.
- iv. Student shall register for examination in all MBChB courses unless senate approves otherwise.

2.4.2 Obligations of the Lecturer/Tutor

Lecturers have the responsibility of:

- i. Preparing the course outline based on the curriculum, upon which the course will be taught and final grade determined. Copies of the course outlines must be distributed to the students and the Head of

Department.

- ii. Content delivery as guided by the curriculum.
- iii. Maintain a class attendance register
- iv. Providing consultations to students for academic advising and mentoring.
- v. Providing the University with fair academic evaluation on the work of each student at the end of each semester and or year

2.5 Credit Transfer and Exemptions

Applicants may transfer credits for similar courses taken and passed in other institutions recognized by the university senate in the basic clinical sciences only.

Applicants seeking transfer of credit may:

- a) Send a formal application seeking transfer of credits, justification of the request and attach evidence of the credentials which would support such request;
- b) Apply for transfer of credit which is processed only after paying the prescribed exemption fee;
- c) Be allowed only in the basic sciences courses of Biochemistry, Physiology and Anatomy which are covered in Year 1 and 2
- d) Be allowed to transfer into the Year 2 or 3
- e) Students undertaking clinical courses will not be allowed to do credit transfer.

2.6 Management and Administration of the Programme

The programme will be managed by an academic team lead by the Dean School of Medicine who oversees all academic programmes. The courses will be implemented through the Medical education and assessment committee (MEAC) and the various

HoDs with input into the different courses. MEAC will work through the year and course coordinators and also the time-tabling coordinator.

2.7 Programme Duration

- a) The duration of the M.B.Ch.B. degree programme shall extend over a period of not less than six academic years and not more than twelve years, unless Senate on the recommendation of the School Board approves exemption.
- b) All courses in the M.B.Ch.B., programme shall be compulsory unless the School Board recommends exemption and senate approves.
- c) The academic session in the School of Medicine shall be divided into 3 terms.
- d) Each term shall be 14 to 15 weeks exclusive of any examinations.

2.8 Mode of Delivery

This will be primarily face to face blended with modular and e-learning methods

2.9 Learning/Teaching Strategies

Each course is fully described in a students' workbook with a corresponding tutors' guide booklet. The course is introduced to the students by the course coordinator together with tutors and resource persons (the experts in the various medical and related sciences).

A multifaceted approach is used, employing mainly those methods that encourage active learning.

2.9.1 Problem Based Learning (PBL)

PBL is the main mode of instruction. Students work in small groups, each group closely guided by a tutor. The groups are stimulated (challenged) using appropriate problems. Through the analysis of such problems, the students derive learning objectives. This is followed by self-directed learning (SDL), during which the students use all available learning resources, including discussions with the resource persons to acquire the relevant information. During discussions in subsequent meetings of the groups with their tutors (tutorials), the completeness of the learning process, with respect to the learning objectives, and the correctness of what has been learned are evaluated and ascertained.

2.9.2 Lectures

Overview lectures are given by the discipline experts. They serve the purpose of outlining the areas to be covered in the course, explaining principles and concepts, and explaining the difficult areas related to any discipline.

2.9.3 Large Group Discussions/Seminars

These are discussions between students and discipline experts on difficult content areas.

2.9.4 Laboratory Practicals/Clinical Demonstrations

Are related to ongoing tutorial problems to demonstrate specific and practical aspects of what the students are currently studying. These help students acquire some skills especially in the early stages of the programme.

2.9.5 Clerkships

These take place in the 4th, 5th and the 6th years of the programme. The students will spend as much time as possible serving as apprentices to their teachers and other health professionals, learning the art and science of clinical medicine. This will involve history

taking, performing physical examinations, and carrying out appropriate investigations to arrive at definite diagnoses; taking part in the appropriate treatment of the patients, their rehabilitation into the community and subsequent follow-up of the patients in the clinics as required; and taking part in the conduct of post mortems on those who die under their care.

During all Clerkships students should demonstrate acceptable professional conduct. By the end of the Clerkships, they should demonstrate ability to manage appropriate medical problems affecting patients and their families.

2.9.6 Field work

The curriculum is both community oriented and community based. This includes not only the courses entitled community Based Education and Services (COBES), but also Occupational Health and other courses that may have a community based educational component. This will help to orientate and to sensitize the graduates of the programme to the health problems of the community and their possible solutions.

2.9.7 Computer-Assisted Learning/E-Learning

2.9.8 Electives

2.10 Assessment and Examination Procedures

Examinations in the M.B.Ch.B programme shall be conducted according to the Moi University Common Examination Regulations for undergraduate students (appended at the end of this document) with the variations as indicated in the School of medicine examination regulations.

Summative Assessment

These must be successfully completed to be awarded the degree and will take the form of written and practical examinations

- I. Candidates shall be required to pass in all the prescribed courses in a given programme. The pass mark shall be 50% (40% for IRD Courses) unless otherwise approved by senate.
- II. Assessment at the end of the course work shall consist of:
 - a) An end of year examination which shall normally constitute 50% of the total marks in each course.
 - b) Continuous assessment and such other tests as may be prescribed by the department. This will also constitute 50% of the total marks.
 - c) Assessment of coursework shall be in the form of a written examination, a practical examination, project reports and viva voce as relevant.

Formative Assessment

This will be done continuously during practical and other placements, assessing the knowledge, skills and attitudes of the students. There will be regular supervisor/mentor feedback, multiple direct observations of performance.

Logbooks will be used to monitor exposure to and acquisition of essential practical skills. It will be an ongoing process throughout the entire duration of the training.

Evidence of satisfactory exposure will be a requirement for progression of the student.

2.10.1 Grading System

The marks shall be translated into letter grades and grade points as specified below:

Marks	Letter Grades	
75-100	A	Distinction
65-74	B	Credit

50-64	C	Pass
< 50	D	Fail

2.11 Course Loading

The M.B.Ch.B. degree programme shall consist of a total of a total of 233 units exclusive of the University common courses. The Moi University unit system of study will apply as follows:

One (1) CREDIT HOUR equivalent to:

- i. 1 hour of lectures OR,
- ii. 2 hours of tutorials OR,
- iii. 3 hours of practicals, clerkships, fieldwork, or self directed learning.

One (1) UNIT is equivalent to:

- i. 15 hours of lectures OR,
- ii. 30 hours of tutorials OR,
- iii. 45 hours of practicals, clerkships, fieldwork, or self-directed learning (SDL).

Each unit of a course will be equivalent to one week of teaching.

2.12 Award of Certification

The BACHELOR OF MEDICINE AND BACHELOR OF SURGERY, (M.B.Ch.B.) degree of Moi University shall be awarded to that person who successfully fulfills all the requirements of the programme herein described subject to the approval of the Board of Examiners and the Senate. The M.B.Ch.B degree will not be classified.

2.13 Programme Evaluation

This will be done regularly after every six year cycle and will be expected to involve all the stakeholders including, students, parents, regulatory bodies and associations, alumni, employers, peers/external examiners and the community at large. It will include all aspects of the programme- the course content, instructional process, infrastructure and equipment for delivery, instructional and reference materials and assessments.

- i. Regulatory bodies such as CHE & MPDB will carry out evaluations as per their standing rules.
- ii. Peers will be invited as external examiners and evaluations will be part of their work.

The other stakeholders will be involved periodically through use of structured questionnaires and their feedback taken into consideration.

2.14 Quality assurance

Monitoring and Evaluation will involve evaluation of the staff, the individual courses. It will be done regularly and will aim at involving all the stakeholders and will use both qualitative and quantitative methods.

External Moderation of Examinations

End of year written/practical examinations will be moderated by external examiner appointed by Moi University Senate

Evaluation of Teaching Staff

Evaluation of teaching staff shall be carried out by students and the Heads of Departments. Students shall be given an opportunity to rate anonymously their lecturers towards the end of each course, using a structured questionnaire covering all aspects of

teaching. Completed evaluation forms shall be forwarded to the Dean of school, and analyzed. Reports will then be given to a staff evaluation committee for further action where necessary.

Course Evaluation

This will also be done by both staff and students through use of structured questionnaires and rating scales. This will include all aspects of the course: the course content, instructional process, infrastructure and equipment for delivery, instructional and reference materials and assessments. Alumni, peers, and External Examiner inputs will also be taken into consideration. Overall curriculum evaluation will be done after a cycle i.e. every six years.

Student Evaluation

Student attendance in the various classes will be monitored and both formative and summative assessment will be done as mentioned above.

2.15 Course Coding

- i. MS Refers to all Medical School courses, which are common to all undergraduate training programmes.
- ii. NS refers to courses adopted from the School of Nursing
- iii. IRD- Refers to University Common courses
- iv. 100-600: Starting code for all undergraduate programmes: 1 for 1ST Year and 6 for 6TH.
- v. B - Refers to Basic Science courses
- vi. C - Refers to Clinical courses
- vii. E - Refers to Electives

viii. P - Refers to Pathology/Pathophysiology courses

3.0 Course Structure

Year One

Course Code	Course Title	Units
1. MSE 100	<ul style="list-style-type: none"> Basics of Medical Education 	1
2. MSE 101	<ul style="list-style-type: none"> ICT in Learning 	2
3. MSB 100	<ul style="list-style-type: none"> Basics of Biomedical sciences 	4
4. MSB 101	<ul style="list-style-type: none"> Cell Biology and Genetics 	4
5. MSB 102	<ul style="list-style-type: none"> Behavioral Sciences and Introduction. to Ethics 	3
6. MSB 103	<ul style="list-style-type: none"> Body fluids, Blood and Immune System 	7
7. MSB 104	<ul style="list-style-type: none"> Upper and Lower limb Anatomy 	3
8. MSB 106	<ul style="list-style-type: none"> Endocrine and Integumentary System 	4
9. NSC 110	<ul style="list-style-type: none"> Basic Nursing Skills 	3
10. MSB105	<ul style="list-style-type: none"> COBES I: Introduction to community health 	4
11. IRD 100	<ul style="list-style-type: none"> Communication Skills I 	3
12. IRD 102	<ul style="list-style-type: none"> Communication Skills II 	3
	TOTAL	41

Year Two

1. MSB 201	▪ Basics of Microbiology, Immunology and Pharmacology	5
2. MSB 202	▪ Neurolocomotor Systems	7
3. MSB 203	▪ Cardiovascular and Respiratory System	5
4. MSB 204	▪ COBES II: Community diagnosis	7
5. MSB 205	▪ Digestive System, Nutrients and Metabolism	5
6. MSB 206	▪ Reproductive and Urinary Systems	4
7. MSC 200	▪ Human communication Skills and history taking	3
8. IRD 103	▪ Development Concepts and Application	3
9. IRD 104	▪ Quantitative Skills	3
	TOTAL	42

Year Three

1. MSP 300	▪ General Pathology	6
2. MSP 301	▪ Haemopoietic System Disorders	3
3. MSP 302	▪ Cardiovascular and respiratory Disorders	4
4. MSP 303	▪ Endocrine Disorders	2
5. MSP 304	▪ Digestive System, Nutrition, and Metabolic Disorders	5
6. MSP 305	▪ Neurolocomotor and Behavioral Disorders	5
7. MSP 306	▪ Reproductive and Urinary Systems Disorders	5
8. MSP 307	▪ Bone, Connective Tissue, and Skin Disorders	3
9. MSB 300	▪ COBES III: Investigative Project I	5
10. MSC 300	▪ Introduction to Clinical Techniques and Basic Life Support	3
	TOTAL	41

Year Four

1. MSC 400	<ul style="list-style-type: none"> • Occupational Health 	3
2. MSB 400	<ul style="list-style-type: none"> • COBES IV: Investigative project II 	6
3. MSP 400	<ul style="list-style-type: none"> • Forensic Medicine and Toxicology 	3
4. MSC 401	<ul style="list-style-type: none"> • Clinical Pharmacology 	4
5. MSC 402	<ul style="list-style-type: none"> • Junior Clerkship Child Health 	5
6. MSC 403	<ul style="list-style-type: none"> • Junior Clerkship Medicine 	5
7. MSC 404	<ul style="list-style-type: none"> • Junior Clerkship Reproductive Health 	5
8. MSC 405	<ul style="list-style-type: none"> • Junior Clerkship Surgery 	5
9. MSC 406	<ul style="list-style-type: none"> • Clinical Management I 	2
10. MSC 407	<ul style="list-style-type: none"> • Clinical Management II 	2
	TOTAL	40

Year Five

1. MSC 500	▪ Anaesthesiology and Critical care	4
2. MSC 501	▪ Oral Health	2
3. MSC 502	▪ Dermatology	2
4. MSC 503	▪ Ear, Nose and Throat Surgery	4
5. MSC 504	▪ Ophthalmology	4
6. MSC 505	▪ Orthopedics and Traumatology	4
7. MSC 506	▪ Radiology and Imaging	4
8. MSB 500	▪ Health Services Management	3
9. MSC 507	▪ COBES V: District Health Service Attachment	6
10. MSE 500	▪ Medical Elective Period	6
11. MSB 501	▪ Introduction to Entrepreneurship	2
	TOTAL	41

Year Six

1. MSC 600	Clerkship in Mental Health	6
2. MSC 601	Senior Clerkship in Child Health	6
3. MSC 602	Senior Clerkship in Medicine	6
4. MSC 603	Senior Clerkship in Reproductive Health	6
5. MSC 604	Senior Clerkship in General Surgery	6
6. MSC 605	Clinical Management III	2
7. MSC 606	Clinical Management IV	2
8. MSC 607	Medical Ethics and Medico-legal issues	3
9. MSC 608	Chronic disease management and Palliative care	3
	TOTAL	40

3.1 Key to Examinations Codes

SUBJECT TITLE	CODE
Behavioral Sciences	PSA
Child Health	CHP
COBES	CBS
Epidemiology and Preventive Medicine	EPM
Forensic Medicine and Toxicology	FMT
Hematology and Blood Transfusion	HHP
Health Management and H. Economics	HME
Histopathology and Cytology	HPC
Human Anatomy	HMA
Immunology	IMM
Medical Biochemistry	MBC
Medical Microbiology and Parasitology	MMP
Medical Physiology	MPP

Medicine	MED
Mental Health	MHP
Nutrition	NUT
Nursing Sciences	NSC
Occupational Health	OPH
Pharmacology	PHM
Radiology and Imaging	RAI
Reproductive Health	RHS
Surgery and Surgical specialties	SUR
Family Health	FMH
IRD Courses	IRD

3.2 Examination Schedule

End of year examinations (EYE) shall be conducted at the end of each year of study.

Key

Laboratory practical assessments may be a mixture of actual practical performance tests and theoretical questions based on actual practicals previously conducted in class.

UNITS: Cumulative units for any discipline in any academic year from different Courses for Examination purposes.

ORAL EXAMINATIONS: In all the exams, viva voce (oral examinations) may be used for secondary purposes such as, making pass/fail decisions in marginal cases, determining distinction students, course diagnosis etc.

In Clinical Assessment, during the long cases, the student is given a patient to carry out the following: Take a history; Examine the patient; Make a diagnosis; Suggest investigations and Make a plan for managing the patient. After 45 minutes to one hour (1) of being with the patient, the student discusses all these aspects with the Examiners (External and Internal). In the short cases each lasting about 10 minutes, the students are examined on selected cases and may involve all aspects from relevant history, physical examination, investigations, interpretation of data and demonstration of certain procedural skills.

The various subjects will be examined according to the schedule indicated below:

Year One

	CODE	TITLE	UNITS	WRITTEN	PRACTICAL
1	MSE 100	Basics of medical education	1	CAT	
2	MSE 101	ICT in Learning	2	CAT	X
3	PSA 100	Behavioral Sciences and Ethics	3	1x3 hrs	
4	CBS 100	COBES I	4	1x3 hrs	

5	IMM 100	Immunology	3	1x3 hrs	X
6	MBC 100	Medical Biochemistry	3.5	1x3 hrs	X
7	MPP 100	Medical Physiology	3.5	1x3 hrs	X
8	HMA 100	Human Anatomy	6	1x3 hrs	X
9	NSC 100	Basic Nursing Skills	3	1x3 hrs	
10	IRD 100	Communication Skills I	3	1x3 hrs	
11	IRD 102	Communication Skills II	3	1x3 hrs	
12	IRD 103	Development Concepts & Applications	3	1x3 hrs	
13	IRD 104	Quantitative Skills	3	1x3 hrs	
		TOTAL UNITS	41		

CARRIED FORWARD: 2 units (Radiology 1 unit and Microbiology 1 unit).

Year Two

	CODE	TITLE	UNITS	WRITTE N	PRACTICA L	COMMENT S
1	CBS 200	COBES II	7	Oral presentation and written report		
2	HMA 200	Human Anatomy	8.3	1x3 hrs	X	
3	MBC 200	Medical Biochemistry	6.4	1x3 hrs	X	
4	MMP 200	Medical Microbiology and Parasitology	3.5	1x3 hrs	X	1 unit from year 1.
5	MPP 200	Medical Physiology	9.7	1x3 hrs	X	
6	PHM 200	Pharmacology	2	CAT		
7	HCS 200	Human communication skills and history taking	3	1x3 hrs	X	+Beh. Sc 0.5 units
1	IMM 200	Immunology	1		CAT	
		TOTAL UNITS	43.9			

CARRIED FORWARD: : 1 Unit Immunology to Yr 3.

Year Three

	CODE	TITLE	UNITS	WRITTEN	PRACTICAL	COMMENTS
1	HPP 300	General Pathology I	5.8	1x3 hrs	x	
2	HPP 310	Systemic Pathology II	9.1	1x3 hrs	x	Includes 1 unit Physio.
3	HHP 300	Hematology	2.0	1x1.5 hrs	x	
4	MBC 300	Clinical Chemistry	3.3	1x3 hrs	x	Includes Nutrition 0.5 units
5	MMP 300	Microbiology & Parasitology	3.0	1X3 hrs	x	
6	IMM 300	Immunology	3.2	1xhrs	x	1 <i>UNIT</i> YEAR2
7	PHM 300	Pharmacology	5.0	1x3 hrs		
8	CBS 300	COBES III	6.0	Oral presentation and written report		
		TOTAL UNITS	36.3			

CARRIED FORWARD: Radiology 1.0 unit and Mental Health 1 unit.

Year Four

	CODE	TITLE	UNITS	WRITTEN	CLINICAL
1	PHM 400	Clinical pharmacology	4	1x3 hrs	
2	CHP 400	Child health	6.5	1x3 hrs	X
3	MED 400	Internal medicine	6.5	1x3 hrs	X
4	RHS 400	Reproductive health	6.5	1x3 hrs	X
5	SUR 400	Surgery	7.5	1x3 hrs	X
6	CBS 400	COBES IV	6	ORAL PRESENTATION & WRITTEN REPORT	
7	OPH 400	Occupational health	3	1x3 hrs	
8	FMT 400	Forensic medicine and toxicology	3	1x3 hrs	
		TOTAL UNITS	43	3 units from year 3	

Year Five

	CODE	TITLE	UNITS	WRITTEN	CLINICAL	Comments
1	CBS 500	COBES V	6.0	Oral Presentation & Written report		
2	RAI 500	Radiology and Imaging	6.0	1x3 hrs	X	CF 2.0Units
3	SUR 500	Anaesthesiology and critical care	4.0	1x1.5 hrs	X	
4	SUR 501	Oral Health	2.0	1x1.5hrs	X	
5	MSC 502	Dermatology	2.0	1x1.5	?	
6	SUR 502	ENT Surgery	4.0	1x1.5 hrs	X	
7	SUR 503	Ophthalmology	4.0	1x1.5 hrs	X	
8	SUR 504	Orthopaedics and Traumatology	4.0	1x1.5 hrs	X	
9	HME 500	Health Service Management	3.0	1x3 hrs		
10	MSE 500	Electives	6.0	WRITTEN REPORT		

1	IRD 500	Entrepreneurship	2.0	1x1.5 hrs		
1						
		TOTAL UNITS	43			

Year Six

	CODE	TITLE	UNITS	WRITTEN	CLINICAL	Comments
1	CHP 600	Child health	7.3	1x3 hrs	x	
2	MED 600	Internal medicine	7.3	1x3 hrs	x	
3	SUR 600	Surgery	7.3	1x3 hrs	x	
4	RHS 600	Reproductive Health	7.3	1x3 hrs	x	
5	MHP 600	Mental health	7.8	1x3 hrs	x	1 Unit CF
6	FMH 600	Family Health	3.0	1x3hrs		
		TOTAL UNITS	41.0	1 unit mental Health from Yr. 3		

3.3 Programme Outcomes Matrix

Course Code	Course Title	Programme Outcomes								
		1	2	3	4	5	6	7	8	9
MSE 100	Basics of Medical Education	X	X	X	-	X	-	-	-	-
MSE 101	ICT in Learning	X	X	X	-	X	X	X	X	-
MSB 100	Basics of Biomedical sciences	X	X	-	-	-	-	-	-	-
MSB 101	Cell Biology and Genetics	X	X	-	-	-	-	-	-	-
MSB 102	Behavioral Sciences and Introduction. to Ethics	X	X	X	X	-	-	-	-	X
MSB 103	Body fluids, Blood and Immune System	X	X	-	-	-	-	-	-	-
MSB 104	Upper and Lower limb Anatomy	X	X	-	-	-	-	-	-	-
NSC 110	Basic Nursing Skills	X	X	-	-	-	-	-	-	-
MSB 200	Endocrine and Integumentary System	X	X	-	-	-	-	-	-	-

MSB 201	Basics of Microbiology, Immunology and Pharmacology	X	X	-	-	-	-	-	-	-
MSB 202	Neurolocomotor Systems	X	X	-	-	-	-	-	-	-
MSB 203	Cardiovascular and Respiratory System	X	X	-	-	-	-	-	-	-
MSB 205	Digestive System, Nutrients and Metabolism	X	X	-	-	-	-	-	-	-
MSB 206	Reproductive and Urinary Systems	X	X	-	-	-	-	-	-	-
MSC 200	Human communication Skills and history taking	X	X	X	X	-	X	X	-	X
MSP 300	General Pathology	X	X	-	-	-	-	-	-	-
MSP 301- MSP 307	Systemic Pathology	X	X	-	-	-	-	-	-	-
MSC 300	Introduction to Clinical Techniques and Basic Life Support	X	X	X	X	-	X	-	-	X
MSC 400	Occupational Health	X	X	-	-	-	X	-	-	X

MSB105, 204,300, 400 & MSC 507	Community based education, Service & Research	X	X	X	X	X	X	-	X	X
MSP 400	Forensic Medicine and Toxicology	X	X	-	-	X	X	-	X	X
MSC 401	Clinical Pharmacology	X	X	-	-	X	X	-	X	X
MSC 402 &MSC 602	Clerkships in Child Health	X	X	X	-	X	X	-	X	X
MSC 403 &MSC 603	Clerkships in Medicine	X	X	X	-	X	X	-	X	X
MSC 404 &MSC 604	Clerkships in Reproductive Health	X	X	X	-	X	X	-	X	X
MSC405 & MSC 605	Clerkships in Surgery	X	X	X	-	X	X	-	X	X
MSC 600	Clerkship in Mental Health	X	X	X	-	X	X	-	X	X

MSC 500 - MSC 506	Special Clinical Rotations	X	X	X	-	X	X	-	X	X
MSB 500	Health Services Management	X	X	X	-	X	X	X	X	X
MSC 607	Medical Ethics and Medico-legal issues	X	X	X	X	X	X	X	X	X
MSC 608	Chronic disease management and Palliative care	X	X	X	X	X	X	X	X	X

3.4 Course Descriptions

Year One

MSE 100: BASICS OF MEDICAL EDUCATION (1 UNIT)

Purpose:

To introduce the learners to the basics of Medical Education and its application at Moi University, School of Medicine

Objectives

1. Explain the Philosophy and Goals of the School of Medicine.
2. Describe the design and implementation of the School of Medicine
3. Describe traditional and innovative teaching/learning methods in Medical Education.
4. Discuss PBL process and the roles of tutors and students.

5. Outline student assessment and assessment methods and tests used in Medical Education.

Outcomes

1. Practice the philosophy and goals of the School of Medicine.
2. Participate in the design and implementation of the programme.
3. Compare and contrast traditional and innovative teaching/learning methods in Medical Education.
4. Participate in the PBL process.
5. Explain student assessment and assessment methods and tests used in Medical Education.

Content

Philosophy and objectives of the College of Health Sciences: Vision, Mission. Practical, technological, and community oriented.

Design: SPICES model, basic, normal, systems, abnormal structures and functions and patient management.

Traditional methods including lectures, demonstrations, field practice, team teaching.

Innovative methods including Spices, PBL, COBES, computer assisted learning, SDL.

The process: Three steps, seven steps and fifteen steps. Roles of tutors including facilitate, advice, guide, inform, participate and withdraw. Roles of students including attendance, taking notes, actively participating. Evaluation: course, tutors and students.

Student assessment including continuous assessments tests (CATS), end of term exams (ETEs), end of year exams (EYEs), end of rotations (EREs). Assessment

methods: MCQs, SAQs, LEQs, MEQs, clinical exams, practicals, vivas, oral presentations, etc.

**MSE 101: INFORMATION AND COMMUNICATION TECHNOLOGY
(ICT) IN LEARNING (2 UNITS)**

Purpose

To equip the learners with knowledge of Information and Communication Technology (ICT) and its application in health care and research.

Objectives

1. Illustrate the types and components of a computer system
2. Describe the principles of computer operating systems and information processing.
3. Describe common computer software packages for word processing and data management.
4. Outline the use of computers in learning and healthcare

Outcomes

1. Distinguish between the functions of various computer components and peripherals
2. Use a computer under the Windows operating system.
3. Apply common computer software packages for word processing and data management.
4. Apply the skills of computer technology in learning, delivery of health care and research

Content:

Types of computers: Microcomputer; minicomputer; palm computers; main frame computer; supercomputers; Hardware and software: Input devices: monitor; mouse; voice data entry; light pen; scanner; key board; touch screen; Output devices: monitor; printer; plotter; Storage devices: buffer; central processing unit; back-up; file storage devices; Operating systems; Utilities and operations software.

Principles of data management: Setting up files; modifying; storing; data coding; data entry; data processing and analysis; databases.

Software and programming: System programmes; operating systems; utility programmes; special purposes programmes; application programmes; programming languages; Word processing: word perfect; word; power point; excel spreadsheets; SPSS; EPI-info; Internet access; Medline; Cochrane databases; World wide web; Ovid: Statistical programmes: statistical tests; data entry; data cleaning

Computer applications in health services and research. Medical literature search, medical record keeping, and retrieval; and searching for information; Telemedicine; Virtual reality Computer assisted learning, computer managed learning and assessment, data management, information communication, storage and retrieval.

MSB 100: BASICS OF BIOMEDICAL SCIENCES (4 UNITS)**Purpose**

To orient the learners on the application of the basic sciences in medicine and health care

Objectives

1. Describe the basic chemistry of the constituents of the body
2. Describe the physical and chemical properties of organic molecules

3. Outline the basic principles of physics as applied in medicine.
4. Describe the biology of micro-organisms and parasites of medical importance.
5. Describe the structure and function of basic biomolecules.

Outcomes

1. Explain the basic chemistry of the constituents of the body
2. Discuss the use of organic compounds in medicine
3. Discuss the basic principles of physics as applied in medicine.
4. Demonstrate knowledge of the biology of micro-organisms and parasites of medical importance.
5. Explain the structure and function of basic biomolecules.

Content:

Basic Chemistry: Physical Chemistry: Water, solutions and colloids; Ion producing substances; water, acids, bases and salts; Acidity: detection, control, and measurement; Kinetic theory and chemical reactions; electrovalent bond formation. Concept of oxidation and reduction processes. Osmotic pressure.

Organic chemistry: Newman projection, Fischer projections, Haworth projection, stereo projection. Electrophiles, nucleophiles and their reactions. Nomenclature, structures, physical and chemical properties and reactions of alkanes, alkyl halides, alkanes, alkynes, alcohols, aldehydes and ketones, ethers, esters. Covalent bond formation. Hydrogen, dative, hydrophilic and hydrophobic bonds. Carboxylic acids and amines. Aldol condensation and claisen reaction.

Physics: Structure and properties of atoms and molecules. Causes and properties of motion. Sound waves; characteristics, measurement. Electricity and magnetism.

Electromagnetic spectrum. Radioactivity. Radioisotopes.

Microbiology/Parasitology: Scope of microbiology and Historical concepts. Structure, Taxonomy, characteristics of protozoa, nematoda, cestoda, trematoda, fungi, viruses, bacteria of medical importance. Laboratory standards, safety and procedures, and microscopic examination of micro-organisms.

Basic biomolecules: Classification, structures and functions of amino acids, lipids, carbohydrates, proteins. Basic enzymology; enzyme classification, catalysis, inhibition, kinetics and enzyme activity. Factors affecting enzyme activity and enzyme regulation. Classification of vitamins, structures and functions. Role of trace elements. Biochemical methods: Subcellular fractionation. Separative procedures; salt fractionation, chromatography, gel filtration and electrophoresis.

MSB 101: CELL BIOLOGY, GENETICS AND GENERAL EMBRYOLOGY (4 UNITS)

Course Purpose

To equip the students with knowledge of cellular structure, basic genetic principles and the key concepts related to the development of human cells, tissues and organs.

Objectives

1. Explain the principles of human genetics.
2. Describe early development of the human embryo
3. Describe cell and tissues structure and functions

Outcomes

1. Explain the molecular basis of human genetics and disease inheritance.
2. Discuss the early development of the human embryo

3. Relate cell and tissues structure and functions

Content

Principles and concepts of human genetics: DNA, RNA; structure and functions. Genetic code and chromosomes; gene expression, genetic drift and polymorphism; multifactorial traits and polygenic inheritance patterns; polymorphism and linkage disequilibrium.

Development of the Human Embryo: Reproductive cycles and female reproductive system. Gametogenesis. Gamete viability and transport. Fertilization, cleavage. Formation and transport of the morula. Blastula, blastocyst, normal and abnormal implantation. Formation of the bilaminar disc, trilaminar germ layers and their derivatives. Embryonic folding and organogenesis. Placenta and fetal membranes. Umbilical cord and twinning. Teratology and teratogenesis

Cell and Tissues structure and functions: The Cell theory. Light microscopic structure of the cells. Size and shape, their relations with performing functions. Ultrastructure of cell organelles, Cytoskeleton and cell inclusions. Structure and function of plasma membrane. Endo- and exocytosis. Phagocytosis. Cell division. Chromosomes. Cell cycle. Apoptosis. Cell death. Factors influencing cell function including free radicals. Classification, structure and functions of: Epithelial tissues, Connective tissues, Muscle tissues, Nervous tissue.

**MSB 102: BEHAVIORAL SCIENCES AND INTRODUCTION TO ETHICS
(3 UNITS)**

Purpose

To equip the learners with knowledge of the psychological, social, cultural, and environmental influences on behavior, health, and disease processes.

Objectives

1. Describe the basic principles of medical psychology, sociology and anthropology.
2. Describe psychological, sociological and anthropological factors that affect health in the community.
3. Describe the ethical principles, Acts and values which govern the practice of medicine, nursing, dentistry, environmental and public health.

Outcomes

1. Demonstrate knowledge of the psychological and social factors influencing patient behavior.
2. Apply knowledge of the behavioral sciences in the management of illness and disability.
3. Discuss the ethical principles, Acts and values which govern the practice of medicine, nursing, dentistry, environmental and public health.

Content:

Developmental psychology; theories of motivation and learning; proper socialization process; emotional development and support. Adaptive and Maladaptive behavioral responses to stress and illness. Interactions between the patient and the physician or the

health care system; understanding groups. Personality, Psychodynamic and behavioral factors, related past experience.

Psychosocial aspects of chronic and medical disorders. Death and dying. Coping with illness and disability: counseling; adaptation, coping and control; stress; role of carer; self-help groups; palliative care; complementary therapies; management of pain; health beliefs and behaviour.

Medical Sociology, Sociology in Medicine, Sociology of Medicine.

Concepts, principles and theories of Medical Sociology: Concepts of health, illness and disease. The basic principles of Medical Sociology. Theories of health seeking behaviour: The sick role theory. The health belief model. Health and illness behaviour.

Relationship between socio-economic factors and health. Demographic variables: race, education, age, sex, and social class, occupation, economic status, religion among others in relation to health.

Life style and Health: Diet, exercise, substance use, prostitution among others in relation to health. Measuring health and illness; changing patterns of health and illness; Anthropology, medical anthropology, culture; Basic principles of medical anthropology: concepts of culture, health, illness, disease and sickness; health seeking behaviour and utilization of health services; Theories of importance to medical anthropology; Explanatory models of illness; Application of anthropological concepts in health matters; Lay theories of illness; Health sectors; Sequence of transactions leading to care

The basic principles of ethics and professionalism Basic Ethical principles of healthcare ethics: Beneficence (non-maleficence); Justice; Utility; Fidelity; Truthfulness; Privacy; Confidentiality; Autonomy; Veracity; Universability, respect for persons,

beneficence; Confidentiality, informed consent, self discipline, among others.

