UNIVERSITY OF NAIROBI

Department of Diagnostic Imaging and Radiation Medicine

PERCEPTIONS, ATTITUDES, EXPERIENCE AND KEY CHALLENGES TO RESEARCH BY POSTGRADUATE MEDICAL RESIDENTS IN KENYA: A SINGLE CENTER STUDY SURVEY

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DECLARATION

Student Declaration

I certify this thesis to be my original work and has not, been presented for a degree to any other college, university, and institution or examination body.

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There is no collaborating institution associated with this study

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Table of Contents

LIST OF ABBREVIATION AND ACRONYMS

ACGME-	Accreditation Council of the Graduate Medical Education
CUE-	Commission For University Education
ERC-	Ethical Review Board
E.U	European Union
KNH-	Kenyatta National Hospital
LMICs-	Low and Middle-Income countries
UK-	United Kingdom
UON-	University of Nairobi
USA -	United States of America
USB-	Universal Serial Bus
SPSS-	Statistical Package for Social Science

OPERATIONAL DEFINITIONS OF TERMS

Attitudes: This refers to a set of emotions, beliefs, and behaviors toward a particular object, person, thing, or event.
Evidence Based Medicine: Medical practice or care that emphasizes the practical application of the findings of the best available current evidence in making decision about the care of individual patients
Perceptions: This refers to the personal judgment arising from the way something is regarded, understood, or interpreted
Research: This involves systematic investigation into and study of scientific materials and sources in order to answer specific questions which may involve basic science, clinical questions, or involve a quality assurance activity(1).
Resident Research: This entails postgraduate students undertaking scholarly activity during the residency program defined as original research, comprehensive case reports, or review of assigned clinical and research topics.
Radiologists: These are specialist physicians who use medical imaging to diagnose and treat medical conditions.
Radiology Residency: This is a period of postgraduate training in a specified medical field by a qualified general physician to become a specialist in that field and is comprised of supervised practice.
Thesis: This refers to dissertation embodying results of original research and substantiating specific views or theory written by a candidate in training for an academic degree.

ABSTRACT

Study background: Scientific research experience among doctors during medical education plays a fundamental role in instilling high-quality diagnostic and analytical skills to enhance efficient evidence-based clinical practice and positive research culture. Generally, residents across all medical subspecialties face many critical challenges to research during residency programs, which greatly affect their perceptions and attitudes towards research activities. This study aims to assess general perceptions, attitudes, and key challenges to research by postgraduate medical students studying at the University of Nairobi School Of Medicine in relation to theses development and completion during the residency program.

Broad objectives: To assess general perceptions, attitudes, experience, and key challenges to research faced by the postgraduate medical residents during theses development and completion in Kenya

Methodology: A descriptive cross-sectional single-centre study survey of the postgraduate medical students in various specialty studying at the University Of Nairobi School Of Medicine were conducted where they were assessed on their perceptions, attitudes, past experience and key challenges to medical research via an online self-administered structured questionnaire with subsequent thematic analysis.

Utility of the study: Understanding the perceptions, attitudes and general barriers to research among postgraduate students help the training institution to identify key areas of strength and weakness in the research training programs and aid develop strong strategies to improve and foster the research cultures among the postgraduate residents.

Results: A total of 303 postgraduate students were targeted in the study and all sample sizes were attained which represent 100% response rate. The mean age of the participant was 33 ±3.04 and the number of males and females were almost equal comprising 52% and 48% respectively.65% of respondents never participated in any research activities prior to enrolment for residency program citing lack of time. The most frequent challenges to research identified included overwhelming clinical duties (81%), inadequate research training (65%) and lack of research funding (55%).

Conclusion: Our study revealed that residents generally have strong positive perceptions and attitudes towards medical research in evidence-based medicine but agree they face considerable challenges during residency programs due to lack of prior experience in research activities as well as lack of time arising from overwhelming clinical duties. This finding is invaluable and informs the faculty on areas that may need improvement to enhance positive research culture among residents

Keywords: Residents, Thesis, Research, Evidence based Medicine, Medical education

1.0 CHAPTER ONE: INTRODUCTION

Scientific health research forms a vital pillar for enhancing global health, health equity, and economic development(1,2) . It also forms a key pillar in the advancement of technology and healthcare of the society(3–5). Great differences exist in disease burden, research budget allocation, and scientific research contribution between the industrialized affluent nations and the low and middle-income countries (LMICs), which account for 80% of the world's population[2]. This stark disparity and inequity are exhibited in research output as evidenced by published scholarly research articles on health(6,7).