Application of the principles in health professions.

Acts, Codes and values which govern the practice of medicine, nursing, dentistry, environmental and public health.

The role of ethics in the practice of medicine, nursing, dentistry, environmental and public health.

Acts, Codes and values which govern the practice of medicine, nursing, dentistry, environmental and public health: Medical practitioners' and Dentists' Act; Public Health Act; The Human Anatomy Act. The Helsinki Declaration; The Nuremberg Convention; The International Code of Medical Ethics; the Tokyo Declaration; The Malta Declaration; The Oath of Athens; The Geneva Convention; Medical health care professions codes; The code of Professional conduct and Discipline(R.O.K.); Guidelines for interns in Medicine and Dentistry(R.O.K.); The Code of ethics for the Nursing profession; Science and Technology Act. Dangerous Drugs Act.

The role of professional bodies: The World Medical Association, The British Medical Association, The American Medical Association, The American Psychological Association, Kenya Medical Association.

MSB 103: BODY FLUIDS, BLOOD AND IMMUNE SYSTEM (7UNITS)

Purpose

To equip the learners with knowledge and skills of the composition and functional organization of body fluids, blood and the immune systems and their laboratory investigations

Objectives

1. Describe body fluid composition, distribution, structure, function and metabolism of blood molecules
2. Describe anatomy and functional organization of the haemopoietic and lymphoreticular tissues.
3. Describe the basic concepts and mechanisms of immunity.
4. Discuss principles of immunogenetics and its application in medicine.
5. Describe anatomical, physiological, haematological and immunodiagnostic tests

Outcomes

1. Explain body fluid composition, distribution, structure, function and metabolism of blood molecules
2. Relate the anatomy and functional organization of the haemopoietic and lymphoreticular tissues.
3. Explain the basic concepts and mechanisms of immunity.
4. Discuss principles of immunogenetics and its application in medicine.
5. Discuss anatomical, physiological, haematological and immunodiagnostic tests in healthcare

Content:

Body fluids: plasma electrolytes, hydrogen ion and protein concentration in various fluid compartments. Total body water, volumes, regulation, estimation and fluid

composition. Structure and function of haemoglobin, myoglobin and plasma proteins (lipoproteins and glycoproteins). Heme, bilirubin and iron metabolism

Haematopoietic, blood and lymphoid tissues: development, histology, gross anatomy, functional organization and characteristics. Primary and secondary lymphoid organs
Haemopoiesis: Erythropoiesis, haemoglobin, metabolism of nutritional factors in production and function of erythrocytes (especially iron, vitamin B12 and folate); erythrocyte function; leucopoiesis, function of leucocytes; thrombopoiesis and function of platelets. Lymphoreticular system, spleen function and role. Haemostasis: Normal haemostasis, role of platelets and vessel endothelium, coagulation factors, fibrinolysis, natural inhibitors of coagulation

Basic concepts of Immunology: historical aspects in immunology; functional organization of the immune system: innate and acquired immunity; active, passive and adoptive immunity; determinants of immunity; elements of an immune response; immunogenicity and antigenicity, primary and secondary immune response, antigen binding sites, epitopes, major classes of antigens, cross-reactivity, immunologic adjuvants. Humoral immunity: B cell structure, antigenic receptor, cell activation: immunoglobulins structure, production, properties, and functions: Complement system proteins, activation pathways, biological activities and regulation. Cellular immunity: T-cell antigenic receptor, mechanism of activation and associated functions.

Major histocompatibility complex: components, inheritance patterns, characteristic features, roles in medicine; genetic control of an immune response.

Laboratory: Laboratory evaluation of blood coagulation. Blood groups and blood group serology especially ABO, Rhesus blood groups; significance of blood groups. Compatibility testing. Laboratory Tests: Red blood cells: Count, fragility and sickling tests. Haemoglobin estimation. White blood cell count. Platelet count. Blood: grouping, cross-matching and coagulation. Bleeding time. Humoral and cellular immunodiagnostic tests Humoral and cellular immunodiagnostic tests. Laboratory tests: Humoral and cellular immunodiagnostic tests

MSB 104: UPPER AND LOWER LIMB ANATOMY (3 UNITS)

Purpose

To equip the students with knowledge on the development, topographic and radiological organization of the upper and lower limbs as biomechanical organs.

Objectives

1. Describe the normal topographic and imaging anatomy of the upper and lower limbs.
2. Describe the normal development of the upper and lower limbs.
3. Describe the developmental defects of the upper and lower limbs

Outcomes

1. Demonstrate knowledge of the anatomy and development of the limbs and their defects
2. Discuss biomechanics of limb movements
3. Relate topographic and imaging anatomy to clinical anatomy

Content:

Upper limb: Bones, joints, muscles, nerves, blood supply, venous drainage, lymphatic drainage; Breast, nerve supply blood supply, venous drainage and lymphatic drainage. Scapular region and shoulder joint complex. Axilla; brachial plexus, arm, cubital fossa and forearm; The hand; palmar spaces, intrinsic muscles, arterial arches, finger movements. Lower Limbs: Bones, joints, muscles, nerves, blood supply, venous drainage, lymphatic drainage, Fascia and ligaments, thigh, popliteal fossa, leg, arches of the foot, Mechanism of walking.

Embryology: upper and lower limbs. Limb bud formation, dorsoventral and proximal-distal axis, digital rays, regulatory factors

Congenital Malformations of the upper and lower limbs: including amelia, phocomelia, polydactyly, syndactyly, coxa vara, coxa valga, club foot.

NSC 110: BASIC NURSING SKILLS (3 UNITS)**Purpose**

The unit is designed to enable student understand the principles of nursing and apply basic nursing skills in patient management.

Objectives

1. Explain the nursing principles and ethics of nursing practice
2. Describe the basic nursing procedures in patient management.
3. Describe the roles of other members of the health care team

Outcomes

1. Apply the nursing principles and ethics of nursing practice
2. Perform the basic nursing procedures with full consideration of a patient's comfort, confidentiality, and privacy.
3. Effectively collaborate with other members of the health care team

Content:

Principles and ethics of nursing: Definition; virtues and values(rights and wrongs; morality confidentiality; Ethical principles, honesty, integrity, empathy, beneficence, non-maleficence, respect, autonomy identification of the needs of the patient; determination of the ways and means of meeting the patient's needs; ways of meeting the needs of a client. Doctor and Nurse/client relationship.

Basic nursing skills: Weight and height; waste disposal, Specimen handling, Wound dressing (aseptic technique), blood pressure, Drug administration (oral, im, iv and), Administration of fluids recording and intake output balancing, Bed

making, Bed bath, Positioning, Cardio-pulmonary resuscitation, Monitoring and evaluation of patient's condition; promotion of patients' comfort. Collection, storage and transportation of specimens. Admission and discharge procedures. Care of equipment and supplies. Care of the dying and the dead.

Collaboration of Health care professionals including; Physicians, Medical officers, clinical officers, nurses, nutritionist, physiotherapists and other non professionals.

Appreciation of one's own limitations, Communication and co-operation with other members of the health team.

MSB 105: COBES I: INTRODUCTION TO COMMUNITY HEALTH (4 UNITS)

Purpose

To equip the learner with concepts of community entry and diagnosis.

Objectives

1. Describe the concepts of a Community, its organization and resources.
2. Describe the ethical principles, acts and values that govern research involving human subjects.
3. Describe the basic principles of Epidemiology.
4. Demonstrate understanding of the principles of Biostatistics.
5. Demonstrate understanding of the basic principles of Demography.
6. Describe the organization and structure of the Health Care System in Kenya.
7. Outline the concepts and principles of Primary Health Care (PHC) in Kenya.
8. Describe environmental health issues in a community

9. Outline factors affecting the nutritional status of a community.
10. Describe the different data collection tools and data collection methods.

Outcomes

1. Explain the concepts of a Community, its organization and resources.
2. Explain the concept of Community Directed Interventions (CDI) strategy.
3. Explain the ethical principles, acts and values that govern research involving human subjects.
4. Describe the basic principles of Epidemiology.
5. Demonstrate understanding of the principles of Biostatistics.
6. Demonstrate understanding of the basic principles of Demography.
7. Describe the organization and structure of the Health Care System in Kenya.
8. Outline the concepts and principles of Primary Health Care (PHC) in Kenya.
9. Describe environmental health issues in a community
10. Outline factors affecting the nutritional status of a community.
11. Develop data collection tools.
12. Describe the concept of M and E

Content:

Community: Introduction to COBES, relevance to health care practitioner, structure, organization
community: definition, organization, structure and resources.

Definition of CDI, Philosophy of CDI, Roles of health system in CDI strategy, Roles of the community, Roles of training institutions, Roles of partners. Components of CDI. Identify potential uses of CDI in a community.

Ethical Principles and values that govern Research Protocol: The Nuremberg Code; autonomy or respect for persons, beneficence, and justice. The Declaration of Helsinki: Clearance, informed consent, confidentiality, acknowledgement, integrity, respect of respondents, privacy, honesty, declaration of sources of finance among others; Application of the principles in research; The Role of Institutional Research and Ethics Committees; Ethics governing publication.

Epidemiology: Community organization, structure and resources. Concepts of health and disease. Disease: Causation; natural history; measurement of levels of prevention. Descriptive epidemiology. Development and pre-testing, data collection tools. Epidemiology of HIV/AIDS.

Biostatistics: Principles; Sampling methods; Data analysis and presentation; measurement of central tendency and dispersion and Statistical Methods.

Demography: Determinants and consequences of population growth. Sources of data. Demographic variables. Population pyramids. Vital events. Vital statistics. Uses of demographic data.

Health care delivery system. Levels of Health Care; Providers/users of health care; Roles of Health Care providers.

Primary Health Care: Origin; elements; implementation; achievements; constraints.

Priority Health problems.

Environmental health issues: Refuse and waste disposal; water, housing and health; food hygiene; environmental pollution.

Nutrition: Factors including food availability, household food security, Maternal and child care. Health, environmental and socio-economic factors. Education and culture.

Nutritional Assessment: of individuals; of a community. Dietary assessment.

Anthropometric assessment.

Data collection tools: qualitative and quantitative tools including questionnaire and interview guides.

M & E Tools and processes: Tools, processes, practice, inputs, concepts & outcomes

MSB 106: ENDOCRINE AND INTEGUMENTARY SYSTEMS (5 UNITS)

Purpose

To equip the student with knowledge on the topographic and histologic organization of the endocrine and integumentary systems and their functions

Objectives

1. Describe the anatomy, development and structure of the cells, tissues and organs of the endocrine system.
2. Describe the organization, functions and control of the endocrine system.
3. Describe the properties of hormones and neurotransmitters.
4. Outline the principles of hormone assay in body fluids.
5. Describe the development of the Integumentary system
6. Describe the structure and functions of the skin and its appendages
7. Describe the biosynthesis and functions of scleroproteins, lipids and pigments.

Outcomes

1. Relate the anatomy, organization, functions and control of the endocrine system.
2. Discuss the properties of hormones and neurotransmitters.
3. Relate the anatomy, organization, and functions skin and its appendages/integumentary system.
4. Discuss the principles of hormone assay in body fluids.
5. Explain the biosynthesis and functions of scleroproteins, lipids and pigments.

Content:

Anatomy, development and malformations of the endocrine glands including: hypothalamus, pituitary, thyroid, parathyroid, adrenal, endocrine pancreas, male and female reproductive glands, diffuse neuro-endocrine systems.

Endocrine functions of the hypothalamus, anterior and posterior pituitary gland, thyroid, C-cells, parathyroids, adrenal cortex, adrenal medulla, pancreas, ovaries, corpus luteum, testicles, atrial myocytes, placenta, liver, kidneys, alimentary tract.

Hormones: synthesis, chemical nature, storage, release, transport, receptors, mode of action physiological effects, inactivation, degradation, and excretion of peptide, steroid, amino acid derived hormones and prostaglandins. Integrated actions of hormones: regulation of blood glucose, calcium homeostasis, body water and electrolyte balance
Neurotransmitters: Classification, synthesis, storage, transport and metabolism of the types of neurotransmitters and other neurochemicals.

Laboratory Tests: Bioassay; Immunoassay; Radio-immunoassay and Radio-receptor assay methods.

Development: Epidermis, Dermis, sweat and sebaceous glands, hair, nails and breast

Structures of the epidermis, dermis, sweat and sebaceous glands; Blood supply, innervation and lymphatic drainage of the skin; Functions including, protection, thermoregulation, storage, osmoregulation, excretion and secretion, sensory. Skin appendages: Functions of the mammary glands; lactogenesis, lactopoiesis, galactokinesis; and their regulation; nails; hairs.

Biosynthesis and functions of scleroproteins, pigments and Vitamin D

IRD 100: COMMUNICATION SKILLS I (3 UNITS)

Study skills: getting to know the academic environment; planning work, organising and budgeting time and resources, storing and retrieving information, thinking critically, solving problems, coping with task-oriented learning, dealing with facts and opinions, drawing conclusions.

Library skills: understanding book classification system of Moi University library, collecting and summarizing information, note-taking and storage of information.

Reading skills: skimming, seaming, inference and prediction, intensive and critical reading, discipline-specific reading skills. Interpretation of nonlinear text: constructing and using statistical tables, indices, maps, graphs.

Listening skills: active listening, understanding lectures, predicting lecture structure, understanding gist, recognizing change of topic, following tutorial discussions, understanding instructions.

Examination skills: understanding examination rubrics, preparing and writing examinations.

IRD 102: COMMUNICATION SKILLS II (3 UNITS)

Writing skills: thinking critically/selectively and writing clearly and precisely reports and academic essays; selecting relevant details, organising the relevant details logically, writing reports and essays in appropriate academic register; expanding notes into full texts; writing up and expanding information from notes, tables, figures, graphs and technical diagrams; formal and informal correspondence; avoiding ambiguities, fallacies, irrationalities and providing supporting evidence to

the issues raised. Analyzing tasks, planning strategies for problem solving, drafting and editing various types descriptive, narrative, argumentative, expository, quoting, citing and paraphrasing/designing non-linear tests, indicating reference, foot-noting, writing bibliographies and being sensitive to observation of language appropriacy.

Speaking skills: effective speaking, public address, the art of persuasion, conducting interviews, conducting meetings and writing minutes, group discussion, non-verbal communication cues, presenting papers/reports in tutorials, seminars, seeking clarification and explanation, giving and justifying opinions, agreeing and disagreeing.

Research skills: Understanding research, types of research, identifying potential research areas, methods of research, stages of research.

IRD 103: DEVELOPMENT CONCEPTS AND APPLICATIONS (3 UNITS)

The basic concepts of development: Economic conception, political conception, social conception, cultural and environmental conceptions. Objectives of development. **Theories of development:** classical, neo-classical and current theories.

Relationship between socio-economic development, modernization and economic growth, analysis of contemporary development problems in Africa. **Philosophical and organizational strategies for development:** agents of development; public accountability and development.

IRD 104: QUANTITATIVE SKILLS (3 UNITS)

Record keeping: Ledger, income statement, balance sheet, assets and liabilities, analysis of simple financial statements. Interest, discounts and commissions: Simple and compound interests, calculations of discounts and commissions.

Budgeting: personal and simple business budgets, financial projections.

Simple investment analysis: cost of capital, working capital expenditure decision, return on capital invested.

Public accounts: revenue and expenditure, balance of payment, balance of trade, Gross National Product (GNP), Gross Domestic Production (GDP).

Index numbers: simple determination and their uses; the concept of inflation.

Taxation: purpose, principal types and calculation of personnel income taxes, Pay-As-You-Earn (PAYE); Value Added Tax (VAT), Stock Exchange: Stocks, shares, bonds, stock market ratios, share valuation.

Demography: Birth and death rates, growth rate, dependency ratio, population trend and projections.

Year Two**MSB 201: BASICS OF MICROBIOLOGY, PHARMACOLOGY AND IMMUNOLOGY (5 UNITS)****Course Purpose**

To equip the learner with knowledge on microbes of medical importance, the immune response, and the basic principles of pharmacology.

Course Objectives

1. Characterize microbes and parasites of medical importance.

2. Discuss the principles of public health microbiology and parasitology.
3. Describe immune response to microbes and parasites.
4. Describe the general concepts of pharmacology
5. Describe the general principles of pharmacokinetics and pharmacodynamics.
6. Describe the general properties of autacoids and their role in inflammation.
7. Demonstrate knowledge of neurotransmitter and endocrine pharmacology
8. Describe the pharmacology of antimicrobial agents.
9. Describe the principles of laboratory diagnostic procedures.

Learning Outcomes

1. Identify microbes and parasites of medical importance.
2. Apply the principles of public health microbiology and parasitology.
3. Explain the immune response mechanism to microbes and parasites.
4. Demonstrate knowledge of the general principles of pharmacodynamic and pharmacokinetic processes.
5. Explain the mechanisms of action of autacoids, neurotransmitters, endocrine drugs, antimicrobial agents, and their role in disease states.
6. Perform and interpret simple laboratory tests

Content:

Structure, composition, physiology and regulation of bacteria. Principles of bacterial genetics. Pathogenic bacteria: gram positive, gram negative, acid fast bacilli, Enterobacteriaceae, anaerobes, spirochaetes, rickettsiae, Chlamydia, mycoplasma. Viruses: properties of viral families, Replication and cultivation of viruses; Host

response to viral infections, genetics, oncogenic viruses, Pathogenic viruses, DNA viruses, RNA viruses, latent and persistent infections. Emerging viral infections. Classification, identification, and nomenclature of fungi, fungal reproduction, physiology and cultivation of fungi. Classification, identification, and nomenclature of parasites and arthropods of medical importance: life cycles, preventive and control measures, of- protozoa, nematoda, trematoda, cestoda. Emerging parasitic diseases in immunosuppressive states. Medical entomology: Modes of pathogen transmission, type's control, vectoral capacity, ecology of vectors of medical importance; venomous bites, stings.

Public health bacteriology: Epidemiology and ecology. Bacteriology of food, water and sewage; Sterilization, disinfection and use of antimicrobial agents: Personal hygienic practices and handling of equipment and clinical samples; Nosocomial infections, Notifiable diseases.

Innate and adaptive immune response to infections and infestations. Immune effector mechanisms. Immune evasion mechanisms. Principles of vaccination, Vaccine production, schedules, administration and associated complications

General concepts: Definitions, History of Pharmacology, The Nature of Drugs Receptor Nomenclature, Drug-Body Interactions, Receptors and Inert Binding Sites, Lipid Diffusion, Special Carriers, Endocytosis and Exocytosis, Fick's Law of Diffusion, Ionization of Weak Acids and Weak Bases; the Henderson-Hasselbalch Equation.

Mechanisms of drug absorption, distribution, metabolism and excretion; routes of administration; bioavailability and dosage forms; drug distribution and biotransformation; sites of metabolism and activation/inactivation; excretion and the entero-hepatic circulation. Mechanisms of drug action; structure-activity relationships; receptors; Factors affecting the absorption, distribution, metabolism and excretion of drugs; regulatory issues. Factors altering drug effects: disease, physiological conditions- age, pregnancy, gender, obesity, compliance, dependence. Drug interactions and pharmacogenetics; side effects, over-dosage, toxicology. Drug metabolism in liver, intestine, kidney, lung, brain.

General properties of autacoids: Prostaglandins; prostaglandin inhibition; leukotrienes and thromboxanes. Biogenic amines: adrenergic; cholinergic; dopaminergic; serotonergic; histaminergic; GABAergic. Peptides and analogs such as endorphins, substance P, erythropoietin. Smooth muscle/endothelial autacoids: nitric acid, platelet-activating factor, endothelin, atrial natriuretic peptide. Cytokines: interleukins, tumor necrosis factor.

Adrenergics: Pharmacological actions of noradrenaline; comparison with adrenaline; α - and β - adrenoreceptor agonists and antagonists; adrenergic neurone blocking drugs; drugs that interfere with synthesis, storage and metabolism of noradrenaline. Acetylcholine: pharmacological actions; drugs affecting cholinergic transmission. Anticholinesterases. Actions and uses of selective agonists and antagonists for muscarinic and nicotinic receptors. Non-adrenergic, non cholinergic transmission. Nitric oxide, adenosine and other NANC transmitters. Central neurotransmission.

Location and function of neurones that release dopamine, GABA, glutamine, 5-HT and acetylcholine.

Chemotherapy of microbial diseases: Antibiotics, modes of action and resistance including penicillins, cephalosporins, carbapenems, monobactams, β -lactamase inhibitors, tetracyclines, aminoglycosides, erythromycin, 4-quinolones, vancomycin and fusidic acid and anti-tuberculosis agents. Antimicrobial synergy, antagonism and resistance. Viral infections and their treatment. Fungal infections including dermatophytes and *Candida albicans* and treatment with amphotericin and azole agents. Treatment of protozoal infections. Helminths and arthropods, including schistosomiasis, filariasis. Tropical diseases: malaria, tuberculosis, leprosy, trypanosomiasis, leishmaniasis, and others.

Principles of diagnostic procedures in bacteriology, parasitology, mycology and virology. Laboratory diagnostic techniques: collection and handling of clinical specimens; microscopy isolation and identification of pathogenic organisms, antibiotic sensitivity testing, interpretation, minimum inhibitory concentration, minimum bactericidal concentration. Quality control. Viral cultivation, assay, laboratory safety; Culture of microorganisms; Immune diagnosis of microbial and parasitic infections.

MSB 202: NEUROLOCOMOTOR SYSTEM (7 UNITS)

Course Purpose

To equip the learners with knowledge on the anatomy and functions of the neurolocomotor system.

Objectives

1. Describe the development of the nervous system, head and neck region
2. Describe the anatomy of the nervous system and various organs of the head and neck region
3. Describe and explain the structure and function of somatic, visceral, motor and special sensory systems.
4. Describe the structure and function of the somatic and visceral motor systems.
5. Describe the anatomy, physiology and biochemistry of the musculo-skeletal system.
6. Describe the anatomical, physiological and biochemical basis of higher functions of the nervous systems.

Outcomes

1. Relate the anatomy, functions and control of the nervous system and various organs of the head and neck region.
2. Discuss the somatic, visceral, motor and special sensory systems.
3. Relate the anatomy, biochemistry, organization, and functions of the musculo-skeletal system
4. Discuss the anatomical, physiological and biochemical basis of higher functions of the nervous systems.

Content:

Embryological development: Formation and differentiation of the neural tube; spinal cord, brain stem, diencephalon and telencephalon; development of the visceral and neuro-cranium; congenital malformations.

Nervous system and various organs of the head and neck region: Anatomy of the scalp and face, cranial cavity, orbit. Morphology and internal structure of the spinal cord, brain stem and cerebellum; ventricular system of the brain; cerebrospinal fluid: formation, composition, circulation and regulation: components and connections of the diencephalon; topography and internal structures of the cerebral cortex and functional areas: Blood supply of the brain; Blood brain barrier; cranial and peripheral nerves; neck, fascial layer, triangles and its contents, root, back and prevertebral muscles; nose, and the ear; oral cavity; pharynx and larynx.

Somatic, visceral, motor and special sensory systems: Structure and functions of organs of the special senses including the eye, ear, tongue and nose; functional organization of the somato-visceral sensory systems including neural pathways; Structures, organization and functioning of the components of the spinal reflexes. Central motor mechanisms at the level of the spinal cord, brain stem, cerebellum and cerebral cortex. Biochemistry of visual pigments and neurotransmitters

Musculo-skeletal system: Development of the musculo-skeletal system; innervation of the bones and muscles; Biochemistry of contractile proteins, mechanisms of muscle contraction. Structure of presynaptic and postsynaptic membranes. Synthesis and function of acetylcholine transferase and acetylcholinesterase. Synthesis of acetylcholine. The chemical nature of acetylcholinesterase inhibitors. Structure, function and metabolism of GABA, serotonin and melatonin. Structure, function and metabolism of catecholamines. Glutamate and aspartate neurotransmitters. The molecular arrangement of neuromuscular junction.

Higher brain functions: Hierarchical organization and their regulation; control of visceral functions Control of consciousness and sleep; Reticular formation; limbic system emotions and behaviours; Hypothalamic functions; Higher neural functions including, language, speech, fine movements, learning and memory, intelligence, motivation and behaviour.

MSP 203: CARDIOVASCULAR AND RESPIRATORY SYSTEMS (5 UNITS)

Purpose

To equip the learner with knowledge on the anatomy and functions of the cardiovascular and respiratory systems

Objectives

1. Describe the embryology of the chest wall and the contents of chest cavity.
2. Describe the anatomy of the cardiovascular and respiratory systems.
3. Describe the functions of the cardiovascular and respiratory systems.

Outcomes

1. Relate the anatomy, organization, and functions of the cardiovascular and respiratory systems
2. Discuss the anatomical, physiological and biochemical basis of the functions of the cardiovascular and respiratory systems.
3. Describe the investigations of the cardiovascular and respiratory functions.

Content:

Development of chest wall, heart, lungs vascular systems and their malformations.

Anatomy of chest wall, intercostal spaces, pleural space, and mediastinum. Thoracic apertures Lungs: features, relations, lobes, broncho-pulmonary segments and blood vessels. Structure of the epithelial lining of the respiratory passages. Structure of the nasal cavity, larynx, trachea, bronchi, respiratory acini. Alveolar cells, blood-air barrier, surfactant. Blood supply of the lung, malformations. Pericardium; layers, relations, nerve supply. Heart: surface landmarks, external features, interior of the chambers, conducting system and coronary blood vessels. Structure of the heart. Endocardium, myocardium, epicardium, fibrous skeleton, heart conducting system. Malformations. Anatomy of Circulatory system: Structure of arteries, veins, microcirculatory vessels, arteriolo-venular anastomoses, lymphatic vessels.

Functional organization of the heart and the blood vessels. Physics of flow in tubes and haemodynamics. Electrical activity of the heart and the electrocardiogram. Blood volume, cardiac output and blood pressure. Integrated control mechanisms. Response to exercise and training. Hemorrhage and shock. Fetal and neonatal circulation; Circulation through special regions. Respiratory system: Functional organization. Gas laws and physical properties of gases; Mechanics of respiration, ventilation, lung volumes and capacities. Lung morphometry; Alveolar function; Air-blood barrier. Pulmonary circulation and ventilation perfusion ratios. Integrated control mechanisms and acid base balance. None one-atmosphere respiratory function. Non respiratory functions of the lungs. Cardiorespiratory adaptation: during muscular exercise, following birth, during pregnancy. Cardio-respiratory functions during foetal life.

Respiration in unusual environments. Artificial ventilation. Effects of hormones on cardiovascular system.

Investigative procedures: Spirometry; ventilation and gas diffusion studies; blood gas analysis, cardiac catheterization and blood pressure; cardiac enzymes.

MSB 204: COBES II: COMMUNITY DIAGNOSIS (7 UNITS)

Course Purpose

To equip the student with skills to carry out community entry and diagnosis

Course Objectives

1. Explain the concepts of a Community, its organization and resources.
2. Utilize the basic concepts of Biostatistics, Demography and Epidemiology in healthcare and medical education.
3. Explain the organization and structure of the Health Care System in Kenya and the concept of PHC
4. Relate environmental health issues to disease and healthcare
5. Explain the role of nutrition and nutritional interventions in healthcare and disease.
6. Develop data collection tools.

Learning Outcomes

1. Conduct Community entry.
2. Conduct a community diagnosis.

3. Participate in health centre and outreach activities.
4. Conduct a nutritional assessment in a specified community.

Content:

Community Entry: Points of entry, community entry techniques including FGDs and in-depth interviews.

Community diagnosis: Definition. Development of tools. Data collection (primary and secondary), Analysis, Applications of statistical methods in health and disease. Report writing, Feedback and Presentation.

Participation in health centre and outreach activities: Laboratory tests done at the health centre; basic clinical procedures; essential drug packages available at the health centre; health talks at OPS and outreach services; Vaccines; family planning methods and practice. Health Education, Health promotions, awareness sensitization. School health talks, outreach activities.

Nutrition: Nutritional Assessment of individuals; of a community. Dietary assessment. Anthropometric assessment. Growth monitoring; prevalence of various forms of malnutrition; prevention and interventions

MSB 205: DIGESTIVE SYSTEM, NUTRIENTS AND METABOLISM (6 UNITS)**Purpose**

To equip the learner with knowledge on the anatomy and functions of the gastrointestinal system and its associated structures.

Objectives

1. Describe the embryological development of the digestive system.
2. Describe anatomy of the alimentary tract and its functionally associated structures and of the abdominal cavity and its contents.
3. Describe the major types and sources of nutrients and their requirements for optimal maintenance of health.
4. Describe the organization and function of the digestive system.
5. Describe the biochemical structures, metabolism and functions of various nutrients.
6. Describe organization and function of the mucosal immune system.
7. Describe the investigative procedures and basic findings in the digestive system.

Outcomes

1. Relate the anatomy, organization, functions and control of the digestive system and its functionally associated structures.
2. Discuss the major types and sources of nutrients and their requirements for optimal maintenance of health.
3. Discuss nutrition and regional metabolism
4. Discuss the functions, metabolism and storage of macromolecules
5. Discuss the laboratory and imaging techniques used in investigating the digestive system.

Content:

Embryological development of alimentary tract, hepatobiliary system, pancreas, salivary glands and teeth.

Structure of the oral cavity, lips, teeth, tongue, salivary glands. Structure of the GIT: esophagus, stomach, small and large intestine. Secretory and absorptive cells. Blood supply and innervation. Structure of the liver, pancreas and gall bladder. Structural units of the liver. Classic, portal lobules, acinus, Blood supply. Abdomen: Surface landmarks, peritoneum; folds, mesenteries, cavities and recesses. Abdominal organs, features, relations, blood supply, nerves and lymphatics. Anterior abdominal wall, Posterior abdominal wall: muscles, aorta, inferior vena cava, thoracic duct, lumbar plexus and the sympathetic chains. Diaphragm; attachments, openings, nerves and vessels.

Nutrition: Food sources, nutrient content, local sources of: carbohydrates, proteins, lipids, vitamins and minerals. Functions of essential nutrients. Nutritional requirements in different stages of development, in pregnancy and lactation; Infant and Childhood Nutrition, Adolescents Nutrition, Nutrition of Older People.

Gastrointestinal system: Functional organization and design. Humoral and neuromyogenic control of regional gut functions. Gut motility and secretion. Gastrointestinal intrinsic and extrinsic glands.

Nutrition and regional metabolism. Appetite and satiety: regulation of food and water intake; Digestion, absorption, and assimilation. Transport of nutrients in blood and

their storage in tissues. Functions of the liver: gluconeogenesis, phosphogluconate pathway. Glycogen synthesis and glycogenolysis. Caloric and nitrogen balance. Biochemical structures and functions. Energetics of carbohydrates, proteins and lipids. The role of hormones in metabolism. Generation, expenditure and storage of nutrients at the whole body level. Standard free energy change of a chemical reaction. Exogenic and endogenic reactions. Adenosine Triphosphate (ATP), Nicotinamide Adenine Diphosphate (NADPH) and other high energy compounds. Carbohydrate metabolism; glycolysis, tricarboxylic acid cycle, anaerobic reactions and glycosylate cycle, electron transport chain, oxidative phosphorylation, mitochondrial shuttle system; Oxidation, reduction, hydrolytic, conjugation and methylation reactions during detoxifications.

Immunology: Mucosal associated lymphoid tissue (MALT) of the digestive, respiratory, urinary and reproductive systems: structure, organization, components, functions, production and role of secretory immunoglobulins. Innate effector mechanisms along mucosal surfaces. Mechanisms and role of oral tolerance

Investigative Procedures: Plain radiography, contrast studies. Ultrasonography, computed tomography. Radio-isotope imaging. Gastric acid secretion tests. Biopsies. Liver function tests. Basal metabolic rate (BMR).

MSB 206: REPRODUCTIVE AND URINARY SYSTEMS (5 UNITS)

Course Purpose

To equip the learner with knowledge on the anatomy and functions of the reproductive and

urinary systems

Objectives

1. Describe the embryology of the pelvic cavity, perineum, urinary and reproductive systems.
2. Describe the anatomy of the pelvis and its contents
3. Describe the anatomy of the reproductive and urinary systems
4. Describe the functions and physiological changes of the reproductive systems
5. Describe the functions of the urinary systems

Outcomes

1. Relate the anatomy, organization, functions and regulation of the genitor-urinary system.
2. Relate the anatomy, organization, functions and regulation of the reproductive system.
3. Discuss the physiological changes of the reproductive system through the life cycle.
4. Discuss the laboratory and imaging techniques used in investigating the reproductive and genitor-urinary systems.

Content:

Development of pelvic cavity, perineum, urinary and reproductive systems.