In one article on scientific publishing in the industrialized countries, 98% of the published research articles in widely read peer-reviewed scientific journals were authored by researchers from the institutions in the developed countries while institutions in LMICs accounted only for ~2% of the published journals(8). In 2001, the USA, EU, and Japan collectively accounted for 78.3% of the world's published scientific research articles(9). Taking citation index as a measure of the global strength of scientific research output, 31 nations out of the 191 countries contributed 98% of the volume of the scientific journals with the USA ranking first followed by the UK then followed by Germany, Japan, Canada, France and then Italy. Of the 31 countries, only three belonged to the developing countries i.e. China, India, and Iran so-called newly industrialized countries(8)(9).

In another study by Arunachalam (2002), in 1998, countries in low and middle-income countries (LMICs) such as Malaysia, Thailand, Pakistan, Sri Lanka, Bangladesh, Peru, Cuba, and virtually every country in Africa with the exception of South Africa had published fewer than 1000 research papers each and in many cases less than 500(10). Per unit population, this research output gap between developing and LMICs is even more striking(6,10). This is further highlighted by the fact that 90% of the important scientific research articles are published in ~10% of the scientific journals, which are mainly found in English-speaking industrialized countries(10)(8).

Among the multiple challenges cited for the low quality and quantity research output in LMICs, include lack of research capacity building usually implemented through research training in higher institutions of learning, poor institutional infrastructure investment, and poor collaboration and partnership with the research-advanced industrialized countries, which can bridge the gap and solve the inherent problems of low research capacity. Research funding in LMICs is also a big concern with only ~10% of the global expenditure on health research and development directed towards 90% of the health-related problems of the world affecting mainly the poor population of the LMICs, the so-called "10/90" gap(3)(4,5). The commission for health recommends 2% of the national budget and 5% of the foreign aid for health be used for health research which is largely disregarded by the political leadership of the developing countries(2,11)(12). This is largely because government priority in LMICs aims to provide food for the population and meet their basic healthcare needs first and thus health research and training skilled researchers is not the main priority(2). Poor governmental leadership towards health research in the LMICs can have demoralizing consequences on the general research cultures and research output of academic

institutions and on the training competency of university students who are the critical workhorses of the next generation of researchers.

Formal education in the basics of research methodology and participation in research by postgraduate medical students is a fundamental requirement incorporated in the widely adopted postgraduate curriculum guidelines set by Commission for University Education (CUE) (13) and Accreditation Council for Graduate Medical Education (ACGME) on the residency-training program(14). It provides the basis for strengthening residents' ability to critically review, analyze and analyze literature and research articles with the anticipated aim of introducing them to future research participations. It improves resident education, enhances quality patient care, provides fundamental skills for lifelong learning, and prepares them for various research roles in academia and society. It is thus an important component of the residency program that greatly influences future career choices and promotes research culture among medical trainees. Most residents are required to participate in mandatory research activities during their residency programs as part of the assessment of their competency by the program directors(15). This improves quality healthcare through evidence-based medical practice in the day-to-day care of patients more so in the developing countries, which are lagging behind in scientific research(16)(17).

Moreover, the role and impact of the junior research trainees are critical because of their curiosity and tendency to test the unknown in clinical research, which can trigger multiple inventions and innovations. Their contributions in the history of scientific discovery have been huge from the discovery of the smallpox vaccine, penicillin, anesthesia, steroids, organ transplantation to the discovery of Helicobacter pylori as a causative agent for peptic ulcers(18) and the notable pioneering invention of the fibre optic endoscope which has paved way for the minimally-invasive medical interventions such as sphincterotomy, polypectomy, and bile duct stone extractions via the endoscopic retrograde cholangio-pancreatography(ERCP) thus replacing the need for the invasive open surgical procedures(2)(18). Their active participation and experience in research is thus a fundamental tool to drive the perpetuity of research in medicine and society.

Thus understanding the perceptions and attitudes of the students towards research helps the training institutions develop better ways of making research activities more interesting and motivate them to a greater level of productivity. Alport (1935) defined attitudes as the mental state of readiness that is organized through experience that exerts a dynamic influence on a person's response to all situations to which it is unrelated. It is a tendency to act in a particular way resulting from an individual's experience and temperament(19). It incorporates complex combinations of personality, beliefs, values, behavior, and motivations. In psychology, attitudes include three basic components that include affect (feeling), cognition (thought/belief) and behavior (action) and thus enable us to see situations as well as how we behave towards them. Although the feeling and cognitions are internal to an individual, we can view and assess a person's attitude from his or her behavior using 5 points Likert response format(19). Perceptions, on the other hand, is a closely related term and it involves the process by which an individual interprets and organizes sensations of their environment to produce a meaningful experience. Individuals choose stimuli that satisfy their immediate needs and disregard those that may cause psychological anxiety.

The general perceptions and attitudes of postgraduate students towards medical research can be influenced by a number of factors such as previous training in research methodology, skills and experience in scientific research activities, faculty motivation, and enabling research environment. This underscores the importance of early exposure of medical students from undergraduate studies to inculcate positive attitudes and enthusiasm towards research(20,21)(22,23). Early involvement in research from junior years fosters a tendency to continue with the same positive spirit later in postgraduate training and beyond. Physicians who have participated in research activities during their academic careers possess strong clinical and analytical skills that help them make more accurate clinical diagnoses(16).

In an in-depth literature review to identify studies on perceptions, attitudes and barriers to research among postgraduate students during residency programs in an African set-up revealed limited studies have been conducted(24–26). In addition, none of these studies covers any of the aspects of the student's perceptions, attitude, and their experience or potential challenges to research that residents may face during their residency.

Locally in Kenya, barriers to research by postgraduate students during residency programs are indisputable. Despite this fact, during my literature review there were no local studies conducted to investigate their nature and scope. Therefore, my current study aims to fill this knowledge gap and explore the general perception, attitude, and key challenges to research faced by postgraduate medical students during their residency programs. Another aim of this study is to assess their knowledge level, past experience, and research collaboration during the medical education. This study is therefore timely as the finding is envisaged to help both students and the faculty members on the key barriers to resident's research during the residency program. Specifically, the study findings will be expected to provide baseline information for making recommendations on the best strategy to overcome such challenges facing postgraduate students during the residency programs.

2.0 CHAPTER TWO: LITERATURE REVIEW

Promoting a conducive and enabling environment for scientific research forms a fundamental pillar for designing and implementing health research and its findings are useful for developing evidence-based policies and cost-effective interventions(27).

To promote clinical research and foster enduring interest in research activities, most universities have introduced a mandatory research program within the 4-year postgraduate training in line with the CUE and ACGME guidelines in an effort to produce physician-scientists who can readily undertake hypothesis-driven research activities at all times(13,17,28).

Generally, medical students have positive perceptions and attitudes about research experience in terms of stimulating research interest and instilling scholarly analytical skills(20,22,27,29–34).In one study by Sahib et al on knowledge, attitude, and barriers to research, 73.3% of the medical graduates responded they have a positive interest in medical research and are interested in conducting research during undergraduate training(27). In another similar study by AlGhamdi et al among senior medical students showed as many as 87% of respondents indicated research is very important in the medical field and 67% further suggested it should be incorporated as mandatory for all during undergraduate medical training(35).In a study by Houlden et al, most students identified additional benefits to mandatory research electives that included information literacy, development of critical appraisal, and logical reasoning(29). Medical residents greatly value research training and in one University program, they suggested no learning activity is more important than the mandatory research projects during residency program with 86% of graduates and 66% of the senior residents agreeing that all physicians should have research experience(35).

Despite this positive reception about medical research, several studies have reported negative students perceptions and obstacles to medical research during residency programs including but not limited to little acknowledgment, time, and poor faculty interaction(15,17,28,30,31,36).