Pelvis: Surface landmarks, Walls and dimensions, male and female bony pelvis., peritoneum; folds, mesenteries, cavities and recesses. Perineum, urogenital triangle, external genitalia, anal canal and ischiorectal fossa, features, relations, blood supply, nerves and lymphatics. Pelvic diaphragm, attachments, relations, nerves and vessels. Pelvic organs: Urinary bladder; surfaces, relations, blood, nerve and lymphatic supply. Rectum: relations, blood, nerve and lymphatics supply. Uterus, ovaries and vagina; features, position, relations, vessels and nerves. Prostate; lobes, capsule, relations, vessels and nerves. Male and female urethra; parts and features. Seminal vesicles; position and features. Sacral plexus and the pelvic vessels.

Reproductive system: Anatomy of the testis: Seminiferous tubules, interstitial cells of Leydig. Genital ducts: ductules efferentes, ductus epididymis, ductus deferens, ejaculatory ducts. Accessory glands: prostate, seminal vesicles, bulbourethral glands, their secretion. Penis. Anatomy of the ovary: follicles, corpus luteum. Fallopian tubes, their structural organization and functions. Uterus: structure of the endometrium in various stages of menstrual cycle, myometrium and perimetrium. Vagina and External genitalia. Urinary system: Anatomy of the kidney: nephron, medulla, juxtaglomerular apparatus, blood supply. Ureters, urinary bladder, urethra, their morphological and functional characteristics.

Function and physiological changes of the reproductive System; Sexual differentiation, physical, biochemical changes associated with puberty, menstrual and spermatogenic cycles, fertility, physiological infertility, contraception, pregnancy, parturition. Biochemistry of gonadotrophins and gonadal hormones, amino acid

metabolism, carbon skeletons and urea synthesis; Special derivatives of amino acids; Special metabolism; Purine and Pyrimidine metabolism; Haem metabolism. Gametogenesis and semen formation. Testicular function and its regulation. Blood testis barrier. Epididymal function and vas deferens Physiology of glands of male reproduction system – prostate, seminal vesicles, bulbourethral glands. Penile tumescence and detumescence, potency. Ovarian functions, reproductive cycles, ovulation, coitus and fertilization. Uterine and fallopian tubular functions and cyclical changes. Implantation, factors promoting the foetal allograft, Foetoplacental unit, maternal adaptation to pregnancy, labour and parturition, Lactogenesis, lactation, breast feeding and neuro-hormonal control. Milk composition and functions. Physiological basis of cellular and organ aging. Foetal homeostasis, foetal growth and development. Normal human sexual function and sexuality.

Functional organization of the urinary system; kidney, cortex and medulla; nephron. Functions: Osmoregulation, Acid-base and electrolyte balance and the kidney. Concept of glomerular filtration rate and renal clearance. Formation of urea, uric acid, creatine and creatinine; Hormonal functions of the kidney. Integrated regulation of blood osmolality, volume and pressure. Autoregulatory control mechanisms; Functional organization of the urinary bladder and micturition reflex. The immature kidney; Biosynthesis, function and metabolism of prostaglandins, thromboxanes and leukotrienes

Tests for kidney functional capacity, Hormonal levels and hormone stimulation tests.

**MSC 200: HUMAN COMMUNICATION SKILLS AND HISTORY
TAKING (3 UNITS)**

Purpose

To equip the learners with the knowledge, skills, and attitudes necessary for effective and sensitive communication skills with patients, families, caregivers professional colleagues and other stakeholders.

Objectives

1. Describe the theories and principles of human communication.
2. Discuss the role of socio-cultural, demographic, and emotional factors in a doctor-patient interaction.
3. Describe the history taking process.

Outcomes

1. Apply the principles of human communication in the clinical process.
2. Cope when communicating with patients in difficult or delicate circumstances.
3. Demonstrate effective communication with relevant stakeholders

Content:

Theories and principles of human communication: verbal and non-verbal communication; Language. Interviewing; definition, environment; behavior, techniques. Interview; recording reproduction.

Use of appropriate communication skills taking into consideration factors including; the patients' culture, age, gender, and emotional status during interviews.

History taking and interviewing skills: Interviewing issues and techniques: conducive atmosphere, interview techniques, listening, pitfalls in questioning and listening, difficult questions and confidentiality, difficult relationships; Structure of the medical interview: source and reliability, identifying data, chief complaint, present illness, past medical history, personal and social history, family history, review of symptoms.

Challenging patients: angry patients; reticent patients; talkative patients; those with physical impairments which hinder communication: deafness, speech impediments.

Communicating about sensitive subjects: what constitutes a sensitive subject; factors that can make us reluctant to impart bad news; empathy with the patient; sexual history- importance of a sexual history both in physical and psychological illness, sexual history from e.g. the opposite sex, adolescents, elderly, physically and mentally challenged, people from different cultures. Ethics in interviewing.

Communication with professional colleagues and other stakeholders.

Year Three

MSP 300: GENERAL PATHOLOGY (6 UNITS)

Purpose

To equip the learners with knowledge on the structural changes affecting, tissues, organs and systems of the human body which result from all forms of injury and disease states and the resulting pathological changes.

Objectives

1. Explain the basic concepts and principles of laboratory medicine
2. Describe cell injury, abnormal accumulations, pigmentation and inflammation
3. Describe pathology of common infectious and communicable diseases
4. Describe the immune mediated disorders of the body
5. Describe alteration in growth control and neoplasia.
6. Describe the pathology of common genetic disorders.
7. Describe the clinical pharmacology of anti-inflammatory, antineoplastic and immunopharmacological agents.
8. Describe the use of plasma proteins and enzymes in diagnosis and the role of tumor markers in mutagenesis and carcinogenesis

Outcomes

1. Apply the concepts and principles of good laboratory medicine and practice.
2. Identify cell injury, abnormal accumulations, pigmentation and inflammation
3. Explain the pathogenesis, the pathological effects and the clinico-pathological correlation of common infectious and communicable diseases.
4. Demonstrate knowledge of immunological disorders and their resultant effects on the body
5. Explain alteration in growth control and neoplasia in different tissues and organs of the body.

6. Demonstrate knowledge of the pathology of common genetic disorders.
7. Explain the mechanisms of action, choice of drugs and roles of anti-inflammatory, antineoplastic and immunopharmacological agents in disease states.
8. Explain the use of plasma proteins and enzymes in diagnosis and the role of tumor markers in mutagenesis and carcinogenesis

Content

Laboratory Medicine: Principles, concepts, techniques and procedures of laboratory medicine of in: parasitology, bacteriology, mycology, virology, clinical chemistry; immunology; haematology; histopathology; organization of laboratory services in a hospital, and good laboratory practices

Cell injury: Cell death, necrosis, apoptosis. Sublethal cell injury, degenerations, hyperplasia, metaplasia, accumulations, amyloidosis, melanin and uric acid deposition; calcification, hyalinisation, jaundice. Inflammation: acute and chronic inflammation, special types of inflammation, aetiology and morphology of inflammation, mediators of inflammation, healing and repair

Infectious and communicable diseases: aetiology, pathology; control and prevention including bacterial, viral, fungal, rickettsial, protozoal, and parasitic; effect on nutritional status; nosocomial infections; notifiable diseases.

Immune Mediated Disorders: Classification and immunological features of: allergic and hypersensitivity reactions; autoimmune diseases; immunodeficiency

disorders. Immunotherapy principles and applications. Laboratory tests for immunological disorders

Alteration in Growth Control: Nomenclature of tumors: benign and malignant, characteristics, modes of spread, staging and grading; carcinogenesis, molecular basis of carcinogenesis.

Genetic Disorders: genetic origin. Chromosomal abnormalities. Genetic causes of foetal wastage and neonatal mortality. Ethical issues in genetic counseling. Gene therapy.

Anti-inflammatory drugs: non-steroidal anti-inflammatory drugs (NSAID); glucocorticoids; immuno-modulatory drugs including cytotoxic and immunosuppressive agents; botulinum toxin ;Cancer chemotherapy: Introduction and principle ,the mechanisms of action, uses and limitations of the major groups of chemotherapeutic agents including alkylating and cross linking agents, antimetabolites, topoisomerase inhibitors, spindle inhibitors and biologicals. New and future therapies. Monoclonal antibodies and conjugates, pro-drugs, vaccines, gene and RNA targeting, aptomers, gene therapy, DNA repair and resistance inhibition. Novel delivery systems. Inhibition of angiogenesis and the metastatic cascade. Radiation and chemotherapy sensitisers and protectors. Special groups including Neonates, Elderly, Pregnant mothers, Patients with concurrent disease conditions.

Clinical enzymology, plasma lipases, amylases transaminases ALP, ACP Lactate dehydrogenase (LDH), Creatinine Kinase (CK). Electrophoresis patterns and tumor markers.

MSP 301: HAEMOPOIETIC SYSTEM DISORDERS (3 UNITS)

Purpose

To equip the student with knowledge of haemopoietic and lymphoreticular disorders and their management including blood transfusion.

Objectives

1. Describe blood disorders.
2. Describe the pharmacology of drugs used in management of haemopoietic disorders
3. Describe the blood transfusion process.
4. Discuss the laboratory techniques used in investigating haemopoietic system disorders.

Outcomes

1. Discuss the features of common haemopoietic disorders, their diagnosis and management.
2. Explain drug management of haemopoietic disorders
3. Explain the processes involved in blood transfusion.
4. Participate in the laboratory investigation of haemopoietic system disorders.

Content:

Disorders of the red blood cell: Anaemias: Disorders of iron metabolism, Megaloblastic anaemia, Haemoglobinopathies (especially sickle cell), thalasseмии, membranopathies, enzymopathies and extracorporeal causes (including haemolytic anaemias, parasitic, mechanical fragmentation); Anaemia of chronic disease; Bone marrow failure: aplastic anaemia, pure red cell aplasia; Hypersplenism; Polycythaemias; Haematology of HIV/AIDS Leukocyte disorders: Leucopenia: Hereditary and acquired causes; reactive leukocytosis, leukemoid reaction, Disorders of haemostasis and coagulation: Hereditary disorders including Haemophilias; Acquired disorders of haemostasis including idiopathic thrombocytopenic purpura, liver disease, disseminated intravascular coagulation; Thrombotic disorders; Anticoagulant and thrombolytic agents and their control. Neoplastic disorders: Acute leukaemias, Chronic leukaemia, myelofibrosis, polycythaemia vera and essential thrombocythaemia; Lymphoproliferative disorders. Mechanisms of tumour immunosurveillance, control and immune evasion, tumour markers and their use in diagnosis. Transplantation immunology: Allograft rejection; histocompatibility antigens; prolongation of allograft survival; bone marrow transplantation; graft vs. host reactions; Molecular basis of various hematological conditions, disorders of heme metabolism; haem, bilirubin metabolism, porphyrias.

Pharmacology: Haematinics; anticoagulants; fibrinolytic agents; antiplatelet drugs. haemostatic agents, Anti-tumour chemotherapy and use of radiation in tumour management.

Blood transfusion: Collection, screening, clinical indications and use of blood components/products. Transfusion and its complications, investigations and management of transfusion reactions.

Investigative Procedures: Histopathological and haematological, techniques. Laboratory evaluation of anaemia. Principles of investigation of a haemostatic disorder. Autopsy findings in haematopoietic disorders. .Immunodiagnosis: Immunological tests

MSP 302: CARDIOVASCULAR AND RESPIRATORY DISORDERS (4 UNITS)

Purpose

To equip the learners with knowledge on the aetiology and pathophysiology of cardiovascular and respiratory disorders, their investigation and the commonly prescribed drugs.

Course Objectives

1. Describe the pathology of the mediastinal, cardiovascular and respiratory disorders.
2. Describe the role of lipids and lipoproteins in cardiovascular diseases.
3. Describe pharmacology of drugs used to treat disorders of cardiovascular and respiratory systems.
4. Identify the methods and techniques used in investigating mediastinal, cardiovascular, and respiratory disorders.

Learning Outcomes

1. Explain the pathology of the mediastinal, cardiovascular and respiratory disorders.
2. Explain the role of lipids and lipoproteins in cardiovascular diseases.
3. Explain the mechanism of action and choice of drugs for treatment of cardiovascular and respiratory disorders.
4. Use appropriate methods and techniques to investigate mediastinal, cardiovascular, and respiratory disorders.

Content:

Pathology of Cardiovascular and Respiratory Disorders: Genetic/congenital, inflammatory, infectious and immunologic, toxic disorders, disorders involving metabolic, physiologic or regulatory processes vascular, traumatic, degenerative disorders, neoplasms of the cardiovascular and respiratory systems. Cardiovascular disorders: Acute rheumatic fever and rheumatic heart disease; Valvular heart disease; Heart failure and cardiogenic shock; Arterial hypertension; hypotension; Pulmonary hypertension; Coronary artery disease; Myocardial diseases; Infective endocarditis; Dysrhythmias; Peripheral artery disease; Pericardial disease; acute and constrictive pericarditis, pleural effusion and tamponade; Venous thromboembolism; Congenital heart disease, cardiomyopathies. Respiratory diseases: Pulmonary edema, Rhinitis, laryngitis, epiglottitis, bronchitis, bronchiolitis, pneumonitis, interstitial lung disease, pleuritis, pneumonia, empyema, tuberculosis, fungal infections, asthma, chronic obstructive pulmonary disease, hypersensitivity disorders, pneumoconioses, HIV/AIDS ,other immunodeficiency states; Traumatic and mechanical disorders:

aspiration, pneumothorax, acute and chronic alveolar injury, RDS, ARDS; hypoventilation; neoplastic disorders; idiopathic disorders; Vascular disorders: pulmonary emboli, pulmonary hypertension; oxygen and ventilator therapy.

Hyperlipoproteinemias; mechanisms leading to elevation of chylomicrons, VLDL, LDL, IDL and LDL, VLDL and chylomicrons. Hypolipoproteinemias; Familial hypercholesterolemia, mechanisms involved in the decrease of LDL and HDL, causes of the absence of LDL and HDL. The abnormalities in lipids associated with respiratory stress syndrome.

Pharmacology: Cardiovascular Drugs; Antihypertensive drugs: Diuretics, vasodilators, ACE inhibitors, AT1 antagonists, alpha-adrenoceptor blockers; alpha -adrenoceptor antagonists, calcium entry blockers and CNS active drugs, endothelin antagonists, endopeptidase inhibitors; Ischaemic heart disease and its treatment; nitrates, alpha -adrenoreceptor blockers and calcium channel blockers; Lipid lowering drugs: statins, cholestyramine, nicotinic acid and ACAT inhibitors; Antiarrhythmic drugs. Class I-IV anti-arrhythmic drugs Sodium channel blockers, Potassium channel blockers; calcium entry blockers: digoxin. Beta-adrenoceptor antagonists; Anti-heart failure drugs: ACE inhibitors, beta-blockers, adrenoceptor antagonists, inotropic agents and vasodilator drugs, diuretics; Anticoagulant therapy: warfarin, heparin. Fibrinolytic mechanisms: streptokinase and tissue plasminogen activator (tPA). Anti-platelet drugs and their use. Haemopoietic agents. Respiratory Drugs: Decongestants; cough suppressants and expectorants; anti-microbial agents; Pharmacotherapy of asthma: bronchodilators; b-agonists, xanthines, anticholinergics, leukotriene receptor antagonists. Anti-

inflammatory drugs: corticosteroids, cromoglycate. Use of longer acting beta-agonists; Pharmacotherapy of chronic obstructive pulmonary disease, chronic bronchitis, emphysema and smoking; Immunosuppressive and anti-neoplastic agents. Pharmacokinetic and pharmacodynamic changes in cardiorespiratory disorders.

Investigative Procedures: Use of: electro-cardiography(ECG), ultrasonography, angiography, echocardiography, cardiac catheterization, chest radiography, radionucleid imaging, bronchoscopy, pleural and cardiac aspirates, computerized tomography; cardiac enzymes, blood lipids, respiratory function tests, blood cultures, sputum examination, biopsies, urinalysis. Immunological tests.

MSP 303: ENDOCRINE DISORDERS (2 UNITS)

Purpose

To equip the learners with knowledge on aetiology and pathophysiology of the disorders of the endocrine system and their investigation

Objectives

1. Describe the pathology of the disorders of the endocrine tissues and organs
2. Describe the biochemical disorders associated with hormone function
3. Describe the clinical pharmacology of drugs used in endocrine disorders
4. Describe the scientific basis of laboratory and imaging techniques used in investigating endocrine disorders

Outcomes

1. Explain the pathology of the disorders of the endocrine tissues and organs
2. Explain the biochemical disorders associated with hormone function
3. Explain the mechanism of action and choice of drugs for treatment of endocrine disorders
4. Use appropriate methods and techniques to investigate endocrine disorders

Content:

The aetiology, epidemiology, pathology of endocrine disorders: Genetic/congenital, traumatic, inflammatory, infectious and immunologic, toxic, metabolic, regulatory processes, vascular, degenerative disorders, neoplastic disorders of; pituitary, thyroid, parathyroid, adrenal glands, endocrine pancreas, ovaries, testicles and other endocrine tissues.

Molecular basis of diabetes mellitus, biochemical aspects of hyper and hypo secretion of hormones. Biochemical basis of diseases such as Cushing's syndrome, goiter, dwarfism and Addison's disease

Endocrine Drugs: Hormones and hormone antagonists. Drug treatment of diabetes mellitus: Insulin and oral antidiabetic agents. Hormones of the pituitary and hypothalamus: Drugs suppressing prolactin release including vasopressin and analogues. Drugs used in thyroid diseases: Corticotropin and adrenal steroids. Drugs affecting calcium homeostasis. Treatment of osteoporosis and Paget's disease. Use of calcitonins, biphosphonates, oestrogen receptor modulators, vitamin D analogues:

calcium. Hormone replacement therapy: Anabolic/androgenic steroids; use and abuse; Antimicrobials and antineoplastics.

Investigative Procedures: Biological assay. Radio-immunoassay and other immunodiagnostic procedures. Radioreceptor assay. Stimulation and suppression tests. Imaging techniques.

MSP 304: DIGESTIVE SYSTEM, NUTRITION AND METABOLIC DISORDERS (5 UNITS)

Purpose

The course is designed to equip the learners with knowledge on the aetiology and pathophysiology of disorders of the digestive system, nutritional and metabolic disorders and investigative techniques.

Objectives

1. Describe the pathology of the disorders of the digestive system.
2. Describe nutritional assessment, nutritional disorders and their consequences
3. Describe the pathology of nutritional and metabolic disorders.
4. Explain the clinical pharmacology of drugs commonly used in digestive system, nutritional and metabolic disorders.
5. Explain the laboratory and radiological techniques used in investigating digestive system, nutritional and metabolic disorders.

Outcomes

1. Explain the pathology of the disorders of the digestive system
2. Explain the biochemical disorders associated with hormone function
3. Explain nutritional assessment and the various nutritional and metabolic disorders
4. Explain the mechanism of action and choice of drugs for treatment of digestive system, nutritional and metabolic disorders.
5. Use appropriate methods, laboratory and radiological techniques to investigate digestive system, nutritional and metabolic disorders.

Content:

The aetiology, epidemiology, pathology of: Congenital, traumatic, inflammatory, infectious, parasitic, immunological, toxicological and neoplastic disorders of the alimentary tract, oral structures, salivary glands, liver and pancreas. Peptic ulceration. Hernias. Dental caries; Fluorosis; systemic manifestations of dental problems. Physical, neurological, psychological and psychiatric manifestations of nutritional and metabolic disorders.

Assessment of nutritional status: Protocols in nutrition assessment, Methods for assessment of nutritional status; Nutritional status indicators and classification systems. Protein energy malnutrition (PEM); Nutritional Anaemia (IDA); Vitamin deficiency disorders and toxicities; mineral deficiencies and toxicities; Iodine deficiency disorders; Malnutrition and infections; Underlying causes of malnutrition (Food Security, Care and Public Health Factors) ;Undernutrition

Adaptive changes in starvation, obesity, differential metabolism in liver, liver cirrhosis. Disorders of carbohydrate, lipid, amino acid, vitamin and mineral metabolism; Metabolic disorders associated with carbohydrate metabolism; lactase deficiency, galactosemia, cataract and glycogen storage diseases. Metabolic disorders associated with amino acid metabolism; phenylketonuria, alkaptonuria, Maple syrup urine disease, homocystinuria and albinism. Diseases associated with purine and pyrimidine metabolism; hyperuricemia, gout, Lesch-Nyhan syndrome. β -Aminoisobutyric aciduria and Orotic aciduria

Gastrointestinal Drugs: Drugs for peptic ulcer disease; antacids, cytoprotective agents, H₂ antagonists and proton pump inhibitors, treatment for H. Pylori. Drugs for motility disorders: stimulants and anti-spasmodics. Anti-emetics: dopamine antagonists, antihistamines, anticholinergics and 5HT₃ antagonists. Laxatives: bulking agents, stool softeners, stimulant and osmotic laxative. Anti-microbial, immunosuppressive and anti-neoplastic agents. Agents used for Biliary and Pancreatic Diseases: pancreatic enzymes. Drugs modifying appetite.

Investigative Procedures: Stool, urine and blood examinations. Use of imaging techniques. Biopsies, endoscopy and other diagnostic techniques.

MSP 305: NEUROLOCOMOTOR AND BEHAVIORAL DISORDERS (4 UNITS)

Purpose

The course is designed to equip the learners with knowledge on the aetiology and pathophysiology of neurolocomotor and behaviour disorders and their investigations.

Objectives

1. Describe the pathology of common neurologic and muscular disorders.
2. Discuss the etiology and mechanisms of abnormal human behavior.
3. Describe the clinical pharmacology of drugs commonly used in neurologic, muscular and behavior disorders.
4. Describe the common diagnostic procedures used in neurologic, muscular and behavior disorders and describe the findings.

Outcomes

1. Explain the pathology of common neurologic and muscular disorders.
2. Relate the etiology and mechanisms of abnormal human behavior.
3. Explain the mechanism of action and choice of drugs for treatment of neurologic, muscular and behavior disorders.
4. Use appropriate methods, laboratory and radiological techniques to investigate neurologic, muscular and behavior disorders.

Content:

The aetiology, epidemiology, pathology of: Congenital defects, vascular disorders; infections; trauma; space occupying lesions; degenerative disorders, muscular

dystrophies, nutritional disorders, Metabolic disorders: Metabolism of sphingolipids and sphingolipid storage diseases including Tay Sachs and Krabbe's diseases. Alcohol metabolism and its effects. Molecular defects in glutamate receptors in certain brain abnormalities, toxic effects. Epilepsy; Immunologic disorders including autoimmune, immunodeficiency of the neurolocomotor system. Infections: viral, bacterial, parasitic, fungal.

Behavioral disorders: Disorders of perception, emotions, thought and cognition and psychomotor activity in children, adults and the elderly.

Pharmacology: Drugs Commonly used in the nervous system including Antipsychotics, antidepressants, mood stabilizers, sedatives/hypnotics, anxiolytics, psychostimulants. Analgesics, anesthetics, anticonvulsants and muscle relaxants.

Investigative Procedures: CSF examination; macroscopic, cytological, biochemical, microbiological, EEG and evoked potentials; electromyography and muscle biopsy; radiological and imaging techniques. Psychometric tests.

MSP 306: REPRODUCTIVE SYSTEM, URINARY SYSTEM AND BODY FLUID DISORDERS (5 UNITS)

Purpose

To equip the learners with knowledge on the aetiology and pathophysiology of urinary and reproductive system disorders and their investigations.

Objectives

1. Describe the pathology of the reproductive and urinary systems.
2. Describe disorders of body fluid and acid-base balance.
3. Describe the pharmacology of drugs used to treat reproductive and urinary systems disorders.
4. Explain the laboratory and imaging techniques used in investigating disorders of reproductive and urinary systems.

Learning Outcomes

1. Explain the pathology of the common reproductive and urinary systems disorders.
2. Discuss disorders of body fluid and acid-base balance.
3. Explain the mechanism of action and choice of drugs used to treat reproductive and urinary systems disorders.
4. Use appropriate methods, laboratory and radiological techniques to investigate disorders of reproductive and urinary systems.

Content:

The aetiology, epidemiology, pathology of: Genetic/congenital, inflammatory, infections/infestations and immunologic, toxic disorders, disorders involving metabolic, physiologic or regulatory processes vascular, traumatic, degenerative disorders, neoplasms of the genitor-urinary system; Pyelonephritis, cystitis, urethritis, prostatitis, glomerulonephritis, interstitial nephritis, transplant rejection; traumatic and mechanical disorders. Disorders involving metabolic, physiological and regulatory

processes; renal failure, cortical and medullary necrosis, nephrotic syndrome, tubular disorders, disorders of collecting system, renal calculi. Prostatic disorders; neoplastic disorders, vascular disorders. Effects of systemic disease on the kidney. Endometrial hyperplasia; abnormal vaginal bleeding; disorders of pelvic support; infertility; premenstrual syndrome. Sex and Sexuality Disorders. Reproductive system infections, congenital defects and neoplasms. Immunopathology of: Early pregnancy loss, abnormalities of pregnancy; labour and puerperium. Abnormalities of lactation. Feto-maternal relationship. Male and female infertility.

Body Fluid Disorders: Dehydration; imbalances of water and electrolytes; Oedema formation; Disturbances of hydrogen ion concentration and compensatory mechanisms. Acid-base balance.

Diuretics: urine acidifying and alkalinizing agents; organic buffers; sex hormones; Contraceptive drugs: oestrogens, progestogens; mechanism of action. Drugs affecting the uterus: uterine relaxants and stimulants; oxytocics and tocolytics; ovulation inductors (including clomiphene and danazol). Drugs for urinary incontinence: anticholinergics, antidiuretic hormone analogues. Drugs for benign prostatic hypertrophy: Alpha-blockers and alpha reductase inhibitors. Anti-androgens and prostate cancer. Drugs for erectile dysfunction: phosphodiesterase inhibitors. Treatment of impotence. Anti-microbial agents. Immunosuppressive and anti-neoplastic agents. Radiotherapy. Effects of impaired renal function on pharmacodynamics and pharmacokinetics of drugs. Teratogenic drugs. Use of drugs in special situation: renal failure, pregnancy and lactation.

Investigative Procedures: Urinalysis; Blood investigations; Biopsies; imaging techniques; immunological tests

MSP 307: BONE, CONNECTIVE TISSUE AND SKIN DISORDERS (3 UNITS)

Purpose

To equip the learners with knowledge on the etiology, epidemiology and pathophysiology of bone, connective tissue and skin disorders

Objectives

1. Describe the Pathology of the disorders of bone, connective tissue and skin
2. Describe the biochemical basis of bone, connective tissue and skin defects.
3. Discuss the pharmacology of drugs for treatment of bone, skin and connective tissue disorders.
4. Explain the laboratory and imaging techniques used in disorders of bone, connective tissue and skin.

Outcomes

1. Explain the Pathology of the disorders of bone, connective tissue and skin
2. Describe the biochemical basis of bone, connective tissue and skin defects.

3. Explain the mechanism of action and choice of drugs used to treat disorders of bone, connective tissue and skin.
4. Use the appropriate methods, laboratory and radiological techniques to investigate disorders of bone, connective tissue and skin.

Content:

Aetiology, epidemiology and pathology of: Bone, Connective Tissues and Skin Disorders: Genetic/congenital, inflammatory, infections/infestations and immunologic, toxic disorders, disorders involving metabolic, regulatory processes, vascular, traumatic, degenerative disorders, neoplasms of; Skin and its appendages including the breast, bone and connective tissue. Pathology and epidemiology of burns.

Defective collagen synthesis or degradation leading to disorders such as Marfan's syndrome, Menke's disease, Ehlers-Danlos syndrome and Scurvy or vit. C deficiency. Mucopolysaccharidoses and mucopolipidoses and their associated deficient enzymes. Metabolic bone diseases; Paget's disease, Osteoporosis, Rickets & osteomalacia.

Antirheumatic; anti-gout agents; Antibiotics and Anti-inflammatory drugs. Skin preparations: steroids, emollients, sunscreen, retin-A, antimicrobials, methotrexate, keratolytics

Investigative Procedures: Biochemical, microbiological, immunological and histopathological tests and imaging techniques.

MSB 300: COBES III: INVESTIGATIVE PROJECT I (6 UNITS)**Purpose**

To equip the students with the knowledge and skills to develop a scientific research

Objectives

1. Explain the concept of urbanization and describe the factors which affect the health of urban communities.
2. Identify the factors that affect community self-reliance.
3. Identify elements of research protocol

Outcomes

1. Identify a problem for study
2. Develop a research proposal

Content:

Concepts of Urbanization; settlements and types, factors affecting the health of the urban community. Factors that determine community health status in urban setups. Environment and pollution

Self- reliance: Socio-economic factors, food security, water, sanitation, waste disposal, poverty.

Elements of research protocol development: introduction; rationalization; literature

review; null hypothesis and alternate hypotheses; experimental design; standard operating procedures methodology; outcomes and methods of measurement; data analysis methods. Time schedule and budget. Ethical issues. Write a proposal and present it for approval.

MSC 300: INTRODUCTION TO CLINICAL TECHNIQUES AND BASIC LIFE SUPPORT (3 UNITS)

Course Purpose

To introduce the students to the professional and technical skills needed to carry out a medical history and examination and administer basic life support

Objectives

1. Describe the process of history taking
2. Demonstrate the process of physical examination.
3. Demonstrate basic life support skills.

Outcomes

1. Elicit, and interpret both a thorough and appropriately focused history and a list of the patient's concerns in a respectful, logical and organized manner
2. Perform complete and appropriately focused physical and mental examination in a respectful, logical and organized manner with full consideration of a patient's comfort, confidentiality, and privacy.
3. Perform basic life support

Content:

Comprehensive history: Adult; child,

Complete physical examination: vital signs, general appearance, skin, head eyes, ears, nose, mouth and throat neck, lymph nodes, breast, thorax and lungs, cardiovascular system, abdomen, back and extremities, neurologic exam, genitalia and rectum: Mental status exam; Paediatric physical exam.

Triage and determination of priorities, Airways, Breathing, Circulation assessment, cardiopulmonary resuscitation, transportation and disposition. Clinical conditions requiring basic life support including unconscious patient, respiratory emergencies, cardiac emergencies, acute abdominal conditions, bleeding, shock, bone injuries, poisoning.

YEAR FOUR**MSC 400: OCCUPATIONAL HEALTH AND SAFETY (3 UNITS)****Purpose**

To equip the learners with the knowledge and skills to provide preventive health services to reduce the health impact of disease and injury resulting from workplace and community factors.

Objective

1. Describe the evolution, concepts and principles of occupational health
2. Explain the cause-effect relationship between occupational risk factors and the health of workers.
3. Explain the aims and functions of occupational health and safety services
4. Describe the causes, effects and control/management of occupational diseases and accidents at the work place.
5. Describe the regulatory frameworks in occupational health and safety.

Outcomes

1. Demonstrate an understanding of the legal and ethical framework which governs occupational health and safety practice
2. Evaluate the level of exposure and the degree of risk to health from workplace and environmental hazards and provide advice on appropriate control measures.
3. Demonstrate knowledge of the factors underlying risk perception and be able to effectively communicate these risks to exposed people in the workplace and the community
4. Provide occupational health services, including preventative programs and environmental advice to industry

Content:

Introduction to Occupational Health: Historical background, Concepts and Principles, types of occupational health hazards, Vulnerable groups.

Specific hazardous agents in work environment: Chemical hazards, biological hazards e.g. blood borne pathogens, physical agents, psychosocial hazards e.g. stress, ergonomic hazards, radiation hazards

Occupational Health Services: Curative and preventive, Functions: Medical exams and Surveillance; Types of Occupational Health Services, prevention and control of occupational hazards: Engineering, Administrative, Education, Personal Protection Gear.

Occupational diseases and accidents: Occupational Chest/Lung Diseases: Pneumoconiosis including Asbestosis, Silicosis; Byssinosis, Bagassosis; Vulnerable workers to chest lung diseases; Occupational dermatoses: Contact and irritant dermatitis; Photosensitivity ; Occupational acne; Management and prevention. Industrial Toxicology: Dose response relationships; Factors influencing the toxicity; Short and long term impact on the workers. Occupational hazards in the agricultural sector: Chemical, Macrobiological and Microbiological hazards. Impact on agricultural workers and vulnerable groups. Industrial Hygiene. Occupational related accidents including fire, collapsing buildings and machines. Prevention and management of accidents.

Regulatory Frameworks in Occupational Health and Safety: Directorate of Occupational Health and Safety Services: Composition of the personnel; Role and policies in promotion of health and safety in work environment; Services and functions related to work environment; Occupational safety and health act.

MSB 400: INVESTIGATIVE PROJECT PART II: COBES IV (6 UNITS)**Purpose:**

To equip the learners with the knowledge and skills to carry out scientific research and disseminate findings.

Objectives

1. Describe the methods of data collection and analysis
2. Describe ways of disseminating research findings.

Outcomes

1. Conduct data collection
2. Perform data analysis
3. Compile and report research findings.

Content:

Data collection; Mapping of the study area; pilot studies; sampling of households; administration of questionnaires; laboratory analysis of specimens.