In one study by Hames et al on barriers to resident'sr research among Canadian medical students, the key limiting factors identified included time constraints (67%), lack of personal interest (32%), inadequate mentorship (32%), and lack of research training (22%)(34). Among the various time constraints, students identified studying demand (61%), on-call demand (52%) and clinical duties (38%) were the major barriers to research during the residency program(37).

A study by Silas et al also identified residents perceived key barriers to research as time, schedule conflict, inadequate faculty support, and lack of protected research time among others(38–40). Others studies also reported similar trends(7,16,21,22,24,30,36,38,41).A study by Robert et al among medical students showed as much as 75% of students preferred to engage in other non-academic scholarly activities after their completion of the residency programs(31,39). Similar findings were indicated by Silcox et al where 75% of residents in anaesthesiology programs preferred to do non-academic activities such as the postgraduate programs in educations rather than complete research projects during residency programs(39).

In response to prevailing negative attitudes to research among medical trainees, the medical institutions have introduced mandatory research programs during postgraduate residency to inculcate positive research culture and experience in basic science and clinical research among the next generation of academic researchers(17,42). Other remedies being instituted include re-organization of department activities to optimally support research process, formation of policies for easy access to modern and state of art imaging equipment, enlisting research coordinators to manage patients and patients data and access to the computerized data system, and encouraging faculty to endeavor as investigators and mentors and through external collaboration in clinical research(17,28,43). Moreover, to overcome such barriers to building strong clinical research capabilities requires departmental leadership that has a strong commitment and that values research culture among its faculty members(17,28).

However, most of these studies were conducted either in developed countries or elsewhere outside Africa. Also, most of the literature articles we reviewed showed the studies conducted were mostly among undergraduate medical students and those on electives to evaluate their knowledge regarding, attitudes towards and perceived barriers to scientific research(16,20–22,27,29–31,35,41,44–46).

In an in-depth literature review to identify similar studies on perceptions, attitudes and barriers to research among postgraduate students in an African set-up revealed limited research articles and none were identify pertaining to research during postgraduate program. A study by Hoving et al(47) on emergency care providers' attitudes and practices towards research in Africa revealed strong positive perceptions by the respondents with 80% of participants agreeing research promotes critical thinking and therefore form an important educational tool. On participation in research the study revealed one in five of the emergency care providers never involved in any research and 56%have never published any research article in Africa. Barriers to research participation identified included lack of research funding (64%), lack of research training (51.2%) and lack of allocated research time (45%)(47).A study survey by Amir et al on knowledge, practice and attitude of physicians towards evidence-based medicine in Egypt showed a generally positive attitudes towards evidence-based medicine and 81% of the respondent found it useful in daily management of the patients. Further 90% of respondent agree practicing evidence-based medicine improved patient outcom(48).

A study by Kanmuonye et al on barriers and facilitators of research among physicians in Cameroon revealed key barriers to research as lack of research team, lack of financial incentives and lack of research grants(49). Other constantly identified barriers included time constraints, heavy workload, and lack of internet connectivity. The main facilitator for research participation included grant availability, scientific recognition, interest in research and previous research experience.A study by Komba et al on challenges of writing thesis and dissertation by postgraduate students in Tanzania's institution of higher learning revealed the major weaknesses identified by the external examiners was low-quality thesis writing skills which were evenly spread to the areas of scope, significance, and general contribution of their theses and dissertation(24).However, none of these studies conducted so far explored any aspect of postgraduate student's perceptions and attitude , past experience and potential challenges to research faced during residency program.

Locally in Kenya challenges to research by postgraduate students during residency programs are indisputable. In spite of the existence of these challenges, during my literature review there were

no local studies identified that was conducted to investigate their nature and scope particularly among medical students. Therefore, my study aims to fill this knowledge gap and explores general perception, attitude, and key challenges to research faced by postgraduate medical students during their residency programs at the University Of Nairobi School Of Medicine. Another aim of my study is to assess their knowledge level, past experience, and research collaborations during their medical educations.

This study is therefore timely as the finding is envisaged to help both students and the faculty members on the key barriers to resident's research during the residency program. Specifically, the study findings will be expected to provide baseline information for making recommendations on the best strategy to overcome such challenges facing postgraduate students during the residency programs.

2.1 Statement of the Problem

Research thesis during residency programs is challenging due to time constraints and overwhelming workload associated with daily clinical duties. In a study conducted by Kate et al on barriers to research among Canadian medical students, the key limiting factors identified included time constraints (67%), lack of personal interest (32%), inadequate mentorship (32%), and lack of research training (22%)(27). Among the various time constraints, students identified studying demand (61%), on-call demand (52%) and clinical duties (38%) were the major barriers to research during the residency program(28). A study by Silas et al also identified student's perceived key barriers to research as time, schedule conflict, inadequate faculty support, and lack of protected research time among others (15)(29)(30). This together with general disinterest and negative perception of research activities due to lack of motivation and encouragement by the relevant institution has led to a reduction in the number of research participations and research output among postgraduate students during residency program and even after their graduation(20,31–35). Literature gap exists on local statistics on perceptions, attitude and key challenges to research among postgraduate students during a residency program in Kenya since most of these studies were conducted in either the developed countries or elsewhere outside Kenya and none as far as the Kenyan context is concerned. The aim of this study, therefore, is to explore and provide local data on perceptions, attitudes, and key barriers to research among postgraduate medical students studying at the University of Nairobi, Kenya.

2.2 Rationale/Study Justification

Research output and publications by developing countries in the leading international journal platforms are extremely discouraging accounting for only ~2% of the collective publications by the LMICs(6,7)(8,9) [6]–[9] despite 80% of the world population living in the developing countries(10). The bulk of the scientific publications (98%) are associated with institutions found in developed nations. Institutions of higher learning play a fundamental role in training and mentoring medical students on basic research methodology and motivating them to actively participate in research. Medical students' positive perceptions and attitudes towards research during residency programs form fundamental initial steps towards future research careers and active participation in research activities, which will contribute to increasing the number of peer-reviewed scientific publications in the international journals and to the generations of evidence-based clinical practice and guidelines.

Scarce local data is available exploring perception, attitudes, practices, and key barriers to research activities among postgraduate medical residents in Kenya. Such data are very important because they aid in generating information that helps create awareness on residents' perceptions and barriers to research that may exist and thus inform on strategic areas of institutional focus and improvement of research interest and practice among the next generation of researchers. This study, therefore, aims to provide local statistics related to perceptions, attitudes, and key challenges to research among postgraduate medical residents studying at the University Of Nairobi School Of Medicine in Kenya.

2.3 Research Question/Hypothesis

What are the perceptions, attitudes, experiences, and challenges faced by postgraduate residents while conducting research during their residency program?

Null hypothesis:Is there a significant relationship between past research experience,level of study ,academic qualifications and barriers to research during residency program?