Computer use in data management and processing: creation of data bases; application of appropriate statistical software. Multivariate analysis: multiple regression; logistic regression; analysis of variance.

Research report writing; Application of format of research report writing; preparation and submission of report; feedback to the community.

MSP 400: FORENSIC MEDICINE AND APPLIED TOXICOLOGY (3 UNITS)

Purpose

To equip the learners with the knowledge and skills and attitudes to practice the medico-legal aspects of patient care, deaths and documentation.

Objectives

1. Describe the medico-legal obligations of a physician.
2. Describe the conduct of autopsies.
3. Describe the medico-legal investigation of poisoning

Outcomes

1. Identify the medico-legal cases, carryout medical examination in such cases and prepare Medico-legal reports as per the law.
2. Participate in the conduct of autopsies, relevant investigations, and prepare reports.
3. Participate in the medico-legal investigation and management of poisoning

Content:

Assessment and examination of injuries and cases arising from accidents; sudden death; suicide; suspicious death; asphyxia; sexual abuse of children; sexual offenses against adults; contested paternity. Crime investigations. Forensic medical examination of prisoners; Medical-legal aspects of therapeutic substances, substance abuse and dependence; Determination of death; Disaster management, methods of investigations.

Autopsy: Statutory provisions for autopsy; Conduct; documentation; forensic tests, exhumation laws and procedures; Governing acts of parliament: Medical Practitioners and Dentists Act, Public Health Act, Human Tissue Act Elements of forensic science. Forensic odontology, radiology, anthropology, psychiatry; Court procedures; presentation of forensic evidence. Pitfalls of gross pathology and toxicological analysis.

Medico-legal investigation of poisonous substances including: gases; carbon monoxide; Hydrogen cyanide. Volatile poisons. Therapeutic drugs. Irritant poisons; Corrosive poisons; Natural poisons. Toxicological samples and sampling procedures; Analysis of toxicological specimens; Interpretation of laboratory toxicology report.

MSC 401: CLINICAL PHARMACOLOGY (4 UNITS)

Course Purpose

To equip the learners with knowledge and skills on therapeutics and rational use of therapeutic agents.

Objectives

1. Discuss the rational use of drugs.
2. Discuss the therapeutic principles of the drugs used in the treatment of disease in the various systems of the body. They should know details of:
 - i. Broad mechanisms of action
 - ii. Main therapeutic
 - iii. Adverse effects
 - iv. Clinically significant drug interactions

3. Describe pharmacological approaches in the treatment of the various disorders.
4. Describe the development of pharmacological agents.

Outcomes

1. Be aware of the importance of rational prescribing of drugs and the concept of essential drugs
2. Demonstrate knowledge of the principles of the prescription writing and be able to select the proper drug and dose for the at risk populations.
3. Demonstrate knowledge of the treatment of the various disorders.
4. Discuss experimental pharmacology and the development of pharmacological agents.

Content:

Rational drug use: Indications of drugs, Classes of drugs, Names (brand and generic) Dosage, Safety, Availability, Cost and adherence, Dosage; calculating dosage based on weight and surface area; therapeutic drug monitoring.

Mechanisms of action, Main therapeutic indications, adverse effects, Clinically significant drug interactions of the drugs used in various body system disorders. Drug use in special groups; neonates, the elderly, and patients with concurrent diseases. Cardiovascular Drugs. Antihypertensive drugs. adrenoceptor blockers and calcium channel blockers. Lipid lowering drugs; Antiarrhythmic drugs. Anti-heart failure. Dermatological Drugs. Endocrine and Reproductive Drugs: hormones and hormone antagonists. Antimicrobials and antineoplastics; Gastrointestinal/Digestive system

Drugs; Genitourinary Drugs, Drugs for Neurological diseases and Psychotherapeutic agents; Respiratory Drugs:

Evaluation of New Drugs: Drug Discovery, Drug Screening, Preclinical Safety and Toxicity Testing, Evaluation in Humans, Confounding Factors in Clinical Trials. The Variable Natural History of Most Diseases, the Presence of Other Diseases and Risk Factors, Subject and Observer Bias, the Food and Drug Administration. Clinical Trials and Orphan Drugs, Adverse Reactions to Drugs.

MSC 402: JUNIOR CLERKSHIP IN CHILD HEALTH (6 UNITS)

Purpose

The course is designed to enable the learner acquire knowledge, basic skills, attitudes, and diagnostic principles in the management of common paediatric conditions.

Objectives

1. Describe the normal growth and development during fetal life, neonatal period, childhood and adolescence and outline deviations
2. Describe the common laboratory, diagnostic, and therapeutic procedures in child health
3. Explain the underlying mechanisms of common conditions in child health.
4. Describe the common childhood disorders and the principles of their management.

Outcomes

1. Demonstrate the knowledge of scientific principles in child health.
2. Carry out and document a paediatric interview, perform a comprehensive physical, and mental examination in a child and generate differential diagnosis.
3. Carry out routine investigations and participate in common diagnostic and therapeutic procedures.
4. Participate in the management of common conditions in child health.
5. Demonstrate appropriate attitudes in care of children

Content:

Growth and Development: Components and stages of normal growth and development -milestones, cognitive and psychosocial development. Abnormal growth and development; delayed milestones, learning disabilities. Anthropometric measurements in growth monitoring. Nutrition: normal nutritional requirements in childhood; breastfeeding and breast milk; HIV and breast feeding; complementary feeding; clinical significance of micro nutrients in child nutrition; malnutrition.

Aetiology, epidemiology, pathophysiology of various paediatric disorders, both Congenital/genetic and Acquired – infective, inflammatory, traumatic, immunologic, metabolic, neoplastic. Malaria, HIV; Nutritional: overnutrition (obesity) and undernutrition (PEM); Respiratory: Pneumonia, bronchial asthma, tuberculosis; Cardiovascular: RHD, infective endocarditis, Cardiac failure; Genito-urinary: AGN, Nephrotic syndrome, Renal failure; Neurological: Meningitis, Encephalitis, Seizure disorders, Spinal cord disorders, Cerebral palsy; Gastro-intestinal: Diarrhoeal diseases, Hepatitis, Malabsorption; Endocrine: Hormonal dysfunctions, including thyroid

disorders, diabetes mellitus, diabetes insipidus, growth disorders, precocious puberty. Neoplastic disorders: Haematological malignances and solid tumors; Adolescence medicine. Skin: Atopy, urticaria, connective tissues disorders; Paediatric emergencies: poisoning, coma, convulsions, anaemia.

History taking, Physical examination, Diagnostic formulation, Differential diagnosis.

Pathophysiological rationale of diagnosis, investigations

Procedures and investigations: indications, complications and limitations of Procedures including; fundoscopy, lumbar puncture, pleural tap, nasogastric tube insertion, urinary catheterization, per-rectal exam, Biopsy of superficial and easily accessible lesions; ascitic tap, abdominal paracentesis; venopuncture; Laboratory tests; hematology, blood biochemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies; CSF studies; endocrinology tests, Basic imaging studies.

Principles of management of disorders in child health: Promotive and preventive activities; development of treatment plan; patient monitoring; consultation, liaison and referrals. Morbidity and mortality meetings, post-mortem demonstration.

MSC 403: JUNIOR CLERKSHIP IN MEDICINE (6 UNITS)

Purpose

The course is designed to enable the learner acquire knowledge, basic skills, attitudes, and diagnostic principles in the management of common adult medical conditions.

Objectives

1. Describe the various manifestations of infectious and non-infectious diseases in internal medicine
2. Describe the basic principle of history taking and clinical examinations.
3. Correlate the clinical symptoms and physical signs to make a provisional diagnosis
4. Describe the common laboratory, diagnostic and therapeutic procedures in Internal medicine
5. Explain the underlying mechanisms of common conditions in adult medicine.

Outcomes

1. Demonstrate the knowledge of various common disorders in internal medicine
2. Carry out and document a medical interview, perform a comprehensive physical, and mental examination and generate differential diagnosis.
3. Carry out routine investigations and participate in common diagnostic and therapeutic procedures.
4. Participate in the management of common conditions in internal medicine..
5. Demonstrate appropriate attitudes in care of children

Content:

Common disorders in internal medicine including respiratory diseases, cardiovascular disorders, endocrine and metabolic disorders, neurologic disorders, gastro intestinal disorders, renal disorders, rheumatological disorders, hemopoietic and lymphoreticular disorders, infectious diseases And HIV/AIDS and oncology and neoplastic disorders.

Comprehensive history taking; comprehensive physical and mental examination; recording of clinical data; interpretation of findings; interpretation of results of commonly done investigations e.g. basic haematology, blood biochemistry, urine and stool examination, X-rays, basic CT scans, electrocardiography, basic contrast studies among others; clinical decision making based on the available data; outline of patient management plan; case presentation.

Routine clinical procedures and investigations: Indications; limitations; and potential complications. specimen handling; lumbar puncture; insertion of nasogastric tube; venepuncture; rectal examination, bladder catheterization, pleural tap,; ascitic tap; cardiopulmonary resuscitation; administration of oxygen; Injections, (intravenous, intramuscular, subcutaneous) ; bone marrow aspiration, nebulisation, arterial blood gas sampling. Urinalysis; peripheral blood film; blood slide for malaria parasites; CSF analysis.

Principles of management of disorders in internal medicine: Promotive and preventive activities; development of treatment plan; patient monitoring; consultation, liaison and referrals. Morbidity and mortality meetings, post-mortem demonstration.

MSC 404: JUNIOR CLERKSHIP IN REPRODUCTIVE HEALTH (6 UNITS)

Purpose

The course is designed to enable the learner acquire knowledge, basic skills, attitudes, and diagnostic principles in the management of common reproductive health disorders.

Objectives

1. Describe the scientific principles in reproductive health.
2. Describe the common disorders in sexual and reproductive health
3. Demonstrate ability to elicit and document history, perform a comprehensive physical, and mental examination in sexual and reproductive health.
4. Describe the common laboratory, diagnostic, and therapeutic procedures in reproductive health
5. Explain the underlying mechanisms of common conditions in sexual and reproductive health.

Outcomes

1. Demonstrate the knowledge of scientific principles in child health.
2. Carry out and document an obstetric or gynaecological interview, perform a comprehensive physical, and mental examination and generate differential diagnosis.
3. Carry out routine investigations and participate in common diagnostic and therapeutic procedures.
4. Participate in the management of common conditions in sexual and reproductive health.
5. Demonstrate appropriate attitudes in care of those with reproductive health problems

Content:

Anatomy of male and female reproductive organs; the menstrual cycle; gametogenesis; sex hormones; puberty; menopause, male climacteric; Normal pregnancy: conception;

fetal growth and development, sex and sexuality, behavioural determinants of sexual and reproductive health.

Adolescent/Elderly Gravida, Hyperemesis gravidarum; multiple pregnancy, Breech presentation, other malpresentations. Pre-eclamptic Toxaemia (PET), Ante-Partum Haemorrhage (APH), Preterm labour/ Premature Rupture of Membranes (PROM), Malaria in pregnancy, Heart disease and Urinary Tract Infection in Pregnancy (UTI). Use of Partogram, Operative vaginal delivery, Induction of labour, Abnormal labour (dystocia), Retained placenta/Post partum haemorrhage (PPH), Genital Tract Trauma. Postnatal Care; Puerperal Sepsis; Perinatal/ Maternal Mortality, Neonatal resuscitation. Pelvic infections/Sexually transmitted diseases (STDS); Infertility, Pregnancy wastage, Neonatal resuscitation, Genital tumours.

Focused history taking including socio-cultural issues; comprehensive physical examination; summarized history; recording of clinical data; interpretation of findings; case presentation. basic diagnostic and technical procedures: partogram, recording and record keeping including electronic records. Clinical reasoning and decision making based on the available data; case presentation.

Routine blood and urine tests, arterial blood gases; coagulation studies; CSF studies; endocrinologic tests, microbiologic tests, seminalysis; basic imaging and radiological studies; Catheterization; Rupture of membranes; Normal deliveries; Resuscitation of the newborn; Apgar scoring; Episiotomy and repair; Repair of perineal tears; Clinical pelvimetry; NG-tube insertion; Manual vacuum aspiration; Speculum examination; Pap

smear ;Insertion and removal of IUCDs; Venepuncture, Induction of labour; Vacuum delivery; Breech delivery; Breech extraction; Amniocentesis; Paracentesis; Culdoscentesis; HSG; Laparotomy for ectopic pregnancy; Manual removal of placenta; McDonald stitch insertion; Minilap BTL; Caesarean section; Oophorectomy; Myomectomy; Drainage of pelvic abscess.

Principles of management of disorders in sexual and reproductive health: Promotive and preventive activities; development of treatment plan; patient monitoring; consultation, liaison and referrals. Morbidity and mortality meetings, post-mortem demonstration. Psychosocial factors influencing pregnancy and parturition; Teratogenesis and targets for toxins; In vitro fertilisation and concept of test tube babies.

MSC 405: JUNIOR CLERKSHIP IN GENERAL SURGERY (6 UNITS)

Purpose

The course is designed to enable the learner acquire knowledge, basic skills, attitudes, and diagnostic principles in the management of common surgical conditions.

Course Objectives

1. Describe the basic principles in surgery.
2. Demonstrate the knowledge of various common surgical disorders
3. Demonstrate ability to elicit and document history, perform a comprehensive physical, and mental examination of a surgical patient.
4. Describe the common laboratory, diagnostic, and therapeutic procedures in reproductive health

5. Explain the underlying mechanisms of common conditions in surgery.

Learning Outcomes

1. Demonstrate the knowledge of scientific principles in surgery.
2. Carry out and document a surgical interview, perform a comprehensive physical, and mental examination and generate differential diagnosis.
3. Carry out routine investigations and participate in common diagnostic and therapeutic procedures.
4. Participate in the management of common surgical conditions and assist in theatre.
5. Demonstrate appropriate attitudes in care of surgical patients

Content:

Principles of Surgery: Aseptic and anti-septic techniques; operating theatre safety; informed consent; peri-operative care and management of surgical complications; wounds and wound healing; fluid therapy and electrolyte balance; pain management; shock in surgery; multiple injury and critical care; co-morbidities of surgical importance; metabolic response to trauma; blood transfusion and transplant surgery, infection control and prevention ,surgical materials.

Knowledge of various surgical disorders: aetiology, epidemiology, patho-physiology and presentation of various surgical disorders including congenital and acquired disorders including;infective,inflammatory,degenerative,neoplastic,vascular,metabolic and traumatic disorders.

Components of the surgical history and examination that upholds good clinician-patient relationship including decency, privacy, confidentiality and ability to consult.

Diagnostic procedures and investigations: indications, complications and limitations of Procedures including; fundoscopy, lumbar puncture, pleural tap, Nasogastric tube, urinary catheterization, per-rectal exam, Biopsy of superficial and easily accessible lesions; ascitic tap, abdominal paracentesis; diagnostic peritoneal lavage. Laboratory tests; hematology, blood biochemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies; CSF studies; endocrinology tests, Basic imaging studies.

Principles of management of disorders in surgery: Promotive and preventive activities; development of treatment plan; patient monitoring; consultation, liaison and referrals. Morbidity and mortality meetings, post-mortem demonstration.

MSC 406: CLINICAL MANAGEMENT I (2 UNITS)

Course Purpose

To integrate the management of various systemic and infectious disorders in a holistic manner

Course Objectives

1. Discuss the management of cardiovascular and respiratory disorders.
2. Discuss the management of haemopoietic disorders.
3. Discuss the management of infectious diseases.

Learning Outcomes

1. Discuss the holistic management of various systemic and infectious disorders

Content

Cardiovascular and Respiratory Disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders including systemic and pulmonary hypertension; shock; cardiac arrhythmias; cardiomyopathies; thromboembolic phenomena; atherosclerosis; aneurysms; heart failure. pulmonary oedema; restrictive and obstructive ventilatory disorders; respiratory failure; disorders of the lymphatic system.

Health problems related to deep sea diving and high altitude

Haemopoietic Disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders including anaemias, thalasaemias, haemoglobinopathies, porphyrias, bleeding tendencies, disorders of white blood cells, disorders of lymphoid organs and tissues. Indications and complications of blood transfusion.

Infectious diseases: common bacterial, viral, fungal, protozoal and helminthic infections and infestations

MSC 407: CLINICAL MANAGEMENT II (2 UNITS)**Course Purpose**

To integrate the management of various systemic and infectious disorders in a holistic manner

Objectives

1. Discuss the management of the disorders of the digestive system.
2. Discuss the management of nutritional disorders.
3. Discuss the management of metabolic disorders.

Outcomes

1. Discuss the holistic management of various digestive, nutritional and metabolic disorders

Content

Digestive Systems Disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders of the digestive system and its associated organs including peptic ulceration, hernias, malabsorption, GIT bleeding, GIT malignancies and intestinal obstruction.

Nutritional Disorders: congenital and acquired disorders including failure to thrive, marasmus, kwashiorkor, nutritional anaemias,

Metabolic Disorders: Disorders of carbohydrate, lipid, amino acid, vitamin, mineral and water metabolism.

YEAR FIVE**MSC 500: ANAESTHESIOLOGY AND CRITICAL CARE MEDICINE (4 UNITS)****Purpose**

The course is designed to equip students with principles of anaesthesiology and skills for practice of basic anaesthetic procedures including airway management and vascular access.

Objectives

1. Describe the principles and practice of anaesthesiology.
2. Discuss the principles of applied physiology and applied pharmacology in anaesthesiology.
3. Explain the mechanism of action of the commonly used drugs for anesthesia and the complications
4. Describe the peri-operative management of an anaesthesia patient and anaesthetic techniques
5. Discuss the medico-legal issues in anaesthesia and their implications.

Outcomes

1. Relate the applied anatomy, physiology and pharmacology to the use of anaesthetics
2. Participate in the peri-operative management of patients.
3. Participate in critical and intensive care of patients, including CPR
4. Demonstrate knowledge of medico-legal issues in anaesthesia and their implications.

Content:

Definition of anaesthesia. History and advancement of anaesthesia. Components and functioning of anaesthetic machines. Colour coding of anaesthetic gases and other accessories used in anaesthesia. Physical status classification. Informed consent.

Classify anaesthetic agents: general anaesthetic agents, local anaesthetic agents and muscle relaxants. Pharmacology of anaesthetic drugs – pharmacokinetics, pharmacodynamics, metabolism, elimination, indications and side effects: Classifying types of fluid; indications for each type. Advantages and disadvantages of each type. Pain pathway; Classify analgesics. Pharmacology of analgesics.

History, physical examination and laboratory investigations. Pre-operative instructions. Pre-medications; goals of premedication, classify drugs used and in pre-medication and their pharmacology. Procedures: intravenous insertion of lines; oropharyngeal airways, laryngeal mask airway, endotracheal intubations; insertion of nasogastric tubes. Central venous catheter insertion. Patient positioning on the operating table: types of positions. Indications; complications associated with each position. Anaesthetic techniques: local/regional anaesthesia, Bier's block; spinal anaesthesia, epidural brachial plexus block; General anaesthesia: methods of induction of anaesthesia, maintenance and emergence of anaesthesia. Anaesthesia for children, aged and the obese. Principles of ventilation of an anaesthetized patient: modes of ventilation and complications associated with each. Reversal of patients from general anaesthesia. Fluid therapy; Pain management; Modalities of pain management. Monitoring of an anaesthetized patient. Instrumental monitoring. Post-operative care

of patients: components of a post anaesthesia care unit. Post operative complications. Early and late complication.

Intensive care unit lay out; intensive care unit personnel and equipment. Criteria for ICU admission. Modes of ventilation of patients in the ICU. Indications for mechanical ventilation. Weaning patients off mechanical ventilation. Supportive management of the critically ill patients. Nutrition, physiotherapy, nursing care, and monitoring of a critically ill patient, fluid management in the intensive care unit. Classify patients requiring cardio-pulmonary resuscitation. Airway management circulation assessment; Resuscitation drugs, use of defibrillators.

Medico-legal issues in anaesthesia: consent form, anaesthetic accidents, anaesthetic death and counseling of patients and guardians in the ICU.

MSC 501: ORAL HEALTH (2 UNITS)

Purpose

To equip students with appropriate knowledge and skills in the management of common oral and dental emergencies and to participate in the promotion of oral health

Objectives

1. Describe the basic applied anatomy and physiology of the oral cavity and allied organs.
2. Demonstrate ability to elicit and document a proper dental history and comprehensive oral examination of a patient.

3. Explain the underlying mechanisms of common conditions in oral health.
4. Describe maxillofacial trauma and common oral and dental disorders
5. Describe the common procedures in oral health

Learning Outcomes

1. Participate in the management of common dental emergencies and oral disorders.
2. Participate in common procedures in oral health.
3. Apply preventive measures and carry out health promotion in oral health.

Content:

Applied Anatomy and Physiology of the Oral Cavity and Allied Organs: anatomy of teeth, mandible, maxilla, zygoma, temporomandibular joint, periodontium, tongue and salivary glands. Including common congenital malformations.

History taking, Physical examination, Diagnostic formulation, Differential diagnosis. Rationale for diagnosis, investigations.

Maxillofacial Trauma: Etiology and classification of facial bones fractures. Diagnosis of mandibular, maxillary and zygomatic bone fracture. Principles of management. First aid management and dealing with emergencies. Oral and Maxillofacial Infection: Etiology of oral and dental infection. Spread of dental infection into the facial spaces. Signs and symptoms. Oral premalignant lesions as leucoplakia, lichen planus and other conditions e.g. broken denture, sharp tooth edge. Signs of early malignant changes on

the oral cavity. Different types of biopsy. Oral Manifestations of Systemic Diseases: hematological, endocrinal, nutritional, autoimmune deficiency syndrome and others. Management of emergencies.

Procedures: including tooth extraction, scaling, anesthetic procedures, filling, flossing

Prevention and promotion of oral health:

MSC 502: DERMATOLOGY (2 UNITS)

Purpose

To equip students with appropriate knowledge and skills in the management of common dermatological conditions,

Objectives

1. Describe the common skin diseases and their manifestations
2. Describe the common laboratory diagnostic procedures in dermatology.
3. Describe the common therapeutic procedures in dermatology.
4. Discuss preventive measures at individual and community levels against communicable skin diseases

Outcomes

1. Demonstrate ability to elicit and document a proper history and comprehensive examination of a patient with a skin condition
2. Participate in the management of common dermatological conditions.
3. Participate in common dermatological procedures.

4. Apply preventive measures and carry out health promotion in dermatology.

Content:

History taking, Physical examination, Diagnostic formulation, Differential diagnosis.

Rationale for diagnosis, investigations.

Infections and rashes: Bacterial infections of skin and soft tissues including impetigo, folliculitis. Superficial fungal infections: candidiasis, mycoses, tinea, dermatophyte infections. Viral including: herpes simplex and zoster, warts, molluscum contagiosum.

Parasitic: scabies; Sexually transmitted diseases: Skin manifestations of HIV infection;

Immunologic and allergic disorders: contact dermatitis, atopic eczema , urticaria , drug reactions Idiopathic and degenerative disorders: Psoriasis, seborrheic dermatitis, acne.

Tumors and Hamartomas: Benign tumors, precancerous lesions and malignant neoplasms of the skin, melanoma, squamous and basal cell carcinoma; Cutaneous manifestations of lupus erythematosus, dermatomyositis and scleroderma; Metastatic skin disease: Skin manifestations of systemic disease; Drug reactions, photosensitivity;

Paraneoplastic skin syndrome: Dermatologic therapeutics: Topical medications: types of formulations and vehicles; topical steroids, antibiotics; wound dressings; leg ulcers:

Procedures: biopsy, scraping for fungal detection curettage, electrosurgery, cryosurgery and laser. Intense pulsed light; patch and photopatch testing; prick tests;

Tzanck smear, Wood's lamp examination, , histopathological assessment and phototherapy.

Prevention and promotion of dermatological disorders.

MSC 503: EAR NOSE AND THROAT SURGERY (4 UNITS)**Purpose**

To equip the learner with the knowledge, skills, attitudes, and diagnostic principles in the management of otorhinolaryngological conditions and to know when to refer.

Objectives

1. Describe the basic principles of ENT, Head and Neck including applied anatomy, physiology and pathology of common ENT disorders.
2. Describe the management of common otorhinolaryngological emergencies
3. Describe common otorhinolaryngological disorders and their management
4. Be aware of preventive otology and head and neck cancers

Outcomes

1. Demonstrate ability to take a focused ENT history, perform and elicit comprehensive physical signs in ENT.
2. Participate in the management of common ENT disorders.
3. Participate in common procedures in ENT surgery.
4. Participate in preventive, promotive and rehabilitative care of ENT patients.

Content:

Principles and Foundations of ENT: Applied anatomy of the ear, nose, throat, and neck : anatomy, histology and embryology of ear, nose nasophagus, paranasal sinuses, oral cavity, salivary glands, larynx, trachea, bronchio-pulmonary tree. Common congenital anomalies; Physiology of hearing, auditory pathway, balance, vestibular pathway, physiology of the nose and paranasal sinuses including olfaction, physiology of oral cavity including deglutition, salivary glands, physiology of phonation.

Focused history taking, comprehensive physical exam, occurrence recording of clinical data interpretation of findings in ENT.

Procedures and Investigations: Indications, limitations, potential risks: X-rays, basic CT scan and MRI, contrast studies: Abilities: Common tuning fork tests such as Rinnes, Webers, Gille's, Schwabach's, proper oral exam, exam of mass in neck, sensitization to TM; Removal of foreign bodies: nose, ear, oral cavity, ear syringing, antral washout, nasal packing. Collection of specimens. Laryngoscopy, Tracheostomy, Adenoidectomy; tonsillectomy, neck biopsies; Bronchoscopy; oesophagoscopy and Naso-gastric tube insertion.

Management of ENT disorders: Ear disorders including: otitis media; congenital anomalies, labyrinthitis; Dizziness/vertigo, tinnitus, foreign bodies, cerumen, Tumors, Traumatic lesions. Nose / paranasal sinuses: Rhinitis, sinusitis, epistaxis, DNS HIT, nasal polypi, rhinoscleroma, tumors, traumatic lesions, foreign bodies, myiasis. Mouth and salivary glands: congenital anomalies, tonsillitis, Adenoiditis, sialadenitis sialectesis, sjogrens syndrome; Dysphagia and odynophagia Ludwig's angina. Larynx and trachea: Congenital anomalies, laryngitis, epiglottitis, LTB, Traumatic lesions, Upper airway obstruction; Hoarseness of voice, stridor; foreign bodies. Neck: masses, abscesses. Consultation and referrals. Rational use of pharmacotherapeutics; other therapeutic modalities. Counseling. Palliation in surgery and care of the terminally ill.

Health promotion in ENT, Head and Neck; Factors influencing surgical care of individuals and community socio-cultural, families, psychological economies,

environmental, political, religions. Prevention of: HIV/Aids; Rehabilitation: ENT appliances: Hearing Aids, Cochlear implants and counseling; Outreach services, health education.

MSC 504: OPTHALMOLOGY (4 UNITS)

Purpose

To equip the learners with the knowledge, skills and attitude to manage common ophthalmic conditions and to know when to refer.

Objectives

1. Describe the anatomy and physiology of the eye and ocular adnexae.
2. Describe the human eye as an optical system and the principles of common refractive errors and their correction
3. Describe the management of common ophthalmic emergencies
4. Describe common ophthalmic disorders and their management
5. Describe the magnitude of blindness and the preventive measures

Outcomes

1. Apply the knowledge of the anatomy and physiology of the eye and ocular adnexae in ophthalmology.
2. Demonstrate ability to take a focused ophthalmic history and perform a basic ocular examination
3. Correctly perform routine clinical procedures and order appropriate investigations
4. Participate in the management of the common ophthalmic disorders

5. Participate in preventive, promotive and rehabilitative ophthalmic care

Content:

Anatomy and Physiology: Orbit; lids; conjunctiva; lymph nodes; lachrymal system; cornea; anterior chamber; iris and pupil; lens; vitreous; choroid and retina; extraocular muscles including origin, course, insertion, innervations, and blood supply; normal alignment; Visual pathways; ocular motor pathways; facial and trigeminal nerves; autonomic pathways; pupillary pathways; aqueous humor physiology.

Clinical Process: Focused history taking; basic examination with flashlight; slit-lamp examination; fundoscopy; visual fields by confrontation; summarized history; recording of clinical data; interpretation of findings; case presentation.

The eye as an optical system: Visual acuity; refractive states: myopia; hypermetropia; astigmatism; presbyopia and accommodation; spectacle correction; contact lenses; intra-ocular lenses; low vision and low vision aids; refractive surgery including newer procedures like PRK and LASIK.

Routine clinical procedures and investigations: Indications; limitations; potential complications; ocular examination; visual acuity; external inspection; papillary reflexes; ocular motility; direct ophthalmoscopy; pupillary dilatation; anterior chamber depth assessment; visual fields by confrontation (perimetry); IOP measurement (tonometry); fluorescein staining; extraocular motility; neuroimaging: X-ray; CT scan; MRI; ultra-sound, among others.

Common ophthalmic disorders: Ocular trauma; orbital trauma and blow out fracture; burns and chemical injuries; ocular foreign bodies. Red eye differential diagnosis: Indications for referral. Eyelid diseases and malpositions; inflammations; infections; and common tumors; Lacrimal system: lacrimal disease; nasolacrimal duct obstruction; dacryocystitis. Orbital diseases: orbital cellulites; thyroid disease; pseudotumor, orbital tumors: Proptosis; Cataract; Xerophthalmia: WHO classification, community health aspects; Trachoma and the “SAFE” strategy. Glaucoma: classification and management; Amblyopia, Strabismus: Vitreoretinal disorders including those caused by diabetes mellitus; hypertension; vaso-occlusive diseases; HIV/AIDS. Neuro-ophthalmology; Neoplasms; Sudden loss of vision; Consultation and when to refer; Rational use of pharmacotherapeutics: drops; ointments; local injections; local anaesthesia; other therapeutic modalities; Counseling

Factors influencing ophthalmic care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual. Programmes including, Kenya ophthalmic programme; Vision 2020; GET 2020 and other promotive programmes. Prevention of ophthalmic diseases and accidents; Rehabilitation: Ophthalmic appliances: low visual aids and care of the blind;

MSC 505: ORTHOPAEDICS AND TRAUMATOLOGY (4 UNITS)

Purpose

To equip the learners with appropriate knowledge and skills in management of orthopaedic emergencies and trauma and common orthopaedic conditions.

Objectives

1. Describe the principles of surgery in the management of orthopaedic patients
2. Describe the management of common orthopaedic emergencies
3. Describe the diagnosis and management of common orthopaedic disorders
4. Describe common orthopaedic procedures including imaging.
5. Be aware of preventive aspects in orthopaedics

Outcomes

1. Apply surgical principles in Orthopaedics and Traumatology.
2. Demonstrate ability to elicit a focused orthopaedic/trauma history and perform a comprehensive physical and mental examination
3. Participate in the management of common orthopaedic and traumatic disorders
4. Participate in common procedures in orthopaedics and traumatology.
5. Apply preventive measures and carry out health promotion in orthopaedic surgery.

Content:

Aseptic and anti-septic techniques; hazards and precautions in operating theatre; patient evaluation; informed consent; peri-operative care and management of surgical complications; wounds and wound healing; fluid therapy and electrolyte balance; pain management; shock; co-morbidities of surgical importance; metabolic response to trauma; transfusion; bone fixation; resuscitation.

Focused history taking; comprehensive physical examination and mental examination; summarized history; recording of clinical data; interpretation of findings; case presentation.

Management: Comprehensive treatment plan; supportive treatment; definitive treatment; surgical prophylaxis. Patient monitoring; Consultation and referrals. Rational use of pharmacotherapeutics; other therapeutic modalities; Counseling; Palliation in orthopaedics and care of the terminally ill. Orthopaedic and traumatic disorders: Bone and joint infections; fractures of bones; compartment syndrome; spinal injury and cord compression; neuro-vascular injury; joint dislocations; multiple injuries. Congenital Bone and Joint Disorders: affecting the foot, the knee and hip joints. Achondroplasia, osteogenesis imperfecta; Inflammatory and Infective Conditions: Hand infections, tuberculous and parasitic bone infections, Osteomyelitis, Septic arthritis, Rheumatoid arthritis, bursitis and synovitis, chronic inflammations associated with other systemic diseases; Degenerative bone and Joint Disorders: synovial joint disorders, osteoarthritis, osteoporosis, low back pain. Metabolic Bone Disorders: rickets, gout. Neoplasms; Common fractures and fracture dislocations; soft tissue injuries. First aid and transportation; multiple injuries; complications of fracture; fracture healing. Response to trauma. Injuries to tendons, nerves, blood vessels; compartment syndrome.