2.4 Objectives

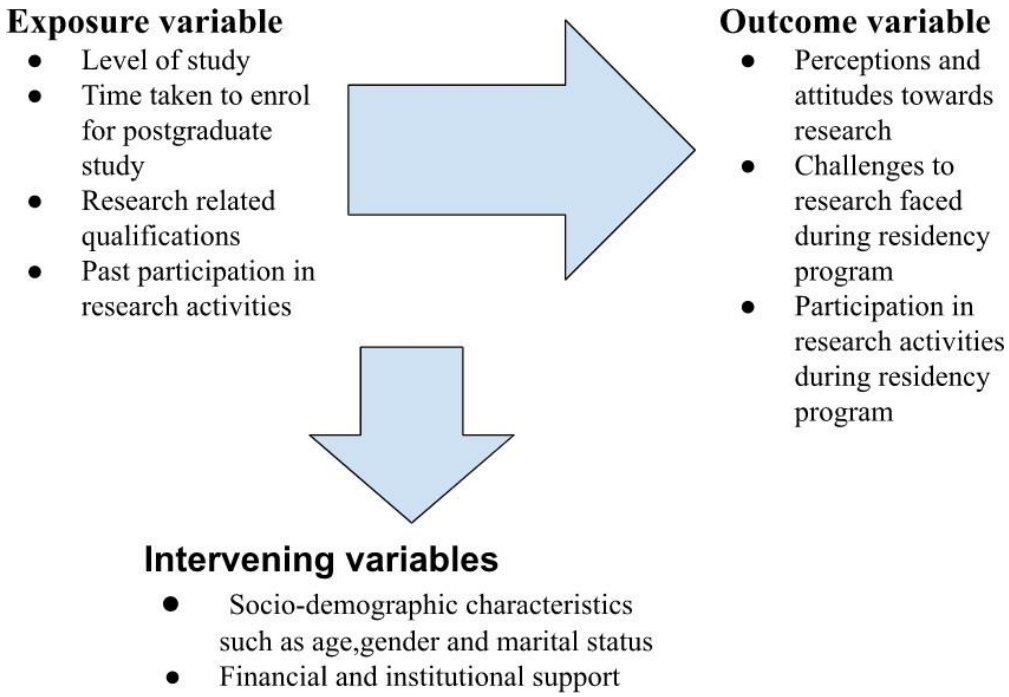
2.4.1 Broad Objective

- To establish general perceptions, attitudes, experience, and key challenges to theses development among the postgraduate medical residents at University of Nairobi.

2.4.2 Specific Objectives

- To establish perception and attitude towards thesis development among the postgraduate medical residents at the University of Nairobi.
- To explore resident experiences and participation in scientific research programs.
- To identify key challenges to thesis development and completion faced by residents during the residency program

2.5 Conceptual Framework



3.0 CHAPTER THREE: METHODOLOGY

3.1 Study Design

This was a descriptive cross-sectional single-centre study design involving postgraduate residents studying at the University of Nairobi using structured self-administered online survey questionnaires to assess their perceptions, attitudes, and key challenges to research during the residency program. The principal investigator designed the questionnaire and themes extracted from a peer-reviewed literature on the factors previously identified to be associated with research productivity(13,37,50–52). Components of this online survey study questionnaire were divided into 3 major parts: Part A covering basic socio-demographic aspects of the participants, Part B covered aspects of residents' perceptions and attitudes to research activities, past experiences, and practices of research and research publications. Part C covered key challenges of theses development and completion during the residency program, their views on institutional support programs, and collaborative research.

The questionnaire included an objective answer option (i.e. closed-ended questions).An information sheet was attached to the e-questionnaire with a short description of the aim of the study, informed consent, voluntary participation, and giving short instructions on how to complete the questionnaire. Local ethical review board approval of the study was obtained. Thereafter the survey was shared with the departmental heads of all specialty residency programs at the University of Nairobi along with an email explaining the aim and relevance of the study requesting them to create awareness of the study among the residents and assist distribute the survey questionnaire to all eligible residents under their program through class representatives. Data collection was conducted over a period of three months with weekly email reminders to the non-responders.

3.2 Study Variables

3.2.1 Exposure Variables

The exposure variables of this study were students' level of study, time taken to enroll for residency program, previous participation and experience in research activities as well as research-related qualification to research. This was assessed by administering specific structured online questionnaire and their responses registered on 5 pointers Likert scale where necessary.

3.2.2 Outcome Variables

The outcome variables of this study included residents' perception, attitudes, participations in research activities and key barriers to research perceived during residency program

The intervening variable included sociodemographic characteristics such as age, sex and marital status, financial and institutional support as well as research training during residency program

3.3 Study Area Description

This study was conducted at the University Of Nairobi School Of Medicine in collaboration with The Kenyatta National Hospital.

3.4 Study Population

The study incorporated postgraduate students only who were undertaking mandatory dissertations as part of the fulfilment of their residency programs. The study questionnaire was distributed to all eligible postgraduate students at the University Of Nairobi School Of Medicine

3.5 Sampling and Sample Size

A consecutive sampling technique was employed for this study

The quantitative sample size was calculated from Fischer's formula:

$n=Z^2P\ (1-P)/E^2$

Where,

n= sample size,

Z = Standard normal deviation (1.96 for a 95% confidence level),

P= the proportion of the population having the characteristic being measured (P = (0.73) estimated at 73% from the study conducted by Sahib et al on knowledge, attitude, and barriers to research[26].