Routine clinical procedures and investigations: Indications; limitations and complications; perform routine clinical procedures including specimen handling; interpretation of the results of blood haematology and biochemistry, urine

biochemistry, X-rays, basic CT, basic contrast studies among others; lumbar puncture; insertion of N/G tube; vene-puncture; suturing of wounds and application of splints and traction.

Factors influencing orthopaedic care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual. Prevention of orthopaedic and traumatic disorders and accidents; Rehabilitation; Orthopaedic appliances.

MSC 506: RADIOLOGY AND IMAGING (4 UNITS)

Purpose

To equip the learners with the appropriate knowledge and skills in the diagnostic, therapeutic and imaging techniques and interpretation of radiological images.

Objectives

1. Describe the scope and basic principles of diagnostic imaging.
2. Describe the diagnostic, therapeutic radiology and other imaging techniques.
3. Describe the normal anatomy of different organs and systems as seen in plain films, tomography, resonance or ultrasound.

Outcomes

1. Participate in the interpretation of common images of various imaging modalities.
2. Correlate findings of imaging to clinical manifestations of disease condition
3. Participate in management of patients using interventional radiology.

Content:

Basic concepts; Nuclear medicine; Physics; Radiological procedures: Indications, contraindications and complications; Principles and application of therapeutic radiology; Radiation protection, monitoring and legislation; Conventional; plain radiography routine and special contrast procedures; Imaging modalities including ultrasound, computerized tomography, Radionuclide scanning and magnetic resonance imaging. Pharmacokinetics of radiographic contrast media and their application.

Interpretation of the common imaging outcomes: Central Nervous System: fractures, space occupying lesions, degenerative disorders, pathologies involving the spine. Head and neck radiology: imaging modalities; pathologies of the nasal cavity, paranasal sinuses, orbits, and temporal bones; other head and neck pathologies; systemic diseases involving the head and neck. Respiratory System: diagnostic features of inflammatory diseases of lungs and bronchi, pulmonary tuberculosis, tumours of lungs and pleura, pulmonary oedema and embolism, air/fluids in pleural space, mediastinal disorders. Cardiovascular system: abnormalities of the heart, abnormalities of the blood vessels and lymphatics. Digestive System. Esophagus: tumours and motility disorders; Stomach and Intestines: tumours, peptic ulceration, perforations; Billiary System: stones. Genitourinary System: Pelvic and urogenital radiology: imaging modalities, imaging in obstetrics and gynecology, pelvic masses, urinary lithiasis, neoplasia and renal cystic disease, tuberculosis, renovascular hypertension, kidney transplantation, prostatic and scrotal pathology, trauma. Musculoskeletal System: normal appearance and pathologic changes of bones, healing and complications of fractures, inflammatory changes of bones and joints, degenerative diseases of joints, diagnostic features of bone

tumours, imaging modalities. Paediatric Radiology: Small Parts: Breast radiology: imaging modalities, breast cancer screening, eye, penis, scrotum, and thyroid, Angiography and interventional radiology.

Interventional radiology including radiotherapy, ultrasound guided investigative and therapeutic procedures.

MSB 500: HEALTH SERVICES MANAGEMENT (3 UNITS)

Course Purpose

This course aims at equipping the learners with the requisite knowledge, skills and attitudes to enable them provide leadership in the delivery of quality and sustainable health services.

Objectives

1. Describe the basic concepts, principles, theories and functions of management and organization.
2. Outline the functions of Health Management Information Systems.
3. Outline the basic principles of public health sector financial management.
4. Describe the basic concepts of Health Economics.
5. Outline the key processes in human resource management.
6. Describe the basic concepts and processes of health planning and policy-making and their application in developing countries.
7. Outline emerging issues in Health services management

Outcomes

1. Explain management principles, functions of management, management processes, decision-making, communication and co-ordination.
2. Demonstrate knowledge of the health policy, health care planning and management in Kenya
3. Demonstrate knowledge of health information and healthcare management systems

Content:

Management and Organization: Management: definition, theories, principles, concepts and functions; Organization structure and design; Quality assurance; Strategic Management; Organization of Health Services; National, Regional and International.

Information for Health Management: Definition of Key Concepts: data, Information; Health Management Information Systems (HMIS): Concepts and Components; Objectives of an HMIS; Types of HMIS; HMIS Operations and requirements; characteristics of good information.

Health Care Financing: Definition and principles of Health Care Financing; sources of health care financing (governments allocation, cost sharing; health insurance); Resource allocation and use issues: equity and efficiency; The budget function and the Government of Kenya budgetary process (Mid-Term Expenditure Framework - MTEF); Auditing and reporting function.

Health Economics: Definition; health measurement and valuation; the patient as demander; the supplier of health care; the supplier - induced demand; assessing the costs and benefits of alternatives; strategies of efficiency in health care; Hospital costs; equity and health care; economic evaluation of health services (cost efficiency, cost benefit, cost utility, cost minimization analyses).

Human Resource Management: Definition, principles and functions; organizational behaviour; leadership and leadership styles; conflict resolution; human resource planning; job design; staffing; supervision; performance appraisal; Government of Kenya personnel policies.

Health Policy and Planning: Definition of health policy; formulation of health policy; adaptation of health policy; implementation and evaluation of health policy. Definition, principles and functions of planning; planning cycle; monitoring and evaluation of plans; health sector reform initiatives and challenges. Levels of health care.

Emerging issues: Burden of disease, Millennium development goals, Vision 2030, Ministry of Health strategic plan. Organization and management of disasters and emergencies, Health services for displaced persons.

**MSC 507: COBES V: DISTRICT HEALTH SERVICES ATTACHMENT
(6 UNITS)**

Course Purpose

To equip the students with the knowledge and skills to manage and render service at a district/county health facility.

Course Objectives

1. Describe the National health policy framework of Kenya
2. Describe the organization of health services in a District.
3. Discuss the delivery of health services in a district
4. Outline the community oriented aspects of Primary Health Care
5. Explain the role and responsibilities of District Health Management Teams, health agencies and boards in provision of primary health care

Learning Outcomes

1. Participate in the management of health services at the district level
2. Participate in the delivery of clinical services at the district level.
3. Participate in district outreach activities
4. Develop and carry out an action-oriented research.
5. Provide leadership in the provision of healthcare

Content:

Organization and delivery of curative, promotive and preventive health services at the district level. Composition and functions of Management Committees and Boards. Statutory bodies and programmes at international, national, provincial and district levels: Centre for Disease Control (CDC); World Health Organization (WHO); Medical Practitioners and Dentist Board; Pharmacy and Poisons Board;

Provincial Health Management Teams (PHMT); District Development Committees (DDC); District Health Management Teams (DHMT); District Health Management Boards (DHMB); Hospital Management Teams (HMT).

Participations in management; assist members of the DHMT. Participate in meetings and activities of the DHMT.

Clinical services: Diagnostic services; clinical management; autopsy; evaluation of service utilization; management systems and functional departments. Outpatient, in-patient, special clinics, emergency care. Referral systems.

Outreach activities: Primary Health Care (PHC). Health promotion. School health programmes. Public health: epidemic monitoring, investigation and control; management of community emergencies; disease screening; surveillance and prevention. Design of training programmes for the community, development of relevant materials; programme implementation; assessment of effectiveness and efficiency.

Integrated Programmes: Functions of: Kenya Expanded Programme for Immunization (KEPI), Essential Drugs Programme (EDP), AIDS Awareness Programme, STD Control Programme. Social medicine - provision of health services to the under-privileged: the aged, motherless babies, destitute and relief measures, follow-up of patients with chronic illnesses.

Medical system audit; Identification of a problem; Conduct an action research; Suggest possible solutions and implementation plan. Preparation and presentation of an oral and written report

MSB 501: INTRODUCTION TO ENTREPRENEURSHIP (2 UNITS)

Purpose

To equip the learners to the concepts, principles and practice of entrepreneurship and business skills.

Objectives

1. Explain the concepts of entrepreneurship.
2. Discuss the characteristics of successful entrepreneurs.
3. Discuss the role of creativity, innovation and risk taking propensity in health services provision.
4. Discuss the business start-up process models.

Outcomes

1. Identify viable business opportunities
2. Prepare a business plan
3. Apply entrepreneurial and management skills in a business situation

Content:

Definition of the terms entrepreneur and entrepreneurship theories and school of the thought of what entrepreneurship and who can become an entrepreneur.

Creativity, innovativeness, risk-taking propensity, good management principles, honesty, integrity, trustworthiness, persistence and relevance to the provision of health services.

Definitions of creativity, innovativeness and risk taking; sources of creativity and innovativeness; role of creativity and innovativeness in the provision of health services.

Models of business start up process; historical development of Small and Medium Enterprises (SMEs) in Kenya. Constraints of SMEs growth and development in Kenya.

Business Plan: preparation, purpose and component.

MSE 500: MEDICAL ELECTIVES STUDIES: (6 UNITS)

Course Purpose

To provide students with opportunities to acquire knowledge, skills and experience in areas of their interest which will be useful in their career. During this period students may choose to take a programme in basic social or clinical sciences or any other field relevant to their future career.

Learning Outcomes

1. Widen student's experience in undergraduate education and strengthen areas of weakness.
2. Develop ability to participate in planning and implementation of learning activities, and make rational decisions.
3. Increase student's responsibility for professional development.

General Guidelines:

- i. The students will be responsible for making arrangements (including finances) pertaining to the Elective.
- ii. The students shall submit a plan of their activities for approval.
- iii. Upon completion of the elective the students shall submit a written report.
- iv. A confidential report shall be submitted to the Dean from the host institution regarding the students performance.
- v. The institution shall provide students with guidelines of their conduct during the elective.
- vi. Students shall conform to the rules and regulations of the host institution during their electives. Where research is involved, there will be need for approval from the host institution.

YEAR SIX**MSC 600: CLERKSHIP IN MENTAL HEALTH (6 UNITS)****Purpose**

To equip the student with the knowledge, skills and attitudes necessary for managing various mental disorders.

Course Objectives

1. Describe the concept of psychiatric disorders, their classification and principles of management.
2. Describe general issues on aetiology of mental disorders and methodology used to study them.

3. Describe the range of investigations necessary in diagnosis and common procedures in mental health.
4. Describe the common disorders in mental health and their management
5. Describe the preventive, rehabilitative and intervention methods in psychiatry
6. Describe the laws and acts governing management and rights of patients with behavioral and mental disorders.

Outcomes

1. Apply the principles and practice of mental health in the management of patients
2. Conduct an interview and perform a comprehensive physical examination in a manner that facilitates information gathering and formation of a therapeutic alliance.
3. Participate in the management of common disorders in mental health.
4. Participate in common procedures in mental health.
5. Utilize preventive and rehabilitative measures and carry out health promotion in mental health.
6. Apply laws and acts governing management and rights of patients with behavioral and mental disorders.
7. Apply research principles in mental health.

Content:

Respect, empathy, responsiveness, and concern regardless of the patient's problems or personal characteristics; psychotherapy; counselling; team concept in management of patients; psychopharmacology; alternative forms of therapy.

History taking, comprehensive physical examination, mental state examination, diagnostic formulation.

Management of conditions including childhood disorders; Delirium, dementias including Alzheimer's disease, Parkinson's disease. Disorders due to general medical conditions including HIV, seizure disorders, strokes and head injuries; Substance related disorders; Schizophrenia and other psychotic disorders; Mood disorders; Anxiety and somatoform disorders; sexual and gender identity disorders; Eating disorders, sleep disorders; personality disorders; suicide. Community psychiatry: liaison, forensic and geriatric psychiatry.

Routine clinical procedures and investigations: Indications; limitations; and potential complications. specimen handling; lumbar puncture; insertion of nasogastric tube; venepuncture; bladder catheterization, ascitic tap; cardiopulmonary resuscitation; administration of oxygen; Injections; nebulisation, arterial blood gas sampling. Urinalysis; peripheral blood film; blood slide for malaria parasites; CSF analysis; EEG and polysomnography; ECT.

Preventive and Health Promotion in mental health: Recognition of genetic predisposition, ethnic/cultural factors, occupational risks, risk assessment for diseases, risk exposure and lifestyle. Behavioural modification. Appropriate and timely intervention programs. Advocacy for mental health. Educational programs and other interventions. Prevention of mental disorders.

Mental health legislation; involuntary admission; fitness to plead, testamentary capacity; power of attorney, court report.

Research in Health: Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases. Role of research in the advancement of diagnosis, therapy and management of patients.

MSC 601: SENIOR CLERKSHIP IN CHILD HEALTH (6 UNITS)

Purpose

To equip the students with the knowledge, skills and attitude appropriate for managing common health problems afflicting newborn, children and adolescents.

Objectives

1. Discuss the clinical process in child health.
2. Describe the common pediatrics disorder and emergencies
3. Describe the common investigations, diagnostic, and therapeutic procedures in child health
4. Describe preventive and promotive strategies for common infectious disorders, malnutrition, genetic and metabolic disorders, poisonings, accidents and child abuse.
5. Outline national programmes relating to child health including immunization programmes.
6. Describe medico-legal and ethical issues in child health.

Outcomes

1. Interview a child (or parent or guardian), perform a comprehensive physical and mental, examination and generate differential diagnosis.
2. Design an appropriate care plan including investigations
3. Participate in the management of common childhood disorders.
4. Carry out common diagnostic and therapeutic procedures in child health.
5. Apply preventive measures and carry out health promotion in child health.
6. Apply laws and acts and observe the rights of children.

Contents:

Comprehensive paediatric history: birth history; feeding history; socio-economic history; growth and development; childhood illnesses, appropriate information documentation, physical and mental examination, formulation of diagnosis, differential diagnosis, appropriate investigations and interpretation of results.

Design of an appropriate care plan for health problem diagnosed, patient monitoring, consultation and referrals. Competence in management of paediatric emergencies including resuscitation of the newborn, perinatal care and care of the newborn and other children. Clinical knowledge and use of pharmacotherapeutic agents in common paediatric conditions- indications, contraindications, drug interactions, side and toxic effects and appropriate dosages. Other therapeutic modalities including physiotherapy, occupational therapy, counseling, palliation and care of the terminally ill, the dying child and the bereaved.

Common paediatric disorders including: malaria; HIV; anaemia; acute respiratory infections; diarrhoea and vomiting; nutritional disorders and immunizable diseases; paediatric emergencies. Systemic paediatric disorders; congenital; infective; traumatic; immunologic; metabolic; neoplastic; degenerative; genetic and impact of environmental factors in disease conditions of the systems: Respiratory; Neoromuscular; Reproductive; Urinary; Haematologic and oncologic disorders; Cardiovascular; Endocrine; Skin and integumentary; Behaviour and psychiatric disorders; phobias; hysteria; anxiety; antisocial behaviour; truancy; drug abuse; behaviour problems associated with physical illness; neurotic and psychotic disorders. Adolescent medicine; neurosis; behaviour disorders; alcohol and substance abuse; psychotic disorders; hysteria; adolescent psychiatry.

Routine clinical procedures and investigations: Indications; limitations; potential complications; Perform under supervision; specimen handling; lumbar puncture; insertion of nasogastric tube; venepuncture; rectal examination, bladder catheterization, pleural tap,; ascitic tap; cardiopulmonary resuscitation; administer oxygen safely; Injections, (intravenous, intramuscular, subcutaneous) , bone marrow aspiration, nebulisation, arterial gas sampling. Carry out; urinalysis; peripheral blood film; blood slide for malaria parasites; CSF analysis

Disease Prevention and Health Promotion: Recognition of genetic predisposition, ethnic/cultural and environmental factors that influence health of children. Approach to prevention including sanitation and safe water supply. Knowledge of child survival

strategies including GOBIFFFFF, UNICEF. Appropriate and timely intervention. Screening programs.

Medico-Legal Issues: Knowledge of the Children's Act and its application; Child advocacy, child fostering and adoption, child living in difficult circumstances, child abuse, child labour, delinquency. Autopsy: indications, value and limitations. Euthanasia: definition and its application in childhood clinical practice.

Research in Health: Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases. Role of research in the advancement of diagnosis, therapy and management of patients.

MSC 602: SENIOR CLERKSHIP IN MEDICINE (6 UNITS)

Purpose

To equip the learners with the knowledge, skills and attitude appropriate for managing common and important adult medical problem.

Objectives

1. Describe the clinical process in internal medicine.
2. Describe the common disorders and emergencies in adult medicine
3. Describe the common investigations, diagnostic, and therapeutic procedures in adult medicine
4. Describe preventive and promotive strategies for common infectious and non-infectious disorders.
5. Describe the use of evidence based medicine in clinical care.

Outcomes

1. Carry out a medical interview, perform a comprehensive physical, examination and generate differential diagnosis.
2. Design an appropriate care plan including investigations
3. Participate in the management of common medical disorders and emergencies in internal medicine.
4. Carry out routine investigations and participate in common diagnostic and therapeutic procedures.
5. Apply preventive measures and carry out health promotive and rehabilitative activities.
6. Apply research principles and ev in internal medicine

Content:

Clinical process: focused history taking; comprehensive physical and mental examination;; recording of clinical data; interpretation of findings; interpretation of results of commonly done investigations e.g. basic haematology, blood biochemistry, urine and stool examination, X-rays, basic CT scans, electrocardiography, basic contrast studies among others; clinical decision making based on the available data; outline of patient management plan; case presentation.

Routine clinical procedures and investigations: Indications; limitations; potential complications; specimen handling; lumbar puncture; insertion of nasogastric tube; venepuncture; rectal examination, bladder catheterization, pleural tap,; ascitic tap; cardiopulmonary resuscitation; administer oxygen safely; Injections, (intravenous, intramuscular, subcutaneous) , bone marrow aspiration, nebulisation, arterial gas

sampling. Urinalysis; peripheral blood film; blood slide for malaria parasites; CSF analysis.

Design of an appropriate care plan for health problem diagnosed, patient monitoring, consultation and referrals. Common disorders in internal medicine: Respiratory disorders, Cardiovascular disorders: Endocrine and metabolic disorders; Neurological disorders; Gastro-enteric disorders; Renal disorders; Rheumatological disorders; Haematopoietic and lymphoreticular disorders; Infectious diseases and HIV/AIDS; Oncology (neoplastic disorders); Common emergencies in medicine.

Health Promotion in Medicine: Factors influencing the medical care of individuals and community; socio- economic, cultural, familial, psychological, economic, environmental, legal, political and spiritual factors. Advocacy; Prevention of diseases and accidents; Medical appliances

Research in Health: Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases. Role of research in the advancement of diagnosis, therapy and management of patients.

MSC 603: SENIOR CLERKSHIP IN REPRODUCTIVE HEALTH (6 UNITS)

Purpose

To equip the learners with the knowledge, skills and attitude appropriate for managing common disorders of the female reproductive system and the normal processes of pregnancy and puerperium and their complications

Objectives

1. Describe the clinical process in reproductive health
2. Describe the common disorders and emergencies in reproductive health and their management
3. Describe the common investigations, diagnostic, and therapeutic procedures in reproductive health.
4. Describe preventive and promotive strategies for common reproductive health disorders.
5. Describe the use of evidence based medicine in clinical care..

Outcomes

1. Apply the principles and practice of sexual and reproductive health in the management of patients
2. Demonstrate ability to elicit and document a proper history and comprehensive physical examination of a patient with sexual and reproductive health condition
3. Participate in the management of common disorders in sexual and reproductive health.
4. Carry out routine investigations and participate in common diagnostic and therapeutic procedures in sexual and reproductive health.
5. Apply preventive measures and carry out health promotion in sexual and reproductive health.
6. Apply research principles in sexual and reproductive health.

Content:

Principles and practice: doctor-patient relationship, communication, theatre procedures and instruments; infection control and prevention, Rational use of medication; peri-operative care and optimization; haemostasis and control of bleeding

Clinical process: focused history taking including socio-cultural issues; comprehensive physical examination; summarized history; recording of clinical data; interpretation of findings; case presentation; diagnostic and technical procedures, imaging techniques: partogram, recording and record keeping including electronic records.

Management: Obstetric conditions; Focused antenatal care; HIV/ AIDs management and PMTCT; multiple gestation; Antepartum hemorrhage; Hypertensive diseases of pregnancy; Diabetes; cardiac disease, anaemia, malaria and other infections and infestations, Disorders associated with the puerperium: lactational problems; postpartum haemorrhage; sepsis; depression;, intrapartum and postpartum disorders of the fetus; neonatal resuscitation. Abnormal labour; induction; methods of operative delivery; Genital tract trauma; prolapse and incontinence.

Gynaecological Conditions; Vulvovaginitis; salpingitis; pelvic inflammatory disease; toxic shock syndrome; mastitis; breast abscess; orchitis; epididymitis; sexually transmitted infections, (including HIV/AIDs), abnormal vaginal bleeding, abortions and related complications, ectopic pregnancy, gestational trophoblastic diseases, genital tract trauma; pelvic organ prolapse and incontinence. Malignancies: Tumors of the uterus, cervix, ovaries, breast, testis; Radiotherapy and chemotherapy;

Menstrual disorders; infertility; polycystic ovarian disease; endometriosis; sexual dysfunction; Assisted reproductive technology ,Treatment of menstrual disorders; hormone replacement; antimicrobials; antineoplastics; Family planning ; population dynamics, the FP programme. Human sexuality and sexuality disorders; Sexual and gender based issues. Clinical Audits

Catheterization; Rupture of membranes; Normal deliveries; Apgar scoring; Resuscitation of the newborn; Episiotomy and repair; Repair of perineal tears; Pelvimetry; Manual vacuum aspiration; Speculum examination; Pap smear; colposcopy, Insertion and removal of IUCDs; Ultrasonography; Bishop scoring, induction of labour; Vacuum delivery; Breech delivery; Breech extraction; Amniocentesis; Paracentesis; Culdocentesis; HSG; hysteroscopy, laparoscopy, Laparotomy for ectopic pregnancy; Manual removal of placenta; Cervical cerclage; Minilap BTL; Caesarean section; Oophorectomy; Myomectomy; Hysterectomy; Drainage of pelvic abscess

Recognition of genetic predisposition, ethnic/cultural factors, occupational risks, risk assessment for diseases,risk exposure and lifestyle. Screening programs:- Pap smears and breast examination. Immunization programs. Behavioural modification. Appropriate and timely intervention programs. Advocacy for sexual and reproductive health and rights. Educational programs and other interventions. Prevention of sexual and reproductive health diseases; participate in youth friendly, male friendly and couple/family friendly clinics. Pre-marital and marital counseling

Research in Health: Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases. Role of research in the advancement of diagnosis, therapy and management of patients.

MSC 604: SENIOR CLERKSHIP IN GENERAL SURGERY (6 UNITS)

Purpose

To equip the learners with the knowledge, skills and attitude appropriate for managing common surgical conditions.

Objectives

1. Describe the principles and practice of surgery
2. Describe the clinical process in surgery
3. Describe the common disorders and emergencies in surgery and their management
4. Describe the common investigations, diagnostic, and therapeutic procedures in surgery.
5. Describe preventive and promotive strategies for common surgical disorders.
6. Describe the use of evidence based medicine in clinical care.

Outcomes

Apply the principles and practice of surgery in the management of patients

Demonstrate ability to elicit and document a proper history and comprehensive physical examination of a surgical patient

Participate in the management of common surgical disorders.

Carry out routine investigations and participate in common diagnostic and therapeutic procedures in general surgery.

Apply preventive measures and carry out health promotion in surgery.

Apply research principles in surgery.

Content:

Principles and practice of surgery: Theatre procedures and instruments; infection control and prevention, Rational use of anti-microbials; peri-operative care and optimization; haemostasis and control of bleeding;

Clinical process: focused history taking; comprehensive physical and mental examination;; recording of clinical data; interpretation of findings; interpretation of results of commonly done investigations; basic haematology, blood biochemistry, urine and stool examination, X-rays, basic CT scans, electrocardiography, basic contrast studies among others; clinical decision making based on the available data;

Management of surgical disorders: Designing an appropriate comprehensive management plan for the surgical disorders; supportive treatment and resuscitation, definitive treatment and rehabilitation, surgical prophylaxis. Patient monitoring: vital signs; biochemical parameters. Consultation and referrals. Rational use of pharmacotherapeutics; other therapeutic modalities. Counseling. Palliation in surgery and care of the terminally ill. Surgical disorders of body systems-congenital and acquired including; dysphagia, acute abdomen; intestinal obstruction; abdominal wall

disorders, gastro-intestinal tract bleeding; hepato-biliary disorders; peptic ulcer disease; peri-anal lesions. Cardiac disorders. Vascular diseases; aneurysms, varicose veins and varicose ulcers, arterio-venous shunts, lymphatic disorders. Endocrine disorders; thyroid and parathyroid glands, adrenal glands. Genito-urinary disorders; obstructive uropathy; haematuria, acute scrotum. Neurological disorders: hydrocephalus, head injury. Thoracic disorders; chest injury, empyema thoracis; foreign body in bronchus. Skin and integumentary; skin lesions, benign and malignant lesions, reconstructive skin surgery. Traumatic disorders.

Diagnostic procedures and investigations: indications, complications and limitations of Procedures including; fundoscopy, lumbar puncture, pleural tap, Nasogastric tube, urinary catheterization, per-rectal exam, Biopsy of superficial and easily accessible lesions; ascitic tap, abdominal paracentesis; diagnostic peritoneal lavage. Laboratory tests; hematology, blood biochemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies; CSF studies; endocrinology tests, Basic imaging studies

Preventive and Health Promotion in Surgery: Recognition of genetic predisposition, ethnic/cultural factors, occupational risks, exposure and lifestyle. Screening programs. Immunization programs. Behaviour modification. Appropriate and timely intervention programs. Advocacy for right to health of individuals and community. Educational programs and other interventions. Prevention of disease

Research in Health: Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases. Role of research in the advancement of diagnosis, therapy and management of patients.

MSC 605: CLINICAL MANAGEMENT III (2 UNITS)

Purpose

To integrate the management of various systemic and infectious disorders in a holistic manner

Objectives

1. Discuss the management of urinary system disorders.
2. Discuss the management of body fluid disorders.
3. Discuss the management of endocrine disorders.
4. Discuss the management of male and female reproductive system disorders

Outcomes

1. Participate in the holistic management of various systemic disorders

Content

Urinary Systems Disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders including renal pathology in systemic hypertension, nephrotic syndrome, other nephropathies, renal calculi, renal failure, hydronephrosis, urinary bladder function disorders, urethral stricture.

Body Fluid Disorders: imbalances of water and electrolytes, oedematous states, acidosis, alkalosis and other conditions requiring fluid and electrolyte therapy.

Endocrine Disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders of the hypothalamus, pituitary, thyroid, parathyroid, adrenal glands, pancreas, ovary, testicle

Reproductive System Disorders: Normal pregnancy, Adolescent and elderly gravida, hyperemesis gravidarum, multiple pregnancy, malpresentations: breech presentation, other malpresentations; gynecological disorders of puberty, adolescence and menopause; Abnormal vaginal bleeding; pelvic support disorders; genital tumours, human sexual dysfunction; amenorrhea; unstable lie, PET/Eclampsia, genital tract infection in Pregnancy, APH, foetal death, liquor abnormalities. Preterm labour and PROM, postdatism/postmaturity, Rhesus immunisation, Diabetes in pregnancy, other endocrine disorders in pregnancy. Active management of labour, operative vaginal delivery, Caesarian Section. Genital tract Trauma, Obstetric shock. Pre-eclamptic Toxaemia (PET), Post Partum Haemorrhage (PPH), Preterm labour and Premature Rupture of Membranes (PROM). Medical conditions in pregnancy including malaria, anaemia, Deep Venous Thrombosis (DVT) and Urinary Tract Infection (UTI). Abnormal labour, Operative vaginal delivery, Caesarian Section, retained placenta. Genital trauma. Postnatal care, puerperal sepsis. Pelvic infections, STDs, infertility and pregnancy wastage. Epididymoorchitis, urethritis, testicular torsion, genital tumours. Imaging in Obstetrics and Gynaecology and in male reproductive system.

MSC 606: CLINICAL MANAGEMENT IV (2 UNITS)**Purpose**

To integrate the management of various systemic and infectious disorders in a holistic manner

Objectives

1. Discuss the management of musculoskeletal system disorders.
2. Discuss the management of neurological disorders.
3. Discuss the management of behavior and psychiatric disorders.

Outcomes

1. Participate in the holistic management of various systemic disorders

Course Content

Musculoskeletal system disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders including arthritis, muscular dystrophies, bone tumors, trauma.

Neurologic disorders: congenital, inflammatory, neoplastic, degenerative and traumatic disorders including space occupying lesions, epilepsies, trauma.

Behaviour and Psychiatric disorders: Personality disorders; neuroses; psychoses; drug; and alcohol abuse; acute and chronic psychiatric states; organic psychiatric disorders; affective disorders. Child and adolescent behavioral and mental disorders.

MSC 607: MEDICAL ETHICS AND MEDICO-LEGAL ISSUES (3 UNITS)**Purpose**

To equip the learners with the basic principles of Professional conduct, Ethical practice and medico-legal issues in their daily practice of medicine.

Objectives

1. Demonstrate knowledge of ethics, principles, and values which underpin the practice of good medicine and medical research.
2. Demonstrate ethical knowledge in the care of special/vulnerable groups.
3. Discuss ethical and legal issues in human reproduction and emerging/re-emerging issues.
4. Discuss the concept of Death and Dying.
5. Recognize vulnerabilities created by the duties of doctors and medical student

Outcomes

1. Conduct oneself in an ethical and professional manner and observe the professional code of ethics
2. Make ethical decisions for patients under care and advocate for the health rights of individuals, family or community.
3. Apply ethical principles in Medical research
4. Work as a member of a team, with equal respect to others regardless of discipline or rank

Content:

Ethical principles and values: Definitions: ethics, morality, professionalism; characteristics of profession;

Informed consent and refusal of treatment: respect for autonomy; adequate information and comprehension, non coercion; treatment without consent and proxy consent; competence; battery and negligence. The clinical relationship: truthfulness, trust, and good communication; Ethical limits of paternalism; building trust; honesty, courage, and other virtues in clinical practice; narrative and the importance of communication skills. Confidentiality: Clinical importance of privacy; compulsory and discretionary disclosure; public v private interests; importance of cultural, gender, inter-generational, religious and racial sensitivity. Ethics in Vulnerable groups: Children's rights and interests; age in the determination of competence to consent to or refuse treatment; legal boundaries of consultation with younger and older children as regards consent to treatment; doctor/parent relationship: proxy decision making and protecting children's interests; child abuse. Mental disorders and disabilities: Ethical and legal justifications for detention and treatment without consent; conflicts of interests between patient, family, and community.

Human reproduction and emerging issues: Ethics and the legal status of the embryo/fetus; maternal fetal relationship; assisted conception; abortion, including prenatal screening. Sterilisation; pre and postnatal screening and testing: informed consent and the interests of the future child. The 'New Genetics: Gene therapy; genetic counselling; genetic testing and screening after birth: the risks of unwelcome information and of genetic stigmatization; cloning: genetic versus personal identity implications; transplantation.

Life, death, dying and killing: Palliative care, length and quality of life and good clinical practice. The duty of care and ethical and legal justifications for the non-provision of life prolonging treatment and the provision of potentially life shortening palliatives; transplantation. Euthanasia and assisted suicide, Transplantation, Death certification

Medical Research: Individual rights, moral tension, and the interests of others. Therapeutic and non therapeutic research; Professional and legal regulation of medical research. ; Ethical distinctions between research, audit and innovative and standard therapy, patients and healthy volunteers; Ethical and legal tensions in doing medical research on patients, human volunteers, vulnerable groups, and animals; the need for effective regulation.

Professional vulnerabilities: Public expectations of medicine; the need for teamwork; the health of doctors and students in relation to professional performance; responding appropriately to clinical mistakes; whistle-blowing. The law of negligence, MPDB complaints and disciplinary procedures; risks, sources of help and duties to disclose; human rights; medical ethics and the involvement of doctors in police interrogation, torture and capital punishment.

MSC 608: CHRONIC DISEASE MANAGEMENT AND PALLIATIVE CARE**Purpose**

To equip the learners with the knowledge, skills and attitude appropriate for managing common chronic diseases.

Objectives

1. Explain the principles and practice of chronic disease care.
2. Describe the application of these principles to the management of common diseases needing chronic disease management.
3. Explain the principles and concepts of palliative care.
4. Discuss management of pain and common distressing symptoms in the terminally ill.
5. Discuss the role of psychosocial and spiritual aspects in the provision of chronic disease and palliative care services.
6. Describe the importance of Nutrition in chronic disease and the terminally ill.
7. Discuss effective communication and counseling strategies in the terminally ill and patients with chronic disease.

Outcomes

1. Apply the principles, concepts and practice of chronic disease and palliative care.
2. Manage pain and common distressing symptoms in the terminally ill.
3. Demonstrate knowledge of psychosocial and spiritual aspects in the provision of chronic disease and palliative care services.

4. Utilize appropriate nutritional interventions in chronic disease and the terminally ill.
5. Communicate effectively and appropriately counsel the terminally ill and patients with chronic disease.

Content

Definition of chronic disease, principles of care – adherence to medical regime, regular visits, multidisciplinary approach, patient education, developing management plans, record-keeping, following protocols.

HIV/AIDS, diabetes, hypertension, congestive heart failure, sickle cell disease, asthma, epilepsy, arthritis, mental disorders.

Concept of palliative care: Definition, rationale for palliative care, goals of palliative care, multidisciplinary team approach, palliative care and suffering, principles of palliative care, communication with patients, advanced care planning, models of care, barriers to palliative care, ethical and legal issues.

Pain: Definition, Concept of total pain and types of pain, Assessment of pain, Pain management- WHO pain management ladder, NSAIDs, opioids and non-opioid analgesics, use of adjuvants or co-analgesics, local anaesthetic and nerve blocks, physical therapies for pain, psychosocial aspects of pain control, barriers to pain management. Roles of chemotherapy and radiotherapy. Management of common symptoms of patients with life limiting illnesses and End of life care, Recognizing death, Complications/adverse effects of therapy in palliative care ; Principles of wound,

skin and mouth care: common oral problems and oral care, decubitus ulcers; Common drug interactions in patients receiving palliative care

Psychosocial care: Definition, psychosocial problems, factors that lead to psychosocial problems and effects on adults, children, and adolescents, signs and symptoms of psychosocial problems and interventions, clinical features, assessment and management of anxiety and depression in the terminally ill; Spirituality, Common aspects of Spiritual Care, Task of Spiritual Care, Fears of Death, Cultural aspects of palliative Care, Spiritual Issues at the end of life. Caring for families and friends of the terminally ill.

Nutrition in palliative care: Definition, Importance and goals, Assessment of nutritional status, Five key aspects of nutrition care, Relationship between nutrition and HIV & AIDS, cancer and other life limiting illnesses, types of HIV & AIDS and cancer related malnutrition nutrient requirements, nutritional counseling and role of nutritionist/dietitian

Counseling: Counseling skills, Counseling process, Client counseling issues in regards to HIV&AIDS and cancer, Care and support for care givers; Meaning of loss, grief and Bereavement, Types of grief, grief process, Death, Dying and Ourselves; Breaking bad news.

4.0 APPENDICES

APPENDIX 1

LIST OF RECOMMENDED BOOKS

COMMUNICATION SKILLS

- i. Shalini Aggarwal, *Essential Communication Skills*.
- ii. AneLeena Sen, *Communication Skills*: Prentice-Hall of India, New Delhi; Summers; Communication Skills Handbook.
- iii. J.W. Mac Amy E., *Communication in the Third World*: New York, Praeger Publishers.
- iv. Okombo Okoth, *A Student Guide to Writing and Study Skills*: Nairobi University Press.
- vi. Bint P. *et al*, *A University Course in Communication Skills*: Nairobi University Press and British Council, Nairobi.

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

- i. James F. Clark (2008); *Computers and Information Processing Concepts and Applications* 1st Ed.; South Western Publishers (Revised Edition)
- ii. *Kalicharan (2009); An Introduction To Computer Studies (clpe); Cambridge University Press*
- iii. Sawyer W.(2001); *Using Information Technology: A Practical Introduction to Computers*: McGraw-Hill.
- iv. *Introduction to computers & programming. Onunga, J. (1999) Mariwa*
- v. Peter Norton, *Introduction to Computers: Career Education (10:0078264219)*.

- vi. Timothy Edward Downs, How Computers Work (9th Edition, Que 10: 0789736136).

NURSING SKILLS

- i. A.G Griffin and P.A Potter, (2009);Clinical Nursing Skills and Techniques ; Mosby, 7th Edition
- ii. S.F Smith, D.J Duell and B.C Martin ,(2007);Clinical Nursing Skills: Basic to Advanced Skills: Prentice Hall, 7th Edition
- iii. Springhouse, Lippincott Williams & Wilkins, (2008);Lippincott's Nursing Procedures,5th Edition
- iv. Pamela (2005) Taylor's Clinical Nursing Skills: A nursing process Approach 1st Ed. Lippincott William
- v. Rosdahl Kowalski, Textbook of Basic Nursing 8th Ed.,Lippincott Williams & Wilkin

HUMAN COMMUNICATION SKILLS

- i. Melanie Sears (YR), Choose Your Words: Harnessing the Power of Compassionate Communication to Heal and Connect (ISBN 9780979620621). Amazon.com.

EPIDEMIOLOGY AND BIostatISTICS

- i. Essentials of Epidemiology in Public Health 2nd ed by Ann Aschengrau and George R. Seage III 2008. Jones & Bartlett (Publishers)

- ii. Modern Epidemiology 3rd ed by K. J. Rothman, S. Greenland and T. L. Lash
2008 Lippincott Williams and Wilkins
- iii. Epidemiology for Public Health Practice 4th ed 2008 Jones and Bartlett
(Publishers)
- iv. Jane McCusker (2001); Epidemiology in Community Health; AMREF
- v. Goordis, Leon (2004). Epidemiology (3rd ed.). Elsevier Saunders, Philadelphia,
Pa.

BEHAVIORAL SCIENCES AND ETHICS

- i. Simon J. William, Jonathan Gabe, Michael Calman (2001): Health Medicine
and Society, Key Theories, Future Agendas.(classic text)
- ii. Jonathan Gabe, Michael Calman, Michael Bary (2003): The Sociology of
Health Service.
- iii. Marita R. Inglehart (1998): Medical Psychology: A Basis for Psychiatry and
Clinical Psychology.

Recommended further Reading:

- i. G. K. Yacorzynski (1951): Reactions to Critical Life Events: A social
Psychological Analysis. (classic text)
- ii. Caroline Sargent, Thomas M. Johnson (1996): Medical Anthropology:
Contemporary Theory and Method.

CELL BIOLOGY AND MOLECULAR GENETICS

- i. Lauralee Sherwood, *Human Physiology: From Cells to Systems*.
- ii. Brooks Cole, Harvey Lodish, *Molecular Cell Biology*.
- iii. W.H. Freeman, David Landowne, *Cell Physiology* (LANGE Physiology Series): McGraw- Hill Medical.
- iv. Wayne M. Becker, Lewis J. Kleinsmith, Jeff Hardin, Gregory Paul Bertoni, *The World of the Cell*: Benjamin Cummings.
- v. Valerie C. Scanlon, Tina Sanders, *Essentials of Anatomy and Physiology*: F.A. Davis Co.

HUMAN ANATOMY AND EMBRYOLOGY

- i. Drake, Vogel and Mitchell (2009), *Gray's Anatomy for Students*, Churchill Livingstone, 40th Edition.
- ii. G.L.Romanes, *Cunningham's Manual of Practical Anatomy Vols.I, II & III* Oxford University Press, 15th edition (1996)
- iii. Simnatamby (2011), *Last's Anatomy: Regional and Applied*, Churchill Livingstone, 12th Edition.1
- iv. Snell (2006), *Clinical Anatomy*, Lippincot, Williams and Wilkins. 1st Edition.
- v. Windmaier, Raff and Strang (2005), *Vander, Sherman & Luciano's Human Physiology*, McGraw-Hill, 10th Edition.
- vi. Junqueira, Carneiro (2005), *Basic Histology: Text and Atlas*, McGraw-Hill, 10th Edition.
- vii. Sadler (2003), *Langman's Medical Embryology*, Lippincot, Williams and Wilkins. 9th Edition.

- viii. Moore and Persand (2003), *The Developing Human: Clinically Oriented Embryology*, WB Saunders and Company, 6th Edition.
- ix. Moor and Dalley (eds) (1999), *Clinically Oriented Anatomy*, Lippincott, Williams and Wilkins. 4th Edition.
- x. Kerr (1999), *Atlas of Functional Histology*, Mosby, 1st Edition
- xi. Richard S. Snell (2000), *Clinical Embryology for Medical Students*; Little Brown & Co.
- xii. J.S.P Lummley (2008); *Surface Anatomy: The anatomical basis of Clinical examination*; Churchill Livingstone; 4th Edition
- xiii. D.Field, and J.O Hutchinson (2006); *Field's Anatomy, Palpation and Surface Markings*; Butterworth-Heinemann, 4th Edition and Company, 2nd Edition.
- xiv. K.L Moore and A.M.R Agur (2006); *Essential Clinical Anatomy by*; Lippincott Williams and Wilkins, 3rd Edition

IMMUNOLOGY

- i. Immunology Ed. 5th Richard A. Goldsby, Thomas J Kindt, Barbara A Osborne, Janis Kuby.
- ii. Immunology Ed. 6th Ivan Roitt, Jonathan Brostoff, David Male

NUTRITION AND DIETETICS

- i. Escort-Stump (2007): *Nutrition and diagnosis-related care* Lippincott Williams and Wilkins, 6th Edition
- ii. LK Mahan and S Escort-Stump (2007): *Krause's Food and Nutrition Therapy*; Saunders, 12th Edition

- iii. S.S. Gropper and JL Smith (2008): *Advanced nutrition and human metabolism*; Wadsworth Publishing, 5th Edition
- iv. *Nutrition therapy and pathophysiology*, by M Nelms, KP Sucher and S Long; Books Cole, 1st Edition 2006
- v. American Dietetic Association: *International Dietetics and Nutrition Terminology Reference Manual*; American Dietetic Association.

Recommended text books for further Reading:

- i. Roth, A.R. and Townsend, C.F. *Nutrition and Diet Therapy* (ISBN 0766835677): Thompson Delmar Learning.
- ii. Eschleman, M. *Introductory Nutrition & Diet Therapy*: Philadelphia J.P: Lippincott Therapy.91
- iii. Peckenpaugh, N.J., *Nutrition Essentials and Diet*.
- iv. Gordener, M., Roth, S.L. & Walkingsshaw, B., *Foundations and Clinical Applications of Nutrition: A Nursing Approach*. Mosby.

EPIDEMIOLOGY AND BIostatISTICS

Core text Books

- i. Ann Aschengrau and George R. Seage III., *Essentials of Epidemiology in Public Health* (ISBN-10:076374025X and ISBN-13:978-0763740252): Jones & Bartlett Publishers.
- ii. K.J. Rothman, S. Greenland and T.L., Lash Lippincott Williams and Wilkins, *Modern Epidemiology*.
- iii. *Epidemiology for Public Health Practice*: Jones and Bartlett (Publishers).
- iv. Jane McCusker, *Epidemiology in Community Health*: AMREF.

- v. Goordis, Leon, *Epidemiology Elsevier Saunders*: Philadelphia, Pa.
- vi. Lilienfield, Abraham, M., *Foundations of Epidemiology*: OUP New York.
- vii. Moon Graham, *Epidemiology: An Introduction*; Open University Buckingham.
- viii. Germstman, B., Burt, *Epidemiology Kept Simple: An Introduction to Traditional and Modern Epidemiology*: Wiley-Liss, Hoboken, N.J.
- ix. Gregg, Michael B., *Field Epidemiology*: OUP, Oxford.
- x. Olsen, Jorn; Saracci, Rodolfo, Trichoponlos, Dimtrios, *Teaching Epidemiology*: OUP, Oxford.
- xi. Oleske, Denise M., *Epidemiology and the Delivery of Health Care Services: Methods and Applications*; Plenumpub, Kluwer Academic

MICROBIOLOGY AND PARASITOLOGY

- i. G.J Tortora (2010); *Microbiology: An introduction*; Benjamin-Cummings Publishing Company
- ii. J Cappuccino and N Sherman (2007): *Microbiology: A laboratory manual* ; Benjamin- Cummings, 8th Edition,
- iii. E Nester, A Anderson and M Nester (2008): *Microbiology: A human perspective* ; McGraw-Hill Science, 6th Edition
- iv. M Gladwin and B Trattler, (2007): *Clinical microbiology made ridiculously simple* MedMaster Inc, 4th Edition

Recommended further Reading:

- i. R. Bauman, *Microbiology: With Diseases by Taxonomy*; Benjamin Cunnings/Pearson Education.
- ii. J.G. Black, *Microbiology: Principles and Explorations*.
- iii. Wiley, R.A. Pollack, L. Findlay, W. Mondschein and R. Modesto, *Laboratory Exercises in Microbiology*: Wiley.

MEDICAL BIOCHEMISTRY

- i. Nelson DL& Cox MM (2011) Lehninger: Principles of Biochemistry, Macmillan, 978-0321707338, 5th edition
- ii. Robert Murray (2012); Harper's Biochemistry, McGraw-Hill Medical 29th edition
- iii. Stryer L. (1995) Biochemistry illustrated WH Freeman, 0-7167-2009-4
- iv. Robert Murray (2012); *Harper's Biochemistry*, McGraw-Hill Medical 29th edition
- v. Textbook of Biochemistry with Clinical Correlations. Ed. Thomas M. Devlin, Wiley-Liss Publishers.

CLINICAL CHEMISTRY

- i. G. J. Beckett, Simon W. Walker, Peter Rae, and Peter Ashby (2005): Lecture Notes: Clinical Biochemistry, Wiley-Blackwell; 7th Edition
- ii. Allan Gaw, Michael J. Murphy, Robert A. Cowan, Denis St. J. O'Reilly, Michael J. Stewart and James Shepherd (2008): Clinical Biochemistry: An Illustrated Colour Text, Churchill Livingstone; 4th Edition

- iii. John R. Bradley, David Johnson, and David Rubenstein (2001): Lecture Notes on Molecular Medicine: Wiley-Blackwell; 2nd Edition
- iv. R. N. Walmsley, L. R. Watkinson, and H. J. Cain (1999): Cases in Chemical Pathology: A Diagnostic Approach

MEDICAL PHYSIOLOGY

- i. John E. Hall (2011); Textbook of Medical Physiology: Saunders; 12th Edition
- ii. Rodney A. Rhoades PhD (Editor), David R. Bell (Editor) (2012). Medical Physiology: Principles for Clinical Medicine. Lippincott Williams & Wilkins; 4th Edition
- iii. John E. Hall (2011); Guyton's Textbook of Medical Physiology: Saunders; 12th Edition
- iv. Kim E. Barrett, Susan M. Barman, Scott Boitano and Heddewen Brooks (2012); Ganong's Review of Medical Physiology, McGraw-Hill Medical; 24th Edition
- v. Walter F. Boron MD PhD (Author), Emile L. Boulpaep MD (Author) (2011). Medical Physiology: Saunders Updated 2nd Edition
- vi. Windmaier, Raff and Strang (2005), Vander, Sherman & Luciano's Human Physiology, , McGraw-Hill, 10th Edition.

GENERAL AND SYSTEMIC PATHOLOGY

- i. Robin Reid, David J. Harrison, Alastair D. Burt, and Stewart Fleming, Muir's Textbook of Pathology (2008):Muir's Textbook of Pathology: Hodder Arnold; 14th Edition

- ii. Vinay Kumar Abul K. Abbas, Nelson Fausto, Jon Aster(2009): Robbins & Cotran Pathologic Basis of Disease::Saunders; 8th Edition
- iii. James O.D. McGee, Peter G. Isaacson, Nicholas A. Wright, and Heather M. Dick, Oxford Textbook of Pathology: Volume 1: Principles of Pathology; Oxford University Press, USA.
- iv. Cells, tissues and disease: Principles of general pathology by Oxford Univ Press, 2nd 2004
- v. David O. Slauson, Barry J. Cooper, and David O. Slauson, Mechanisms of Disease a Textbook of Comparative General Pathology: Mosby.
- vi. JCE Underwood and SS Cross (2009): General and systematic pathology; Churchill Livingstone, 5th Edition
- vii. EF Golian (2009): Rapid Review Pathology: Mosby, 3rd Edition

PHARMACOLOGY

- i. Dr Lawrence, PN Bennett & MJ Brown; Clinical Pharmacology
- ii. Katzung B.G,(2009), Basic and Clinical Pharmacology (0-07-117968-2): McGraw-Hill, 11th Edition
- iii. Handman J.G., Goodman & Gilman (2009): The Pharmacological Basis of Therapeutics: 12th Edition McGraw-Hill.
- iv. Tripathi K.D., Essentials of Medical Pharmacology : Jaypee Brothers.
- v. H.P. Rang, M.M. Dale et al, Pharmacology: Churchill Livingstone.
- vi. G. Grahame-Smith and J.K. Aronson, Oxford Textbook of Clinical Pharmacology and Therapy: Oxford University Press.

ENVIRONMENTAL AND OCCUPATIONAL HEALTH

- i. G.K. Rukunga, Environmental Health for East Africa, AMREF.
- ii. H. de Glanville, R.S.F. Schilling, C.H. Wood, Occupational Health AMREF.
- iii. The Kyoto Protocol on Climate Change: UN/UNEP Publication.

RESEARCH METHODS

Core Text Books

- i. R. Fisher, Research Methods: Quantitative and Qualitative Approaches.
- ii. Olive M. Mugenda, Research Methodology: Methods and Techniques (9966-41-107-0); ACTS: Nairobi.

HAEMATOLOGY AND BLOOD TRANSFUSION

- i. B.J. Bain, Blood Cells: A Practical Guide; Wiley-Blackwell.
- ii. D.M. Harmening, Modern Blood Banking and Transfusion Practices: F.A. Davis Co,
- iii. D. Harmening, Clinical Haematology and Fundamentals of Haematosi: FADavis Co,
- iv. C.D. Hillyer L.E. Silberstein, P.M. Ness et al; Blood Banking and Transfusion Medicine: Basic Principles and Practice; Churchill Livingstone.
- v. J. McCulough, Transfusion Medicine: Churchill Livingstone.
- vi. H.G. Klein and D.J. Anstee, Mollison's Blood Transfusion in Clinical Medicine: Wiley Blackwell.

FORENSIC MEDICINE AND TOXICOLOGY

Core Texts:

- i. K. S. N. Reddy (2002): The essentials of Forensic Medicine & Toxicology;. Published by-K. Saguna Devi, H, No. 16-11-15/2/2, Saleem nagar Colony, No.1, malapet, Hyderabad-500036; 21st Edition
- ii. BV Subramanyam, Butterworths (2001): Modi's Textbook of Medical Jurisprudence and toxicology-India, New Delhi.22nd Edition,.
- iii. C. K. Parikh (1999) :A text book of Medical Jurisprudence, Forensic Medicine & Toxicology, CBS Publishers, Delhi, 6th Edition.

Recommended Further Reading:

- i. Dr. Apurba Nandy(2000): Principles of Forensic Medicine, , New Central Book Agency (P) Ltd. Calcutta, 3rd Edition
- ii. Dr. Krishan Vij (2002): Text book of Forensic Medicine & Toxicology- Principles and Practice, BI Churchill Livingston, New Delhi, 2nd Edition

CLINICAL TECHNIQUES AND BASIC LIFE SUPPORT

Core Texts:

- i. Michael Swash, Michael Glynn (2007): Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice; Saunders Ltd; 22rd Edition
- ii. Graham Douglas, Fiona Nicol, Colin Robertson (2009):Macleod's Clinical Examination: Churchill Livingstone; 12th Edition
- iii. St. Johns First Aid Manual

Recommended Further Reading:

- i. Norman S Williams, Christopher J.K. Bulstrode, and P Ronan O'Connell,(2008): Bailey and Love's Short Practice of Surgery ; Oxford University Press, USA; 25th Edition
- ii. Hamilton Bailey's and John S. P. Lumley Hamilton, (1997): Bailey's Physical Signs: Demonstration of Physical Signs in Clinical Surgery: A Hodder Arnold Publication; 18th Edition (Classic)
- iii. Andrew W. Bradbury, O. James Garden, John L. R. Forsythe, and Rowan W Parks(2007):Principles and Practice of Surgery; Churchill Livingstone; 5th Edition

ENTREPRENEURSHIP**Recommended Text Books**

- i. Kurako, D. F. and Hodgets, R.M. (2003); Entrepreneurship Theory Process and Practice; Thomson, South Western Publishing Co
- ii. Drunker P.F. ; Innovations and Entrepreneurship; McGraw- Hill, London
- iii. Timons J.A (2008); New Venture Creation: Entrepreneurship for the 21st Centaury; Irwin, Burry Ridge
- iv. Entrepreneurship: Starting developing and managing a new enterprise 2nd Edition Robert Hisrich (1992); Homewood Boston

OPHTHALMOLOGY

Core Texts:

- i. JP Ehlers, CP Shah, et al (2008) The Wills Eye manual: Office and emergency room diagnosis and treatment of eye disease, Lippincott Williams and Wilkins, 5th Edition
- ii. J J Kanski(2007) Clinical ophthalmology: A systematic approach, Butterworth-Heinman, 6th Edition
- iii. Parson's diseases of the Eye, 19th Edition.

Recommended Further Reading:

- i. J.D Bartlett and S.D Jaanus (2007) Clinical ocular pharmacology, Butterworth-Heinman, 5th Edition

ENT

Core Texts:

- i. HS Ludman and P Bradley (2007)ABC of Ear Nose and Throat, BMJ Books 5th Edition
- ii. Magbool; (2007) Textbook of Ear, Nose and Throat Diseases, Jaypee Brothers Medical Publishers (P) Ltd,
- iii. MJ Gleeson, NS Jones, et al; (2008) Scott-Brown's Otorhinolaryngology: Head and Neck surgery; Oxford Univ Press, 7th Edition

Recommended Further Reading:

- i. Logan Turner; Text Book of ENT
- ii. Scott Brown's Otolaryngology - 5 volumes
- iii. P.L Dhingra ; Text book of ENT

- iv. K.J Lee; (2008) Essential Otolaryngology: Head and Neck Surgery, McGraw-Hill Professional, 9th Edition

RADIOLOGY AND IMAGING

Core Texts:

- i. R. Weissleder, J Wittenberg, Harisinghani, et al; (2006) Primer of diagnostic imaging with CD-ROM, Mosby 4th Edition
- ii. W.R Webb, W Brant and N Major; (2005) Fundamentals of body Ct, Saunders, 3rd Edition
- iii. W Huda(2009) Review of radiologic physics; Lippincott Williams and Wilkins, 3rd Edition 2009
- iv. L.F. Donnelly(2008) Paediatric Imaging: The Fundamentals, Saunders, 1st Edition
- v. Mettler and MJ Guiberteau (2005) Essentials of Nuclear medicine imaging: Saunders, 5th Edition
- vi. P. Shackett (2008) Nuclear medicine technology: Procedures and quick reference, Lippincott Williams and Wilkins, 2nd Edition

DERMATOLOGY

Core Textbooks

- i. TP Habif and TP Habif (2003) Clinical Dermatology: A color guide to diagnosis and therapy, Mosby, 4th Edition
- ii. TP Habif, JL Campbell Jr, et al (2004) Skin Diseases: Diagnosis and treatment, Mosby 2nd Edition

- iii. MW Mann, DR Berk, et al (2009) Handbook of dermatology: practical manual, Wiley-Blackwell, 1st Edition
- iv. Neena Khanna: Text Book of Dermatology and Venereology
- v. L.K. Bhutani: Atlas of Dermatology

ANAESTHESIOLOGY AND CRITICAL CARE

Core Textbooks

- i. Alan R. Aitkenhead, David J. Rowbotham, Graham Smith: “The book of Anaesthesia” ;Churchill Livingstone.
- ii. Colin Pinnock, Ted Lin, Tim Smith: “Fundamentals of Anaesthesia”; Greenwich Medical Media Ltd.
- iii. E.d. Petter Hurtton, Cooper Butterworth (2002) Fundamental Principles and practice of Anaesthesia, Martin Dunitz,.
- iv. Principles and Practice of Anaesthesiology Edited David E. Longnecker Published by Mosby St. Louis.
- v. J.J. Marini and AP Wheeler (2009) Critical care medicine: The essentials, Lippincott Williams and Wilkins, 4th Edition
- vi. R.K. Stoelting, SC Hillier et al (2005) Pharmacology and physiology in anaesthetic practice, Lippincott Williams and Wilkins, 4th Edition

ORAL HEALTH

Core Textbooks

- i. M.P. Bonner and E Mindell (2003) The Oral Health Bible, Basic health publications, 1st Edition

- ii. R.C. Atkins et al; (2008)Whole-body dentistry,Quantum Health Press LLC; 1st Edition
- iii. A.L. Sutton, Dental care and oral health sourcebook, by; Omnigraphics 3rd Edition
- iv. Dental Public health: Contemporary practice for the dental hygienist; Prentice Hall, 2nd Edition 2004
- v. E.B. Hayeless (2007)Applied Pharmacology for the dental hygienist, Mosby, 5th Edition
- vi. O.A.C. Ibsen and J.A. Phelan (2008) Oral pathology for the dental hygienist, Saunders, 5th Edition

ORTHOPAEDICS AND TRAUMATOLOGY

Core Textbooks

- i. David L. Hamblen, Hamish Simpson (2009): Adams's Outline of Orthopaedics; Churchill Livingstone; 14th Edition
- ii. David L. Hamblen and Hamish Simpson, (2007):Adams's Outline of Fractures: Including Joint Injuries; Churchill Livingstone; 12th Edition
- iii. Orthopedic traumatology – A resident’s guide, by David Ip; Springer 2 Edition 2006
- iv. A clinical guide to dental traumatology, by LH Berman, LB Endodontist, et al Mosby 1st Edition 2006
- v. Operative approaches in orthopedic surgery and traumatology, by F Kerschbaumer; Thieme Medical Pub, 2010
- vi. Orthopedic rehabilitation, assessment and enablement, by David Ip; Springer 1st Edition 2007

- vii. Essentials of physical medicine and rehabilitation, by WR Frontera, JK Silver and T.D. Rizzo Jr.; Saunders, 2nd Edition 2008

COMMUNITY HEALTH

Core Texts:

- i. C. H. Wood, H. de Glanville, J. P. Vaughan: Community Health, AMREF; 3rd Edition
- ii. Gina Joubert, Rodney Ehrlich (2000): Epidemiology: A Research Manual for South Africa, Oxford University Press, 2nd Edition.
- iii. J F McKenzie, R R Pinger and J E Kotecki (2007): Introduction to community health ; Jones & Bartlett Publishers Inc, 6th Edition
- iv. J.F. McKenzie, R.R. Pinger and J.E. Kotecki, An Introduction to Community Health: Web Enhanced: Jones & Bartlett Publishers Inc.
- v. J.F. McKenzie, R.R. Pinger and J.E. Kotecki, An Introduction to Community Health: Student Note-taking Guide: Jones & Bartlett Publishers Inc.
- vi. R.J. Bensley and J.B. Fisher, Community Health Education Methods: A Practical Guide; Jones & Bartlett Publishers Inc.

Recommended Further Reading:

- i. J.F. McKenzie, RR Pinger and JE Kotecki (2002): An Introduction to community health: Web Enhanced ; Jones & Bartlett Publishers Inc, 4th Edition
- ii. J.F. McKenzie, RR Pinger and JE Kotecki (2008): An Introduction to community health: Student Note-taking guide; Jones & Bartlett Publishers Inc, 6th Edition

- iii. R.J. Bensley and JB Fisher (2008): Community health education methods:A practical guide ; Jones & Bartlett Publishers Inc, 3rd Edition
- iv. Introduction to community health, 6th ed. By J. F. McKenzie, R. R. Pinger and J. E. Kotecki 2007. Jones and Bartlett (Publishers)
- v. Community Health, 3rd ed. By C. H. Wood, H. de Glanville and J. P. Vaughan

INTERNAL MEDICINE

Core Texts

- i. Nicholas A. Boon, Nicki R. Colledge, Brian R. Walker, and John Hunter (2006): Davidson's Principles and Practice of Medicine: Churchill Livingstone; 20th Edition
- ii. Parveen Kumar and Michael L (2009): Kumar and Clark's Clinical Medicine: Saunders Ltd.; 7th Edition
- iii. Michael Swash , Michael Glynn (2007): Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice: Saunders Ltd.; 22nd Edition
- iv. Graham Douglas , Fiona Nicol , Colin Robertson (2009):Macleod's Clinical Examination: Churchill Livingstone; 12th Edition

Recommended Further Reading

- i. Anthony S. Fauci, Eugene Braunwald, Dennis L. Kasper, and Stephen L. Hauser (2008): Harrison's Principles of Internal Medicine : McGraw-Hill Professional; 17th Edition
- ii. Charles Wiener, Anthony Fauci, Eugene Braunwald, and Dennis Kasper (2008): Harrison's Principles of Internal Medicine, Self-Assessment and Board Review: McGraw-Hill Professional; 17th Edition

- iii. David A. Warrell, Timothy M. Cox, and John D. Firth (2009): Oxford Textbook of Medicine (Warrell,Oxford Textbook of Medicine) : Oxford University Press, USA; 5th Edition

GENERAL SURGERY

Core Texts:

- i. Norman S Williams, Christopher J.K. Bulstrode, and P Ronan O'Connell,(2008): Bailey and Love's Short Practice of Surgery ; Oxford University Press, USA; 25th Edition
- ii. Hamilton Bailey's and John S. P. Lumley Hamilton, (1997): Bailey's Physical Signs: Demonstration of Physical Signs in Clinical Surgery: A Hodder Arnold Publication; 18th Edition (Classic)
- iii. Andrew W. Bradbury, O. James Garden, John L. R. Forsythe, and Rowan W Parks(2007):Principles and Practice of Surgery; Churchill Livingstone; 5th Edition

Recommended Further Reading:

- i. J. Tjandra, GJA Clunie, et al. (2001) Textbook of surgery; Wiley-Blackwell, 2nd Edition
- ii. (2006) Schwartz's Principles of Surgery Self-assessment and Board review, by Professional, McGraw-Hill 8th Edition
- iii. J.L Cameron (2007) Current surgical therapy, Mosby, 9th Edition.
- iv. WW Souba, MP Fink, et al (2005) ACS Surgery: Principles and practice, WebMD Professional Publishing and MT Hughes, Revised Edition 2005

- v. SD Bines, JM Velasco, et al (2006) Rush University Medical Center Review of surgery, Saunders, 4th Edition

PAEDIATRICS AND CHILD HEALTH

Core Texts

- i. William Hay, Myron Levin, Robin Deterding, Judith Sondheimer,(2008): Current Diagnosis and Treatment Paediatrics (LANGE CURRENT Series): McGraw-Hill Professional; 19th Edition
- ii. Mary Rudolf, Malcolm I. Levene (2006), Paediatric and Child Health, Wiley Blackwell, 2nd Edition

Recommended Further Reading:

- i. Robert M. Kliegman (2007): Nelson Textbook of Paediatrics: Publisher: Saunders; 18th Edition
- ii. Michael Swash, Michael Glynn MA(2007) :Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice ;Saunders Ltd.; 22nd Edition

REPRODUCTIVE HEALTH

- i. Philip N. Baker (2006). Obstetrics by Ten Teachers; 18th Edition
- ii. Ash Monga (2006). Gynaecology by Ten Teachers; 18th Edition
- iii. Kevin P. Hanretty (2010). Obstetrics Illustrated; 7th Edition
- iv. David M. Hart, Jane E. Norman. Gynaecology Illustrated; 5th Edition
- v. Roger P. Smith (2008): Netter's Obstetrics and Gynecology (Netter Clinical Science) : Saunders; 2nd Edition .

Recommended Further Reading:

- i. Alan DeCherney, Lauren Nathan, and T. Murphy Goodwin (2006); CURRENT Diagnosis & Treatment Obstetrics & Gynecology : McGraw-Hill Medical; 10th Edition
- ii. John D. Gordon, Jan T. Rydfors, Maurice L. Druzin, and Yona Tadi r(2007): Obstetrics, Gynecology and Infertility: Handbook for Clinicians; Pocket Edition : Scrub Hill Press, Inc.; 6th Edition
- iii. John Schorge, Joseph Schaffer, Lisa Halvorson, and Barbara Hoffman (2008): Williams Gynecology (Schorge,Williams Gynecology) : McGraw-Hill Professional; 1 edition
- iv. F. Cunningham, Kenneth Leveno, Steven Bloom, and John Hauth (2009):Williams Obstetrics: 23rd Edition : McGraw-Hill Professional; 23rd Edition
- v. Barbara Anderson (2005); Reproductive Health: Women and Men's Shared Responsibility : Jones and Bartlett Publishers, Inc.; 1st Edition

MENTAL HEALTH**Core Texts:**

- i. Robert E. Drake, Matthew R. Merrens, and David Lynde(2005) Evidence-Based Mental Health Practice:
- ii. Benjamin J. Sadock and Virginia A. Sadock 2008) Kaplan and Sadock's Concise Textbook of Clinical Psychiatry ,
- iii. Benjamin James Sadock, Virginia Alcott Sadock, and Pedro Ruiz , 2009)Kaplan and Sadock's Comprehensive Textbook of Psychiatry (2 Volume Set)

Recommended Further Reading:

- i. Nancy C. Andreasen and Donald W. Black (2006) Introductory Textbook of Psychiatry, 4th Edition.
- ii. S. Hossein Fatemi and Paula J. Clayton (2008) The Medical Basis of Psychiatry
- iii. Dinesh Bhugra and Kamaldeep Bhui (2007) Textbook of Cultural Psychiatry
Cambridge University Press; 1st Edition

ETHICS AND PROFESSIONAL CONDUCT

- i. N Kenny and W Shelton; 2006 Lost Virtue: Professional character development in medical education, Volume 10 (Advances in Bioethics), Press, 1st Edition
- ii. JE Snyder, CC Gauthier and R Tong 2008 Evidence-based medical ethics: Cases for practice-based learning, Humana Press, 1st Edition
- iii. PA Singer and AM Viens 2008 The Cambridge Textbook of Bioethics, CUP, 1st Edition
- iv. . Robert M. Veatch, Medical Ethics.
- v. iii. Flint Austin Jnr, Medical Ethics and Etiquette: The Code of Ethics Adopted by the American Medical Association (AMA

HEALTH MANAGEMENT AND HEALTH ECONOMICS**Core Texts:**

- i. Robert J. Taylor, Susan B. Taylor (2006), The AUPHA Manual of Health Services Management, Jones and Burtlet.
- ii. William S. J. , Thompson Delmar (2002): Introduction to Health Services.
- iii. William O. Cleverly (2006): Essentials of Health Care Finance, Jones and Burtlet

- iv. A Practical Approach for Health Care Management (2nd edition.

Recommended Further Reading:

- i. James Walker W. (1980): Human Resource Planning, McGrawHill.
- ii. Ramesh Rao, Jon Gisenberg (2004): Improving Disaster Management and prepare Editioness, Health Administration Press.

APPENDIX II: List of Facilities**TEACHING AND LEARNING ROOMS**

ITEM	CAPACITY	NUMBER	SIZE (M²)
MECC Building	0 – 20	10	24
	21 – 40	5	48
	41 – 60	-	-
	61 – 100	-	-
Conference hall	250	1	272
MTRH Building	0 – 20	-	-
	21 – 40	-	
	41 – 60	8	56
	61 – 100	-	
Old Library Hall	220	1	234
LRC	0 – 20	-	-
	21 – 40	-	-

	41 – 60	2	
	61 – 100	-	-
LRC Hall	120	1	
PDN Complex	0 – 20	6	19
	21 – 40	1	48
	41 – 60	-	-
	61 – 100	-	
PDN Hall	300	1	374
Dental School	0 – 20	1	24
	21 – 40		
	41 – 60		
	61 - 100		
AMPATH Building	0 – 20	-	-
	21 – 40	2	48
	41 – 60	-	
	61 – 100	-	

Mother & Baby Hosp.	0 – 20	-	
	21 – 40		
	41 – 60	2	33
	61 – 100	2	82
Laboratories	0 – 20		
	21 – 40	-	
	41 – 60	-	
	61 – 100	2	374
Computer Lab	0 – 20		
	21 – 40		
	41 – 60		
	61 – 100		
Drawing Room	0 – 20		
	21 – 40	1	48
	41 – 60		
	61 – 100		

Wards in MTRH	With Capacity of 800 Beds, used for clinical rotations
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OFFICES

ITEM	NUMBER	SIZE (M ²)
Chief Administrator	1	42
Other Administrative offices	220	30
Stores	6	304

ACCOMMODATION/SUPPORT FACILITIES

ITEM	NUMBER	CAPACITY	SIZE (M ²)
Hostels	5 (693 rooms)	2015	3661
Student common rooms	14	84	248
Kitchens	2	88	204
Cafeteria	1	75	146
Staff houses	8	4 bed roomed	
Toilets	525		

SUMMARY OF FIRE FIGHTING EQUIPMENT

ITEM	NUMBER	MAIN LOCATION	DATE LAST INSPECTED
Fire extinguisher Class A	1	Kitchen (SoM)	6/10/2011
Fire Blanket	1	Kitchen (SoM)	6/10/2011

RECREATIONAL FACILITIES

ITEM	NUMBER
Football fields	Hired
Basket ball courts	1
Table tennis courts	2
Badminton	2
Hockey fields	Hired
Rugby fields	Hired
Volley ball	Hired
Lawn tennis	Hired

LIBRARY AND INFORMATION SERVICES

The College of Health Sciences Library is situated in Eldoret town. The Library serves four schools, School of Medicine, School of Nursing, School of Dentistry and School of Public Health. The Library serves undergraduates and Postgraduate medical students as well as staff.

The College of Health Sciences Library had continued over the years to build its information resources using a collection development policy (now under review). The information resources acquired are relevant to the academic programmes offered and up-dated to facilitate teaching, learning, research and community service. The materials available include:

1. Books in both print and electronic format (data available online)
2. Electronic journals and some periodicals in print (e-journal list available online)
3. Pamphlets
4. Government publications
5. Audiovisual materials – (yet to be catalogued online)

The library can easily be accessed since it is within the college and near the student's halls of residence and lecture theaters and the Hospital.

To enable access to Information materials, the College of Health Sciences library has installed a web based Library Management Software. Books and other materials are catalogued and processed (within two weeks from date of receipt) electronically with records being availed online to users instantly via the Online Public Access Catalogue (OPAC). Portal for access to e-resources and other information that the library may wish to deliver to users or other Libraries can use <http://chslibrary.mu.ac.ke>

The College Library has fiber optic connectivity to the Internet service providers, thus enabling high bandwidth access to the Internet. Wireless connectivity has also been installed and can be accessed in the whole Library Building with over 300 laptops registered to use. Expansion of wireless connectivity is being planned.

Access to most e-resources is via registered IP addresses; however access to Research4life is via user-name and passwords which is given to students and researchers for remote usage.

The College of Health Sciences Library

- i. Seating capacity – 500
- ii. Stack capacity – can accommodate over fifty thousand volumes in the two floors
- iii. Short loan / lending area
- iv. Audiovisual room
- v. Students TV lounge
- vi. Video conference room.
- vii. Two computer labs for under/post graduate students
- viii. Display space
- ix. Acquisitions, cataloguing and processing room
- x. Server room with data backups
- xi. Staff offices
- xii. Kitchenette
- xiii. Bindery
- xiv. Cleaners and general stores
- xv. Printing space

The library is constructed in such a way that persons with disabilities and those on wheel chairs can easily access the building. Two fire exits and main entrance exits can be used in case of emergency


The university employs qualified staff, all librarians have at least a masters degree, others have Doctor of Philosophy Degrees while others are currently in the process of completing their PHDs. This has been possible due to the fact that School of Information Sciences is housed in the library. This has also enabled most Library Assistants and Senior Library Assistants, who had diplomas to get their first degrees. Below is a summary of the library's staff strength.

Appendix III: Equipment and teaching materials

1. LCD Projectors
2. Library
3. Information Technology Resources

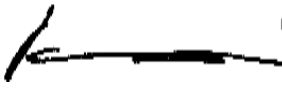
**APPENDIX IV: PROCEDURE FOR CURRICULUM DEVELOPMENT AND
REVIEW**


**MU/ACD/2/26A: PROCEDURE FOR CURRICULUM
DEVELOPMENT AND REVIEW**

AUTHORIZATION:	
This procedure has been issued under the authority of: DEPUTY VICE- CHANCELLOR ACADEMICS, RESEARCH & EXTENSION	
TITLE/POSITION:	DEPUTY VICE-CHANCELLOR (ACADEMICS, RESEARCH
SIGNATURE:	
DATE OF ISSUE:	28TH AUGUST 2013
DOCUMENT CONTROL	
ISSUE NO	0
REVISION NO	0
Controlled issue of this procedure will be final in case of dispute	
COLLEGE	UNIVERSITY

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0.1 RECORD OF CHANGES

No.	Details Of Change			Authorization
	<i>dd-mm-yy</i>	Page	Clause/sub-clause and comment	Name and signature
1	22/6/12	1 to 10	The entire procedure was Reviewed for effective	PROF. K. OLE KAREI 

2	23/08/13	1 & 5 4	<p><u>Authorization&5.0</u></p> <p><u>Responsibilities</u></p> <p>Changed to DVC(A,R&E)</p> <p><u>0.2DistributionList</u></p> <p>Academics added to</p> <p>Research and Extension,</p> <p>Updated and Reorganised</p> <p><u>3.0 Reference</u></p> <p>Replaced MoiUniversity</p> <p>Act,1984withUniversitiesAct</p>	<p>PROF.</p> <p>B.E.L.WISHITEMI</p> 
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0.2 DISTRIBUTION LIST

Distribution of controlled copies of this procedure has been issued to:

S.NO	COPY HOLDER
1.	VICECHANCELLOR
2.	DEPUTYVICECHANCELLOR
3.	DEPUTYVICECHANCELLOR (PLANNING&DEVELOPMENT)
4.	DEPUTYVICECHANCELLOR (STUDENTSAFFAIRS)
5.	DEPUTYVICECHANCELLOR (ADMINISTRATIONANDFINANCE)(MR)
6.	PRINCIPAL,ODERAANKANG'O SATELLITECAMPUSCOLLEGE-YALA
7.	PRINCIPAL,COLLEGE OFHEALTHSCIENCES
8.	DIRECTORS
9.	ALL DEANS OFSCHOOLS

10.	DEANOF STUDENTS
11.	REGISTRARS
12.	FINANCE OFFICER
13.	SENIOR LEGALOFFICER
14.	HEADSOFDEPARTMENTS

1.0 PURPOSE

The purpose of this procedure is to ensure that all academic curricula developed or reviewed in the University are standardized for quality in line with the University mandate, mission, vision and quality objectives; Commission for University Education (CUE) and Government of Kenya Development Plans and International Standards.

2.0 SCOPE

The procedure is applicable to all academic curricula developed/reviewed and implemented at the University.

3.0 REFERENCES

- Universities Act, 2012
- Moi University Statutes, 2013
- Moi University Charter 2013
- Moi University Strategic Plan; 2009/10-2014/15
- Moi University Quality Assurance Policy
- Commission of Higher Education, Kenya, Quality Handbook
- Kenya Education Sector Support Programme, 2005–2010

4.0 ABBREVIATIONS AND DEFINITIONS

DVC (A, R&E) - Deputy Vice Chancellor (Academics, Research and Extension)

Curriculum –A document that comprises a stated number of academic courses or teaching units that run for a specified period which may be sub-divided into sessions comprising days, months or years.

A curriculum must have goals/purpose/objective, learning outcomes and award, scope of information to be covered, duration, requirements for enrolment and progress, set of specific courses, mode of teaching and assessment monitoring and evaluation and standard references for each course among others.

5.0 Responsibilities

The Deputy Vice Chancellor (Academics, Research and Extension) and Director Quality Assurance are responsible for ensuring that curriculum development review and implementation is carried out in accordance with University regulations.

6.0 PROCEDURE DETAILS

- 6.1** The curriculum sub-committees in the teaching Departments shall collect and collate input from stakeholders, including staff, students, graduates, alumni, Government and employers regarding current and changing trends in academic environment.
- 6.2** The sub-committees shall prepare a memorandum of suggested new curricula or revisions to the existing curricula and submit them to the Head of the relevant Department as draft zero.
- 6.3** The Head of Department shall present memoranda from the curriculum sub-Committees at a special Departmental Academic Board meeting for discussion.
- 6.4** The Departmental Academic Board shall consider the proposals by the curriculum sub-committees, and task specialists to design specific courses,

or make revisions to existing courses in line with suggestions by stakeholders, professional and quality requirements; current trends in the area of specialisation.

- 6.5** The specialists shall submit draft courses or suggested revisions to existing courses to the Head of the Department within a specified time referred to as draft one.
- 6.6** The Head of Department shall distribute the draft courses for revisions to the academic staff for further input.
- 6.7** The Dean, in liaison with Head of Department shall organise a workshop to deliberate on the draft curricula. The workshop shall have resource persons from other Departments/schools and representatives of the stakeholders.
- 6.8** The workshop findings shall be submitted to the curriculum sub-committee for input and submissions to the Head of Department as draft two.
- 6.9** The Head of Department shall convene a Departmental Academic Board meeting to deliberate on draft two and submit it to the Dean of School for consideration by the School Board.
- 6.10** The input from the School Board shall be incorporated into the curricula by the Department and forwarded to the Dean as draft three for submission to the Chairman/person, Committee of Deans. Where College Academic Boards exist, the input from the School Board shall be presented at the College Board meeting then forwarded to the Committee of Deans for consideration.
- 6.11** The Chairman/person, Committee of Deans tables draft curriculum before the Committee of Deans for deliberation and may recommend revision to the relevant Department to consider.

6.12 Once the draft curriculum is endorsed by the Committee of Deans, it shall be submitted to Senate for deliberation.

6.13 Senate may recommend revision to the draft curriculum which shall then be incorporated by the relevant Department and be resubmitted to Senate for approval.

6.14 The approved curriculum dully signed by the chair of Senate becomes a Senate and Moi

Appendix 7: COBES Courses Moi University MBChB Curriculum**MSB 105: COBES I: INTRODUCTION TO COMMUNITY HEALTH (4 UNITS)****Purpose**

To equip the learner with concepts of community entry and diagnosis.

Objectives

1. Describe the concepts of a Community, its organization and resources.
2. Describe the ethical principles, acts and values that govern research involving human subjects.
3. Describe the basic principles of Epidemiology.
4. Demonstrate understanding of the principles of Biostatistics.
5. Demonstrate understanding of the basic principles of Demography.
6. Describe the organization and structure of the Health Care System in Kenya.
7. Outline the concepts and principles of Primary Health Care (PHC) in Kenya.
8. Describe environmental health issues in a community
9. Outline factors affecting the nutritional status of a community.
10. Describe the different data collection tools and data collection methods.

Outcomes

1. Explain the concepts of a Community, its organization and resources.
2. Explain the concept of Community Directed Interventions (CDI) strategy.

3. Explain the ethical principles, acts and values that govern research involving human subjects.
4. Describe the basic principles of Epidemiology.
5. Demonstrate understanding of the principles of Biostatistics.
6. Demonstrate understanding of the basic principles of Demography.
7. Describe the organization and structure of the Health Care System in Kenya.
8. Outline the concepts and principles of Primary Health Care (PHC) in Kenya.
9. Describe environmental health issues in a community
10. Outline factors affecting the nutritional status of a community.
11. Develop data collection tools.
12. Describe the concept of M and E

Content:

Community: Introduction to COBES, relevance to health care practitioner, structure, organization .community: definition, organization, structure and resources.

Definition of CDI, Philosophy of CDI, Roles of health system in CDI strategy, Roles of the community, Roles of training institutions, Roles of partners. Components of CDI. Identify potential uses of CDI in a community.

Ethical Principles and values that govern Research Protocol: The Nuremberg Code; autonomy or respect for persons, beneficence, and justice. The Declaration of Helsinki:

Clearance, informed consent, confidentiality, acknowledgement, integrity, respect of respondents, privacy, honesty, declaration of sources of finance among others; Application of the principles in research; The Role of Institutional Research and Ethics Committees; Ethics governing publication.

Epidemiology: Community organization, structure and resources. Concepts of health and disease. Disease: Causation; natural history; measurement of levels of prevention. Descriptive epidemiology. Development and pre-testing, data collection tools. Epidemiology of HIV/AIDS.

Biostatistics: Principles; Sampling methods; Data analysis and presentation; measurement of central tendency and dispersion and Statistical Methods.

Demography: Determinants and consequences of population growth. Sources of data. Demographic variables. Population pyramids. Vital events. Vital statistics. Uses of demographic data.

Health care delivery system. Levels of Health Care; Providers/users of health care; Roles of Health Care providers.

Primary Health Care: Origin; elements; implementation; achievements; constraints. Priority Health problems.

Environmental health issues: Refuse and waste disposal; water, housing and health;

food hygiene; environmental pollution.

Nutrition: Factors including food availability, household food security, Maternal and child care. Health, environmental and socio-economic factors. Education and culture. Nutritional Assessment: of individuals; of a community. Dietary assessment. Anthropometric assessment.

Data collection tools: qualitative and quantitative tools including questionnaire and interview guides.

M & E Tools and processes: Tools, processes, practice, inputs, concepts & outcomes

MSB 204: COBES II: COMMUNITY DIAGNOSIS (7 UNITS)

Course Purpose

To equip the student with skills to carry out community entry and diagnosis

Course Objectives

1. Explain the concepts of a Community, its organization and resources.
2. Utilize the basic concepts of Biostatistics, Demography and Epidemiology in healthcare and medical education.
3. Explain the organization and structure of the Health Care System in Kenya and the concept of PHC
4. Relate environmental health issues to disease and healthcare
5. Explain the role of nutrition and nutritional interventions in healthcare and disease.

6. Develop data collection tools.

Learning Outcomes

1. Conduct Community entry.
2. Conduct a community diagnosis.
3. Participate in health centre and outreach activities.
4. Conduct a nutritional assessment in a specified community.

Content:

Community Entry: Points of entry, community entry techniques including FGDs and in-depth interviews.

Community diagnosis: Definition. Development of tools. Data collection (primary and secondary), Analysis, Applications of statistical methods in health and disease. Report writing, Feedback and Presentation.

Participation in health centre and outreach activities: Laboratory tests done at the health centre; basic clinical procedures; essential drug packages available at the health centre; health talks at OPS and outreach services; Vaccines; family planning methods and practice. Health Education, Health promotions, awareness sensitization. School health talks, outreach activities.

Nutrition: Nutritional Assessment of individuals; of a community. Dietary assessment. Anthropometric assessment. Growth monitoring; prevalence of various forms of malnutrition; prevention and interventions

MSB 300: COBES III: INVESTIGATIVE PROJECT I (6 UNITS)**Purpose**

To equip the students with the knowledge and skills to develop a scientific research

Objectives

1. Explain the concept of urbanization and describe the factors which affect the health of urban communities.
2. Identify the factors that affect community self-reliance.
3. Identify elements of research protocol

Outcomes

1. Identify a problem for study
2. Develop a research proposal

Content:

Concepts of Urbanization; settlements and types, factors affecting the health of the urban community. Factors that determine community health status in urban setups. Environment and pollution

Self- reliance: Socio-economic factors, food security, water, sanitation, waste disposal, poverty.

Elements of research protocol development: introduction; rationalization; literature review; null hypothesis and alternate hypotheses; experimental design; standard operating procedures methodology; outcomes and methods of measurement; data analysis methods. Time schedule and budget. Ethical issues. Write a proposal and present it for approval.

MSB 400: INVESTIGATIVE PROJECT PART II: COBES IV (6 UNITS)**Purpose:**

To equip the learners with the knowledge and skills to carry out scientific research and disseminate findings.

Objectives

1. Describe the methods of data collection and analysis
2. Describe ways of disseminating research findings.

Outcomes

1. Conduct data collection
2. Perform data analysis
3. Compile and report research findings.

Content:

Data collection; Mapping of the study area; pilot studies; sampling of households; administration of questionnaires; laboratory analysis of specimens.

Computer use in data management and processing: creation of data bases; application of appropriate statistical software. Multivariate analysis: multiple regression; logistic regression; analysis of variance.

Research report writing; Application of format of research report writing; preparation and submission of report; feedback to the community.

MSC 507: COBES V-DISTRICT HEALTH SERVICES ATTACHMENT**(6 UNITS)****Course Purpose**

To equip the students with the knowledge and skills to manage and render service at a district/county health facility.

Objectives

1. Describe the National health policy framework of Kenya
2. Describe the organization of health services in a District.
3. Discuss the delivery of health services in a district
4. Outline the community oriented aspects of Primary Health Care
5. Explain the role and responsibilities of District Health Management Teams, health agencies and boards in provision of primary health care

Outcomes

1. Participate in the management of health services at the district level
2. Participate in the delivery of clinical services at the district level.
3. Participate in district outreach activities
4. Develop and carry out an action-oriented research.
5. Provide leadership in the provision of healthcare

Content:

Organization and delivery of curative, promotive and preventive health services at the district level. Composition and functions of Management Committees and Boards. Statutory bodies and programmes at international, national, provincial and district levels: Centre for Disease Control (CDC); World Health Organization (WHO); Medical Practitioners and Dentist Board; Pharmacy and Poisons Board;

Provincial Health Management Teams (PHMT); District Development Committees (DDC); District Health Management Teams (DHMT); District Health Management Boards (DHMB); Hospital Management Teams (HMT).

Participations in management; assist members of the DHMT. Participate in meetings and activities of the DHMT.

Clinical services: Diagnostic services; clinical management; autopsy; evaluation of service utilization; management systems and functional departments. Outpatient, in-patient, special clinics, emergency care. Referral systems.

Outreach activities: Primary Health Care (PHC). Health promotion. School health programmes. Public health: epidemic monitoring, investigation and control; management of community emergencies; disease screening; surveillance and prevention. Design of training programmes for the community, development of relevant materials; programme implementation; assessment of effectiveness and efficiency.

Integrated Programmes: Functions of: Kenya Expanded Programme for Immunization (KEPI), Essential Drugs Programme (EDP), AIDS Awareness Programme, STD Control Programme. Social medicine - provision of health services to the under-privileged: the aged, motherless babies, destitute and relief measures, follow-up of patients with chronic illnesses.

Medical system audit; Identification of a problem; Conduct an action research; Suggest possible solutions and implementation plan. Preparation and presentation of an oral and written report

Appendix VI: Publications



The Perceived Role of Community-Based Medical Education among Kenyan-Trained Medical Doctors' Choice of Specialty

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Abstract

Background: The recruitment and retention of doctors in rural and remote areas remains a challenge that leads to inequity that favors urban populations worldwide. Sub-Saharan Africa suffers major challenges related to doctors not working in rural areas where over 60% of the population lives. Community based medical education (CBME) influence on medical doctors' choice of specialty and rural practice has been documented in a few countries but not in Kenya.

Objective: To determine the perceived role of CBME in the choice of specialty among Kenyan-trained doctors.

Study Design and Methods: An analytical cross-sectional study design was used. Medical graduates of the years 2000, 2001 and 2002 from Nairobi and Moi universities were reinterviewed.

Google forms were used to email the study questionnaire to the participants.

Results: The eligible number of participants for each cohort was 96, 83 and 90 for Nairobi University graduates and 49, 40 and 41 for Moi University graduates for the years 2000, 2001 and 2002 respectively. The response rates were [35.8 % (45.8, 19.3, 42.2%) and 38% (32.7, 27.5, 53.7%) for years 2000, 2001 and 2002 respectively for Nairobi and Moi University participants. Factors found to be associated with a positive perception included, the medical school, rural upbringing, parents' level of education and early rural posting. After multivariate analysis for confounders it was observed that the medical school the participant graduated from was statistically significantly associated with a positive perception on the role of CBME in the choice of specialty [Moi = 65.3(95% CI: 51.5, 79.1)] vs. Nairobi University [34.7 (95% CI: 25.1, 44.3); chi-square p-value =0.000

Conclusions: CBME played a positive role in the study participants' choice of specialty

Key Words

Role of Community Based Medical Education; Rural Practice; Choice Specialty; Kenyan-trained doctors.

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Background

Across the globe there are multiple factors that have been associated with the preference and choice of specialization by medical students and young graduates. These factors range from parental level of education where those with more educated parents preferred specialties that result in practice in highly specialized facilities in urban areas while most female doctors have been reported to choose specialties that made it easier for them to work in non-demanding practices in urban areas^{1,2}.

Some medical schools in the developed economies have chosen to implement medical curricula that favor specific specialties that are associated with these schools. This has resulted in most graduates of these schools pursuing specialty in these

disciplines³. In medical schools in developing countries, departments that have vibrant collaborative clinical and research activities across the globe tend to attract more applicants for specialist training than those that do not have similar approach. It has also been noted that good supervision and mentoring that gives a student or young graduate opportunities to learn and enjoy a specific specialty during medical internship also plays a major role in choice of specialty. Also rated high is career guidance during training and after graduation from medical school⁴.

Studies on factors that mostly influenced of choice of areas of specialty among medical students and young graduates in SSA have reported that gender, prestige associated with certain specialties and presence of role models as main determinants of choice of specialty by medical students and the young graduates^{5,6,7}. The perceived favorable income in some specialties and prestige also influences career choices⁸.

A survey of 56 medical doctors whose medical training involve a spiral courses on community based education and service (COBES) along problem based learning (PBL) in all the years of training in Ghana reported that the majority felt that COBES may have significantly influenced their choice of specialty and also their willingness to serve in rural Ghana⁹.

The Nairobi and Moi University medical schools are the oldest in Kenya having been started in 1967 and 1989 respectively. The other approved public medical schools are in the universities of Kenyatta, Maseno, Egerton and Jomo Kenyatta University of Agriculture & Technology. Approved private medical schools are Kenya Methodist University, Uzima University and Mount Kenya University. Except for Nairobi and Moi University medical schools the rest have developed within the last decade. Aga Khan University Hospital in Nairobi offers Masters of Medicine (MMed) programs as a private university but does not have a medical school. Nairobi and Moi Universities also offer masters of medicine (MMed) and clinical fellowship programs. The Nairobi University School of Medicine (NUSOM) and the Moi University School of Medicine (MUSOM) both offer medical training curricula that have CBME as core courses in the medical training curricula.

MUSOM offers spiral COBES courses in five of the six years of medical training. NUSOM currently offers community health rotations in level two and five of the six levels of training. NUSOM initially offered CBME only during the fourth year of medical training.

My study explored what the medical graduates perceived as the role of CBME on the individual doctor's choice of area of specialization and rural practice.

Methods

Study Site: The study was carried out in Moi University School of Medicine while data were collected from medical doctors, who are members of the selected cohorts, using their contact details provided by the Kenya Medical Practitioners and Dentists Board (MP&DB) register. Other available medical directories were also used to complement the medical board contact details.

The implementation of the Nairobi University medical school community health course for medical students was accessed on the Nairobi University School of Public Health webpage while the Moi University medical school community based education and service (COBES) course for medical students was accessed from the School Curriculum Implementation and Evaluation Committee (CIEC) secretariat.

Study Design: An analytical cross-sectional study design was used to study both the exposure and

outcome of CBME among Kenyan trained medical doctors. Six cohorts (three from MUSOM and three from NUSOM) who graduated with Bachelor of Medicine and Bachelor of Surgery (MBChB) from the two medical schools in years 2000, 2001 and 2002 participated in the study.

Target Population: Medical graduate cohorts of years 2000, 2001 and 2002 from Moi and Nairobi schools of Medicine who had been out of medical school for between 16 and 18 years. These cohorts were conveniently selected as medical doctors who were likely to have a significant degree of career stability and also beneficiaries of more innovative medical education teaching and learning methods in these two oldest Kenyan medical schools.

Inclusion Criteria: Medical graduates from Nairobi and Moi University medical schools as provided by the respective offices of school deans and as appears on alumni lists on the websites of both universities for the medical graduates of the years 2000, 2001 and 2002.

Exclusion Criteria: Medical doctors who are not graduates of NUSOM and MUSOM even if they graduated in the years 2000, 2001 and 2002.

Sample Size Determination and Sampling Procedures:

All medical graduates of NUSOM and MUSOM in the years 2000, 2001 and 2002 were eligible to participate. The contact addresses and telephone numbers of the participants were retrieved from the Kenya Medical Practitioners & Dentists Board (MP&DB) register, and the Kenyan medical directories.

The study population (see table below) was small and all members of the different cohorts were

Medical school	Medical graduate cohorts of year 2000	Medical graduate cohorts of year 2001	Medical graduate cohorts of year 2002	Total
Moi University School of Medicine	4 9	40	4 1	130
Nairobi University School of Medicine	9 6	83	9 0	269
TOTAL	1 4 5	123	1 3 1	399

Table 1: Illustration of the cohorts

Data Collection Procedures

The offices of the Deans of Nairobi and Moi medical schools were approached for authority to conduct the study and also requested to provide the lists of the cohorts that graduated in the years 2000, 2001 and 2002. The MP&DB secretariat was requested to provide available contact details (email and mobile telephone) for members of these cohorts.

Google Forms were used to get consent and to send the questionnaires (**See appendix**).

The Google Forms worked well as data collection forms which the participant clicked send after responding to the last question. The data were stored in MS Excel databases.

Data Management, Analysis and Presentation of Results

The Google Form responses were saved in MS Excel database. Reminders to participants were sent in the form of repeated email reminder messages, short text messages and telephone calls within six months. It was not possible to determine who among the non-respondents were still residing in Kenya or whether they were alive or dead. The retention register of the Kenyan medical board bears only names of doctors who pay up annual retention fees.

Data were exported to International Business Machines (IBM) Statistical Package for Social Sciences

(SPSS) version 21 for analysis. Fisher's exact test was used in the analysis of the categorical data. The data was categorical in 2 by 2 contingency tables. The sample sizes were small and the expected values were small. Chi-square test was used to test for association in the categorical variables. Multivariate analysis was used for confounders. The level of significance α was arbitrarily taken as 0.05 with 95% Confidence Interval (CI). Results were presented in frequency tables.

Ethical Considerations

Ethical approval was sought and granted by the Institutional Research and Ethics Committee (IREC) of Moi University.

Permission to conduct the study was sought and granted from the Deans of Nairobi and Moi University medical schools.

Informed consent was sought from all the participants. The names of the interviewees were not revealed on the database and confidentiality was maintained.

Data are stored in password protected folders and will be destroyed as guided by the rules and regulations of IREC.

Study Limitations

Dependence on recall by participants was foreseen as a limitation. This was minimized by limiting the questions to major events and avoiding questioning details on specific CBME rotations. The tool had been pretested on medical graduates from as long as four decades before my study and compared with those of the last decade. No significant variation was noted on the responses among various cohort members during the pretest.

The response rate of less than 50% of the study was a limitation. My study did not sample but aimed to have all members of the six cohorts participate. We used the most recent available contact details as provided by the Kenya Medical Practitioners and Dentists Board. Like in all censuses records in our country, there had not been updates on this record that would delete those who died, dissented the medical career or migrated out of Kenya. It was noted that similar studies had published findings of response rates lower than 30%. The low response rates may also be attributed to medical graduates' reluctance to participate in activities outside their clinical duties.

Use of online self-administered questionnaires may have the disadvantage of the respondents' controlling their responses without the researcher involvement. During the pretest, responses of interviewer administered interviews were compared to the online responses. There was no significant difference between the two that could affect the objectives of this study

Results

The study was conducted between February and September 2018.

The response rate was calculated against the list provided by the respective medical schools. A significant proportion of these graduates were not on the current Kenyan medical board retention register and did not respond to our email and telephone communication that was sent every fortnight. After six months the effort to get responses from the non-responders was halted.

The eligible number of in each cohort was 96, 83 and 90 for Nairobi and 49, 40 and 41 for Moi University medical schools in the years 2000, 2001 and 2002 respectively. The response rates were [35.8 % (45.8, 19.3, 42.2%) and 38% (32.7, 27.5, 53.7%) for years 2000, 2001 and 2002 respectively for Nairobi and Moi University participants

Variable	Nairobi University	Moi University	Total
	Freq(%)	Freq(%)	Freq(%)
Age in years			
35-40	24 (24.5)	15 (30.6)	39 (26.5)
41-45	55 (56.1)	31 (63.3)	86 (58.5)
>45	19 (19.4)	3 (6.1)	22 (15)
Gender			
Male	67 (68.4)	28 (57.1)	95 (64.6)
Female	31 (31.6)	21 (42.9)	52 (35.4)
Marital status			
Single	5 (5.1)	11 (22.4)	16 (10.9)
Married	90 (91.8)	37 (75.5)	127 (86.4)
Divorced	3 (3.1)	1 (2)	4 (2.7)
Year of graduation			
2000	44 (44.9)	16 (32.7)	60 (40.8)
2001	16 (16.3)	11 (22.4)	27 (18.4)
2002	38 (38.8)	22 (44.9)	60 (40.8)
Employer			
Self	11 (11.2)	7 (14.3)	18 (12.2)
Private institutions	12 (12.2)	8 (16.3)	20 (13.6)
University	27 (27.6)	12 (24.5)	39 (26.5)
Ministry of Health	48 (49)	21 (42.9)	69 (46.9)
Research Institute	0 (0)	1 (2)	1 (0.7)
Post medical training			
None	9 (9.2)	15 (30.6)	24 (16.3)
Masters in Medicine	73 (74.5)	27 (55.1)	100 (68)
Masters in Public Health	11 (11.2)	2 (4.1)	13 (8.8)
Masters in Palliative Care	3 (3.1)	1 (2)	4 (2.7)
PhD	0 (0)	1 (2)	1 (0.7)
Masters in Medicine plus (Clinical Fellowship or PhD)	2 (2)	3 (6.1)	5 (3.4)
Where you grew up			
Rural	78 (79.6)	29 (59.2)	107 (72.8)
Urban	18 (18.4)	19 (38.8)	37 (25.2)
Both	2 (2)	1 (2)	3 (2)
Father's education level			
None	13 (13.3)	5 (10.2)	18 (12.2)
Primary	18 (18.4)	14 (28.6)	32 (21.8)
Secondary	35 (35.7)	14 (28.6)	49 (33.3)
College	32 (32.7)	16 (32.7)	48 (32.7)

Table 2: Study population characteristics

The study population was youthful with 58.5 % of the population aged 41-45 years. Sixty-eight percent of the respondents were masters of medicine graduates majority of who worked in public service. Seventy- three percent reported growing up in rural Kenya.

Table 3: CBME role on choice of specialty

Variable	Poor Freq(%)	Good Freq(%)
Medical school		
NUSOM	64 (65.3)	34 (34.7)
MUSOM	17 (34.7)	32 (65.3)
Age in years		
35-40	24 (61.5)	15 (38.5)
41-45	45 (52.3)	41 (47.7)
>45	12 (54.5)	10 (45.5)
Sex		
Male	48 (50.5)	47 (49.5)
Female	33 (63.5)	19 (36.5)
Marital status		
Single/ Divorced	13 (65)	7 (35)
Married	68 (53.5)	59 (46.5)
Year of graduation		
2000	29 (48.3)	31 (51.7)
2001	13 (48.1)	14 (51.9)
2002	39 (65)	21 (35)
Where you grew up		
Rural	54 (50.5)	53 (49.5)
Urban	24 (64.9)	13 (35.1)
Both	3 (100)	0 (0)
Mothers education		
None	5 (26.3)	14 (73.7)
Primary	31 (58.5)	22 (41.5)
Secondary	20 (51.3)	19 (48.7)
College	25 (69.4)	11 (30.6)
Fathers education		
None	6 (33.3)	12 (66.7)
Primary	16 (50)	16 (50)
Secondary	21 (42.9)	28 (57.1)
College	38 (79.2)	10 (20.8)
Rate of rural experience		
Poor	11 (73.3)	4 (26.7)
Good	47 (47)	53 (53)
No rural	23 (71.9)	9 (28.1)
Rate CBME yr4		
Poor	18 (75)	6 (25)
Good	63 (51.2)	60 (48.8)

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Summary of Findings on the Perceived Role of Community-Based Medical Education (CBME) in the Choice of Specialty by Medical Graduates

The factors associated with positive perception on the role of CBME in choice of specialty were: the medical school; where the doctor's spouse grew up; the doctor's mother level of education; the doctor's father level of education and good rating of previous rural experience in early practice.

On controlling for confounders for the five factors it was observed that the medical school in which a doctor trained was found to have statistically significant association with the positive perception of the role of CBME in the choice of choice specialty. Moi University medical graduates [65.3 (95% CI: 51.5, 79.1)] vs. Moi University medical graduates [34.7(95%CI: 25.1, 44.3); chi-square, p-value = 0.000].

Discussion

Perception of Community-Based Medical Education (CBME) by Medical Students and Young Graduates

The positive perception on the role of CME in career growth by my study participants was higher among medical graduates of Moi University than those of Nairobi University

Students' perception and perspective of CBME has been studied in different CBME delivery contexts. There is evidence of reported perception of better preparedness for clinical roles in British young medical graduates who had CBME as part of their medical curriculum. The positive impact was in comparison with those that did not CBME in their medical curriculum. The perceived positive impact was by both the medical graduates and those who supervised their internship activities¹⁰.

Australian medical graduates who had CBME as part of their medical training were found to demonstrate more social accountability and better skills to serve disadvantaged and rural communities than those who did not have CBME as part of their medical training¹¹.

Community-Based Medical Education Versus Community Oriented Medical Education

It was observed that Moi University medical school offered Community Based Education and Service (COBES) program in the form of spiral courses from year one to five that had up to six week rotations within communities. These are communities that the medical graduates are expected to serve. Nairobi University medical school offered more of a Community Oriented Education (COE) program with a one term in the fourth year of the medical training program. The courses are provided by the Nairobi University School of Public Health and are mainly didactic with several one-day visits to rural communities.

In Malaysia, Sahid documented a significant difference in the commitment to rural and community health care for medical students who had in medical school who offered similar programs during medical training¹².

In historical cohort comparison of three traditional medical schools in Quebec, Canada, transition from a tradition medical curriculum to one with a community oriented problem based learning component was associated with significant improvements in preventive care, continuity of care and improvement in indicators of diagnostic performance of the graduates compared to the ones before the transition. Graduates of medical curricula with CBME demonstrated improved skills and practice on disease prevention and emphasis on continuity of care¹³. The Medical Education Partnership Initiative (MEPI) for selected African medical schools and funded by the government of the United States of America to promote medical education with emphasis on enhancing CBME has impacted positively on improved skills and interest among medical graduates to serve in rural and underserved populations¹⁴.

Factors Associated With Choice of Specialty by Medical Students

I studied the perceived role of CBME in the choice of specialty by doctors. Data on factors that influence specialty choice revealed similarity across the globe. The factors reported to influence the choice of specialty by my study population included mentoring during and after medical school, whether a doctor

brought up in rural or urban settings, the parents level of education and culture in the medical school a doctor was trained in, among factors.

Harris, Gravel & Young studied the factors influencing the choice of specialty among Australian medical graduates. The highest rated factors included appraisal of own skills and aptitudes, intellectual content of the specialty and extrinsic factors such as work culture and flexibility of working arrangements. All of these were personal and not based on social accountability. CBME as a factor was not even rated in the Harris' study¹⁵.

A study on senior medical students and young medical graduates in New Zealand reported that career choice was mostly based on interest in the specialty and that individuals favored specialties that were likely to enhance chances for a doctor to work outside New Zealand. Also favored were specialties that were likely to lead to super specialty training¹⁶.

In a medical college in southern India, Subba, et al, conducted a survey on medical students. The questionnaires enquired about the students' preferred specialty and the factors that influenced the choice. The findings were that these students rated the following in order of preference: high interest in high paying specialties, job satisfaction (including potential for high prestige) and employment opportunities for the individual doctor. Low interest in primary care specialty that offered low paying working opportunities in rural India was also observed¹⁷.

Medical students at the Jordan University of Science and Technology reported their choice of specialty to be influenced by perceived intellectual content of the specialty and the reputation of the specialty¹⁸.

Significant variation in career choices by medical students was documented in United Kingdom (UK) graduates of 1999 and 2000. It was evident in the study findings that some of these UK medical schoolshada—culture that encouraged interest in certain specialties while diminishing interests in others¹⁹. In countries where the time period between leaving medical school and starting of specialty training is not as big as it is in Kenya (where it sometimes takes more than five years or never happens), medical students are expected to choose and compete for their choice of specialties by the time they finish medical training. Though this has the advantage of continuity in medical training and shortening the period it takes for a doctor to become a specialist, Luther documented a significant sense of unpreparedness for UK medical students who were expected to decide on area of specialization by end of medical school²⁰.

Final year medical students in public universities in Nigeria chose specialty preference because of expected better income and anticipated opportunities for career progression^{21,22}.

In Kenya, Mwachaka and Mbugua attributed role modeling which created enthusiasm in a specialty as one of the major factors determining choice of specialty among medical students and new graduates²³.

The Role of CBME in the Choice of Specialty by Doctors

My study results showed a statistically significant difference in reported positive influence of CBME in choice of specialty between the medical graduates of Nairobi and Moi Universities. It is noted that medical graduate cohorts of the years 2000, 2001 and 2002 had gone through a medical training curriculum that had different approaches to CBME in Nairobi and Moi Universities. While the Moi University curriculum had community based education and service courses and rotations in years one to five, the Nairobi University one had a community health course in the fourth year of training.

The South Australian Flinders University Parallel Rural Community Curriculum (PRCC) is a government initiative started in 1997 to help address the rural doctor workforce shortage in Australia. The initiative involves a one year clinical rotation in rural Australia as part of medical training in students who enroll for this program. A study on the impact of this initiative on choice of specialty by the graduates of the PRCC showed that it significantly influenced the graduates to choose a rural career path²⁴.

Similar studies in Australia have supported the importance of CBME as a strong component of the medical training curriculum to enhance choice of specialties that relate to health needs of the people^{15, 25}.²⁶ The same may explain the significant difference observed between Moi and Nairobi University medical graduates' positive perception on the role of CBME on choice of specialty.

Amalba, Mook, Mogre and Scherpbier interviewed pioneering graduates of Problem Based Learning/ Community Based Education and Service (PBL/ COBES) curriculum in a medical school in Ghana documented over half of the doctors reporting that COBES had positively influenced their choice of specialty. The participants in the Amalba study were doctors serving in both rural and urban parts of Ghana. The doctors reported that even students brought up in urban areas reported COBES rotations changed their perceptions of rural practice positively and a significant number had chosen career lines and specialties that favored rural practice²⁷.

Conclusions

1. The findings of this study concur with similar studies done in other contexts in the findings that community based medical education has a positive role in the medical graduate's choice of specialty
2. The difference in perceptions on the positive role of community based medical occupation from Kenyan medical graduates whose only difference was the medical school they trained in and the way the course delivered was noted
3. Exposure of rural Kenya to persons in early life, during training and early career posting played an important role in the choice of specialty

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4. All my colleagues in the Moi University School of Medicine

Declaration of Conflict of Interest

I declare no conflict of interest

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The Perceived Role of Community-Based Medical Education Among Kenyan-Trained Medical Doctors' Choice of Rural Practice

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Abstract

Background: The recruitment and retention of doctors in rural and remote areas remain a challenge, leading to inequity favoring urban populations worldwide. Sub-Saharan Africa suffers a major challenge related to doctors not working in rural areas where over 60% of their population reside. The influence of community-based medical education (CBME) on medical doctors and rural practice has been documented in a few countries except Kenya.

Objective: To determine the perceived role of CBME in the choice of rural practice among Kenyan-trained doctors.

Study Design and Methods: An analytical cross-sectional study design was used. Six cohorts of medical graduates of the years 2000, 2001 and 2002 from Nairobi University and Moi University were interviewed.

Google forms were used to email the study questionnaires to the participants.

Results: The eligible number of participants for each cohort was 96, 83 and 90 for Nairobi University graduates and 49, 40 and 41 for Moi University graduates for the years 2000, 2001 and 2002 respectively. The response rates were 35.8% (45.8, 19.3, 42.2%) and 38% (32.7, 27.5, 53.7%) for years 2000, 2001 and 2002 for Nairobi and Moi University participants respectively. Factors found to be associated with a positive perception included: the medical school, rural upbringing, parents' level of education, and early rural posting. After multivariate analysis for confounders, it was observed that the medical school the participant graduated from was significantly associated with a positive perception on the role of CBME in the choice of rural practice [Moi University = 73.5 (95% CI: 60.6, 86.3) vs. Nairobi University = 45.9 (95% CI: 35.9, 56.6) chi-square, p-value = 0.002].

Conclusions: CBME played a positive role in the study participants' choice of rural practice

Key Words

Role of Community-Based Medical Education; Choice of Rural Practice; Kenyan-Trained Doctors

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Background

The recruitment and retention of healthcare professionals, especially doctors, in rural and remote areas remains a major challenge and a contributor to inequity in healthcare services provision that favours urban populations worldwide. Also skewed, in favour of the urban centers, is the distribution of health facilities. This is particularly worrying in developing countries, especially those in Sub-Saharan Africa (SSA)¹⁻⁴.

Governments and global healthcare leaders have developed initiatives and strategies to improve the attraction and retention of healthcare workers in underserved areas in different countries globally, with mixed results of some success and failure.

Over the years, the government of Thailand has used various strategies to increase the number of doctors serving in rural underserved areas. These strategies have involved coercion and financial and non-financial incentives. Coercion involves a compulsory three-year service in rural Thailand after medical training. Financial incentives include supplemented income with hardship allowances, non-private practice and professional allowances. The non-financial incentives include preferential consideration in promotion and increased opportunity for specialist training.

In 1994 the Thailand Ministry of Health and some medical schools developed an initiative that involved selecting cohorts of medical students to spend their clinical years of training in rural health facilities. After medical training, members of these cohorts would be posted to work in the same facilities. This initiative was a collaborative effort between the medical schools and the Ministry of Health of Thailand⁵.⁶ The positive outcomes of this initiative have been documented⁷.

Sub-Saharan Africa (SSA) has many documented challenges that result from the unavailability of doctors and other health workers in rural areas where over 60% of the population lives. A significant number of these doctors also leave their native African countries to work in Europe, United States of America, Canada and other countries that pay better than their own. This problem is compounded by the fact that medical schools in SSA are few and with limited capacity for enrolment of trainees. The number of non-African doctors interested in working in SSA is very small⁸.

Strategies that have been employed to retain doctors in some SSA countries include coercion, which involves bonding of medical graduates to serve in underserved areas for at least two years after medical training and internship. Other means involve financial incentives that include higher salaries and allowances. The World Health Organization policy, implemented by ministries of education and health, promotes the enhancement of community-based medical education (CBME) by making it a core course in the curriculum for undergraduate and graduate medical programmes^{2, 7}.

⁹ Some countries have documented that CBME during undergraduate medical training played a positive role in attracting more medical doctors to rural practice.

In Australia, offering medical education and training with important insights into factors affecting preference for future rural practice has resulted in increased recruitment and retention in these rural areas¹⁰.

In Uganda, medical graduates of the Makerere College of Health Sciences who went through the medical training curriculum with community education and service (COBES) component spiraled in all levels of the training programme reported that COBES made them confident health workers in primary healthcare, especially when serving rural communities in Uganda¹¹.

In Kenya, health workers from three different underserved contexts were interviewed about the challenges they faced and what made it difficult for facilities in these areas to attract and retain workers.

These different facilities were in Turkana (arid part of northern Kenya), Machakos (borders Nairobi but has a large semi-arid portion) and Kibera (the largest slum in Nairobi, the capital city of Kenya). The factors that the health workers in these facilities attributed to poor attraction and low retention included low salaries, female workers finding it difficult to work in this environment, level of training (highly trained personnel avoided these areas), suboptimal working environment due to poor allocation of resources, work overload among the few available workers, among many others issues¹².

The Nairobi and Moi University medical schools are the oldest in Kenya, having been started in 1967 and 1989 respectively. The other approved public medical schools are in the universities of Kenyatta, Maseno, Egerton and Jomo Kenyatta University of Agriculture and Technology. Approved private medical schools are Kenya Methodist University, Uzima University and Mount Kenya University. Except for Nairobi and Moi University medical schools, the rest have developed within the last decade. Aga Khan University Hospital in Nairobi offers Masters of Medicine (MMed) programmes as a private university but does not have a medical school. Nairobi and Moi Universities also offer Masters of Medicine (MMed) and clinical fellowship programmes.

The Nairobi University School of Medicine (NUSOM) and the Moi University School of Medicine (MUSOM) both offer medical training curricula that have CBME as core courses in the medical training curricula.

Moi University offers spiral community-based education and service (COBES) courses in five of the six years of medical training. During the last decade, Nairobi University has started to offer community health courses in level two and five of the six levels of training. Before then, community health was offered only in fourth year of medical training.

My study explored what the medical graduates perceived as the role of CBME on the individual doctor's choice of rural practice.

Methods

Study Site: The study was carried out in Moi University School of Medicine while data were collected from participants using their contact details provided by the Kenya Medical Practitioners and Dentists Board (MP&DB) register. Other available medical directories were also used to complement the medical board contact details.

The implementation of the Nairobi University medical school community health course for medical students was accessed on the Nairobi University School of Public Health webpage while the Moi University medical school community-based education and service (COBES) course for medical students was accessed from the School Curriculum Implementation and Evaluation Committee (CIEC) secretariat.

Study Design: An analytical cross-sectional study design was used to study both the exposure and outcome of CBME among Kenyan-trained medical doctors. Six cohorts of medical graduates (three from Moi University and three from Nairobi University) who graduated in years 2000, 2001 and 2002 participated in the study.

Target Population: Medical graduate cohorts of years 2000, 2001 and 2002 from Moi and Nairobi Schools of Medicine. These cohorts were conveniently selected as medical doctors who were likely to have a significant degree of career stability and also beneficiaries of innovative medical education teaching and learning methods in these two oldest Kenyan medical schools.

Sample Size Determination and Sampling Procedures

The target population was small. All members of these cohorts were eligible to participate. The contact addresses and telephone numbers of the participants were provided by the Kenya Medical Practitioners and Dentists Board (MP&DB) secretariat and were supplemented by the Kenyan medical directories. The study population (see table below) was small and all members of the different cohorts were eligible to participate.

Table 1: Illustration of the cohorts

Medical School	Medical Graduate Cohorts of Year 2000	Medical Graduate Cohorts of Year 2001	Medical Graduate Cohorts of Year 2002	Total
Moi University School of Medicine	49	40	41	130
Nairobi University School of Medicine	96	83	90	269
Total	145	123	131	399

Data Collection Procedures

The offices of the Deans of Nairobi and Moi medical schools were approached for authority to conduct the study and access to the alumni lists. The Kenyan medical board secretariat authorised access to the contact details of the participants.

The participants preferred online participation through Google Forms which were used to get consent and questionnaires (See appendix).

Responses were received within a short period of the participants finishing.

Data Management, Analysis and Presentation of Results

The Google Form responses were saved in MS Excel database. Reminders to participants were sent in the form of repeated email reminder messages, short text messages and telephone calls within six months.

It was not possible to determine who among the non-respondents were still residing in Kenya or whether they were alive or dead. The annual retention register of the Kenyan medical board bears only the names of doctors who pay up annual retention fees.

Data were exported to International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) version 21 for analysis. Fisher's Exact test was used in the analysis of the categorical data. The data was categorical in 2 by 2 contingency tables. The sample sizes were small and the expected values were small. Chi-square test was used to test for association in the categorical variables. Multivariate analysis was used for confounders. The level of significance α was arbitrarily taken as 0.05 with 95% Confidence Interval (CI). Results were presented in frequency tables.

Ethical Considerations

Ethical approval was sought and granted by the Institutional Research and Ethics Committee (IREC) of Moi University.

Permission to conduct the study was sought and granted from the Deans of Nairobi and Moi University medical schools.

Informed consent was sought from all the participants. The names of the interviewees were not revealed on the database and confidentiality was maintained.

Data are stored in password protected folders and will be destroyed as guided by the rules and regulations of IREC.

Study Limitations

1. Dependence on recall by participants was foreseen as a limitation. This was minimised by limiting the questions to major events and avoiding questioning details on specific community -based rotations. The

tool had been pretested on medical graduates from as long as four decades before my study and compared with those of the last decade. No significant variation was noted on the responses among various cohort members during the pretest.

2. The response rate of less than 50% of the study was a limitation. This use of a denominator as provided by alumni lists of more than 15 years may be misleading. My study did not sample but aimed to have all members of the six cohorts participate. The most recent available contact details as provided by the Kenya Medical Practitioners and Dentists Board. Vital statistics, though updated in Kenya for new entrants, fall short because challenges in updating losses through migration and even death. It was noted that similar studies had published findings of response rates lower than 50%. The low response rates may also be attributed to medical graduates' reluctance to participate in activities outside their clinical duties.
3. The use of online self-administered questionnaires may have the disadvantage of the respondents' controlling their responses without the researcher's involvement. During the pretest, responses of interviewer-administered interviews were compared to the online responses. There was no significant difference between the two that could affect the objectives of this study.

Results

The study was conducted between February and September 2018.

The response rate was calculated against the list provided by the respective medical schools. A significant proportion of these graduates were not on the current Kenyan medical board retention register and did not respond to our email and telephone communication that was sent every fortnight. After six months, the effort to get responses from the non-responders was halted.

The eligible number of in each cohort was 96, 83 and 90 for Nairobi and 49, 40 and 41 for Moi University medical schools in the years 2000, 2001 and 2002 respectively. The response rates were 35.8% (45.8, 19.3, 42.2%) and 38% (32.7, 27.5, 53.7%) for Nairobi and Moi University participants respectively for years 2000, 2001 and 2002.

Table 2: Study population characteristics

Variable	Nairobi	Moi	Total	
	University	University	Freq(%)	
	Freq(%)	Freq(%)	Freq(%)	
Age in Years				
35-40	24 (24.5)	15 (30.6)	39	(26.5)
41-45	55 (56.1)	31 (63.3)	86	(58.5)
>45	19 (19.4)	3 (6.1)	22	(15)
Gender				
Male	67 (68.4)	28 (57.1)	95	(64.6)
Female	31 (31.6)	21 (42.9)	52	(35.4)
Marital Status				
Single	5 (5.1)	11 (22.4)	16	(10.9)
Married	90 (91.8)	37 (75.5)	127	(86.4)
Divorced	3 (3.1)	1 (2)	4	(2.7)
Year of Graduation				
2000	44 (44.9)	16 (32.7)	60	(40.8)
2001	16 (16.3)	11 (22.4)	27	(18.4)
2002	38 (38.8)	22 (44.9)	60	(40.8)
Employer				
Self	11 (11.2)	7 (14.3)	18	(12.2)
Private institutions	12 (12.2)	8 (16.3)	20	(13.6)
University	27 (27.6)	12 (24.5)	39	(26.5)

Ministry of Health	48 (49)	21 (42.9)	69 (46.9)
Research Institute	0 (0)	1 (2)	1 (0.7)
Post-Medical Training			
None	9 (9.2)	15 (30.6)	24 (16.3)
Masters in Medicine	73 (74.5)	27 (55.1)	100 (68)
Masters in Public Health	11 (11.2)	2 (4.1)	13 (8.8)
Masters in Palliative Care	3 (3.1)	1 (2)	4 (2.7)
PhD	0 (0)	1 (2)	1 (0.7)
Masters in Medicine plus Clinical Fellowship or PhD	2 (2)	3 (6.1)	5 (3.4)

Where did you grow up?

Rural	78 (79.6)	29 (59.2)	107 (72.8)
Urban	18 (18.4)	19 (38.8)	37 (25.2)
Both	2 (2)	1 (2)	3 (2)

What was your father's level of education?

None	13 (13.3)	5 (10.2)	18 (12.2)
Primary	18 (18.4)	14 (28.6)	32 (21.8)
Secondary	35 (35.7)	14 (28.6)	49 (33.3)

The study population was youthful with 58.5% of the population aged 41-45 years. Sixty-eight percent of the respondents were Masters of Medicine graduates, the majority of whom worked in public service. Seventy-three percent reported growing up in rural Kenya.

Variable	Nairobi University Freq(%)	Moi University Freq(%)	Total Freq(%)
Rate CBME Year 1			
Poor	0 (0)	5 (10.2)	5 (3.4)
Good	0 (0)	21 (42.9)	21 (14.3)
Very good	0 (0)	11 (22.4)	11 (7.5)
Excellent	0 (0)	12 (24.5)	12 (8.2)
Not applicable	98 (100)	0 (0)	98 (66.7)
Rate CBME Year 2			
Poor	0 (0)	2 (4.1)	2 (1.4)
Good	0 (0)	15 (30.6)	15 (10.2)
Very good	1 (1)	19 (38.8)	20 (13.6)
Excellent	0 (0)	13 (26.5)	13 (8.8)
Not applicable	97 (99)	0 (0)	97 (66)
Rate CBME Year 3			
Poor	0 (0)	5 (10.2)	5 (3.4)
Good	0 (0)	22 (44.9)	22 (15)
Very good	0 (0)	17 (34.7)	17 (11.6)
Excellent	0 (0)	5 (10.2)	5 (3.4)
Not applicable	98 (100)	0 (0)	98 (66.7)

Rate CBME Year 4			
Poor	20 (20.4)	3 (6.1)	23 (15.6)
Good	30 (30.6)	24 (49)	54 (36.7)
Very good	42 (42.9)	15 (30.6)	57 (38.8)
Excellent	6 (6.1)	6 (12.2)	12 (8.2)
Not applicable	0 (0)	1 (2)	1 (0.7)
Rate CBME Year 5			
Poor	1 (1)	5 (10.2)	6 (4.1)
Good	1 (1)	17 (34.7)	18 (12.2)
Very good	1 (1)	17 (34.7)	18 (12.2)
Excellent	0 (0)	8 (16.3)	8 (5.4)
Not applicable	95 (96.9)	2 (4.1)	97 (66)
Rate CBME in Your Competence			
Poor	52 (53.1)	9 (18.4)	61 (41.5)
Good	30 (30.6)	24 (49)	54 (36.7)
Very good	16 (16.3)	13 (26.5)	29 (19.7)
Excellent	0 (0)	3 (6.1)	3 (2)

In Nairobi University School of Medicine, community health was offered only in fourth year with 80% of the Nairobi University medical graduates rating that experience positively. In Moi University School of Medicine, community-based education and service (COBES) was offered in years one to five. The positive rating of CO-BES was above 90% in all the years except year five (82%). The highest rating was for second year (96%).

Table 4: Rating the role of the CBME course during the medical training and good skills in early practice

Variable	Nairobi University Freq(%)	Moi University Freq(%)	Total Freq(%)	P-value
Rate CBME in the Choice of Early Posting to Rural Hospitals				
Poor	49 (50)	9 (18.4)	58 (39.5)	0.001
Good	32 (32.7)	24 (49)	56 (38.1)	
Very good	17 (17.3)	16 (32.7)	33 (22.4)	
Rate CBME in Rural Practice Choice After Internship				
Poor	53 (54.1)	13 (26.5)	66 (44.9)	0.002
Good	19 (19.4)	13 (26.5)	32 (21.8)	
Very good	26 (26.5)	20 (40.8)	46 (31.3)	
Excellent	0 (0)	3 (6.1)	3 (2)	
CBME Plays a Role in Competence				
Strongly disagree	5 (5.1)	2 (4.1)	7 (4.8)	0.719
Disagree	7 (7.1)	4 (8.2)	11 (7.5)	
Neutral	28 (28.6)	9 (18.4)	37 (25.2)	
Agree	29 (29.6)	16 (32.7)	45 (30.6)	
Strongly agree	29 (29.6)	18 (36.7)	47 (32)	
CBME Plays a Role in Current Rural Practice				

Strongly disagree	6 (6.1)	2 (4.1)	8 (5.4)	0.033
Disagree	19 (19.4)	12 (24.5)	31 (21.1)	
Neutral	40 (40.8)	8 (16.3)	48 (32.7)	
Agree	20 (20.4)	15 (30.6)	35 (23.8)	
Strongly agree	13 (13.3)	12 (24.5)	25 (17)	

CBME was perceived to be significantly associated with choice of early posting to a rural hospital (internship and immediately after internship) and the current choice of rural practice.

Table 5: Rating of the perceived role of CBME in the choice of early rural posting, considering competence and settling into rural practice

	Poor Freq(%)	Good Freq(%)
Medical School		
Nairobi University	53 (54.1)	45 (45.9)
Moi University	13 (26.5)	36 (73.5)
Age in Years		
35-40	15 (38.5)	24 (61.5)
41-45	44 (51.2)	42 (48.8)
>45	7 (31.8)	15 (68.2)
Sex		
Male	43 (45.3)	52 (54.7)
Female	23 (44.2)	29 (55.8)
Marital Status		
Single / Divorced	6 (30.0)	14 (70.0)
Married	60 (47.2)	67 (52.8)
Year of Graduation		
2000	28 (46.7)	32 (53.3)
2001	11 (40.7)	16 (59.3)
2002	27 (45)	33 (55)
Where did you grow up?		
Rural	46 (43)	61 (57)
Urban	19 (51.4)	18 (48.6)
Both	1 (33.3)	2 (66.7)
What was your mother's level of education?		
None	3 (15.8)	16 (84.2)
Primary	30 (56.6)	23 (43.4)
Secondary	13 (33.3)	26 (66.7)
College	20 (55.6)	16 (44.4)
What was your father's level of education?		
None	2 (11.1)	16 (88.9)
Primary	20 (62.5)	12 (37.5)
Secondary	19 (38.8)	30 (61.2)
College	25 (52.1)	23 (47.9)
Rating of rural experience		
Poor	11 (73.3)	4 (26.7)

Good	36 (36)	64 (64)
No Rural Experience	19 (59.4)	13 (40.6)
Rate CBME Year 4		
Poor	18 (75)	6 (25)
Good	48 (39)	75 (61)

Seventy-four percent of Moi University medical graduates rated the positively perceived the role of CBME in choice of rural practice compared to 46% in Nairobi University medical graduates.

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Table 6: Groups' rating of the perceived role of CBME on the choice of rural practice

Variable	Odds Ratio	P-value	95% Confidence Interval	
Moi vs. Nairobi University	7.315	0.000	2.497	21.428
Mother's Education Level				
Primary vs. None	0.347	0.262	0.055	2.204
Secondary vs. None	1.178	0.873	0.157	8.855
College vs. None	0.372	0.389	0.039	3.525
Fathers Education Level				
Primary vs. None	0.049	0.005	0.006	0.407
Secondary vs. None	0.378	0.372	0.045	3.204
College vs. None	0.227	0.193	0.024	2.119
Rate Rural Experience				
Good vs. Poor	3.390	0.087	0.839	13.695
No Rural Experience vs. Poor	0.723	0.707	0.134	3.918
Rate CBME Year 4				
Good vs. Poor	1.865	0.337	0.523	6.649

Summary of Findings on the Perceived Role of Community-Based Medical Education (CBME) in the Choice of Rural Practice by Medical Graduates

It was observed that the factors that were associated with positive perception on the role of CBME in the choice of rural practice were: the medical school where a doctor trained, the doctor's mother's level of education, the doctor's father's level of education, the good rating of early career rural experience and a good rating of the CBME experience in year four.

On controlling for confounders for the five factors, it was observed that the medical school in which a doctor trained was found to have a statistically significant association to a positive perception of the role of CBME with the choice of rural practice. The proportion of Moi University medical graduates who rated the perception positively was 73.5% (95% CI: 60.6, 86.3) while in Nairobi University medical graduates the proportion was 45.9% (95% CI: 35.9, 56.6) [chi-square; p-value=0.002).

Discussion

Perception of Community-Based Medical Education (CBME) by Medical Students and Young Graduates

The positive perception on the role of CBME in career growth by my study participants was higher among medical graduates of Moi University than those of Nairobi University

Students' perception and perspective of CBME has been studied in different CBME delivery contexts.

There is evidence of reported perception of better preparedness for clinical roles in British young medical graduates who had CBME as part of their medical curriculum. The positive impact was in comparison with those that did not have CBME in their medical curriculum. The perceived positive impact was by both the medical graduates and those who supervised their internship activities²².

Australian medical graduates who had CBME as part of their medical training were found to demonstrate more social accountability and better skills to serve disadvantaged and rural communities than those who did not have CBME as part of their medical training²³.

Community-Based Medical Education versus Community-Oriented Medical Education

It was observed that Moi University Medical School offered a community-based education and service (COBES) programme in the form of spiral courses from year one to five that had up to six week rotations within communities. These are communities that the medical graduates are expected to serve. Nairobi University Medical School offered more of a community-oriented education (COE) programme with a single term in the fourth year of the medical training programme. The courses are provided by the Nairobi University School of Public Health and are mainly didactic, with several one-day visits to rural communities.

In Malaysia, Sahid documented a significant difference in the commitment to rural and community health care for medical students who had in medical school been offered similar programmes during medical training²⁴.

In historical cohort comparison of three traditional medical schools in Quebec, Canada, transition from a traditional medical curriculum to one with a community-oriented problem-based learning component was associated with significant improvements in preventive care, continuity of care and improvement in indicators of diagnostic performance of the graduates compared to the ones before the transition. Graduates of medical curricula with CBME demonstrated improved skills and practice on disease prevention and emphasis on continuity of care²⁵.

The Medical Education Partnership Initiative (MEPI) for selected African medical schools is funded by the government of the United States of America to promote medical education with emphasis on enhancing CBME. This has impacted positively on improved skills and interest among medical graduates to serve in rural and underserved populations²⁶.

Factors Associated with Young Doctors' Choice of Rural Posting and Setting Up Rural Practices

My study findings were that some of the participants positively identified community-based medical education as one of the factors that influenced their choice of rural posting as new medical school graduates and later in settling for rural practice, employment or both.

The persistent global problem of attracting and retaining doctors to serve in rural underserved populations is well documented. The problem is worse in low and middle income countries (LMICs) where it has been attributed to many factors that include poor working conditions, lack of supervision, under-resourced health systems and low wages. Global and national health policy makers and health managers continue to grapple with possible ways of dealing with this problem²⁷. CBME as a major component of the medical training curriculum has been supported as one of the many interventions by health educators and policy makers.

Conclusions

The findings of this study concur with similar studies done in other contexts in the findings that community-based medical education has a positive role in the medical graduate's choice of rural practice.

The difference in perceptions on the positive role of community-based medical occupation from Kenyan medical graduates whose only difference was the medical school they trained in and the way the course delivered was noted.

Exposure of rural Kenya to persons in early life, during training and early career posting played an important role in the choice rural practice.

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Conflict of interest

I declare no conflict of interest.

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KENYAN-TRAINED DOCTORS' CHOICE OF RURAL PRACTICE AND SPECIALTY
CHAPTER ONE INTRODUCTION TO THE STUDY