E=error of margin for the sampling of 0.05.

Therefore, $n= (1.96)^2 \times 0.73\ (1 - 0.73)/ (0.05)^2=302.9$

A sample size of 303 participant was required for this study.

3.6 Inclusion Criteria

All year II and above postgraduate students enrolled in the University of Nairobi masters programs who gave consent were included in the survey

3.7 Exclusion Criteria

The postgraduate year I students were excluded as research training does not typically begin until 2nd year of the residency program and those residents who decline to give consent to participate in the study.

3.8 Screening and Recruitment Strategy

Potential study participants were chosen using the consecutive sampling method in strict accordance with the KNH-UON-ethical ERC's standards. It demonstrated respect for the dignity and autonomy of the participants by avoiding any potential undue influence through coercion or threats and protecting privacy and confidentiality of any information obtained during the study. The study participation was voluntary and the participants were free to withdraw at any stage of the study process without any repercussion.

The potential study participants provided written, informed consent. The information sheet was carefully worded to be informative avoiding being coercive, overly enticing, or promising any benefit. The potential participants were also informed of the study purpose, potential benefits, and any risks involved in the study**.**

3.9 Ethical Issues

Ethical clearance and permission was sought from Kenyatta National Hospital and UoN ethics committee (KNH-UON-ERC) with approval number P651/08/2021. The study was conducted in accordance with the Helsinki Declaration (1975) revised in 2008.The researcher only commenced the study survey after receiving an approval from the KNH-UON-ERC ethical committee. Informed consent form was attached to the introductory part of the online survey questionnaire. The subjects were adequately informed of the purpose of the study, the data collection process involved, and their freedom to decide to participate or decline. They were given ample time to ask questions and address any concerns.

The potential participants are required to indicate their permission to take part in the study by ticking yes or no before they can continue filling the rest of the e-questionnaire. The anonymity and confidentiality of the participants were preserved by concealing their names and identity in the data collection, analysis, and reporting of the study findings. To further preserve their identity during the dissemination of findings of the study, the participants were referred to by their pseudonyms names.

Any documents, which contain participants' personal information, were kept in a locked cabinet with no access to anyone other than the principal investigator. They were informed that their actual age, level of study, and specialty they are undertaking might be used during the study. Data were shared with my two other supervisors and a statistician for reaching an agreement on the interpretation of the study findings without exposing participants' details at any interim stage.

Collected data were stored in encrypted devices and password protected. During data analysis, participant's data were shared with my research supervisors through password-protected emails only and through a secure cloud storage system which allows secure transfer of large files. The information stored on any device including a personal laptop, university computer, or hard disk were always password protected held only by myself as the principal investigator. Hard copies of written documents were kept in a secured cabinet in a locked room with no access to others in accordance with the legal requirement and ethical guidelines. Both written and electronic data of the participants will be kept for a minimum period of ten years and will be disposed of only once it's no longer needed in accordance with UON-KNH research guidance procedures. The outcome of the study and recommendations will be delivered to Kenyatta National Hospital/University of Nairobi research committee (KNH-UON-ERC) and reported and disseminated through peer-reviewed scientific journals, conference presentations, the university library, and written feedback to research participants or relevant resident's forums

3.10 Study Procedure

The questionnaire was pilot-tested among 20 eligible postgraduate students and the responses used to improve the survey. The final e-questionnaire (**Appendix III Questionnaire form**) was created using Google Form, and then distributed to the eligible participants via emails and social media platforms along with an explanation of the study and an invitation to take part. The invitation included a personalized link and designed to ensure participants responded to the survey only once and that there were no multiple responses.

A brief description of the study topic and purpose of the research were shared with the respective departmental head in all specialties undertaking a postgraduate course to seek their authority and assistance. This was also circulated to all class representatives of the respective specialty to share with residents under their jurisdiction through social media platforms such as class WhatsApp forum or Telegram so that the e-questionnaire could reach as many potential participants as possible.

Non-responders were reminded by emails or text messages at a weekly interval until they responded or target sample size was reached.

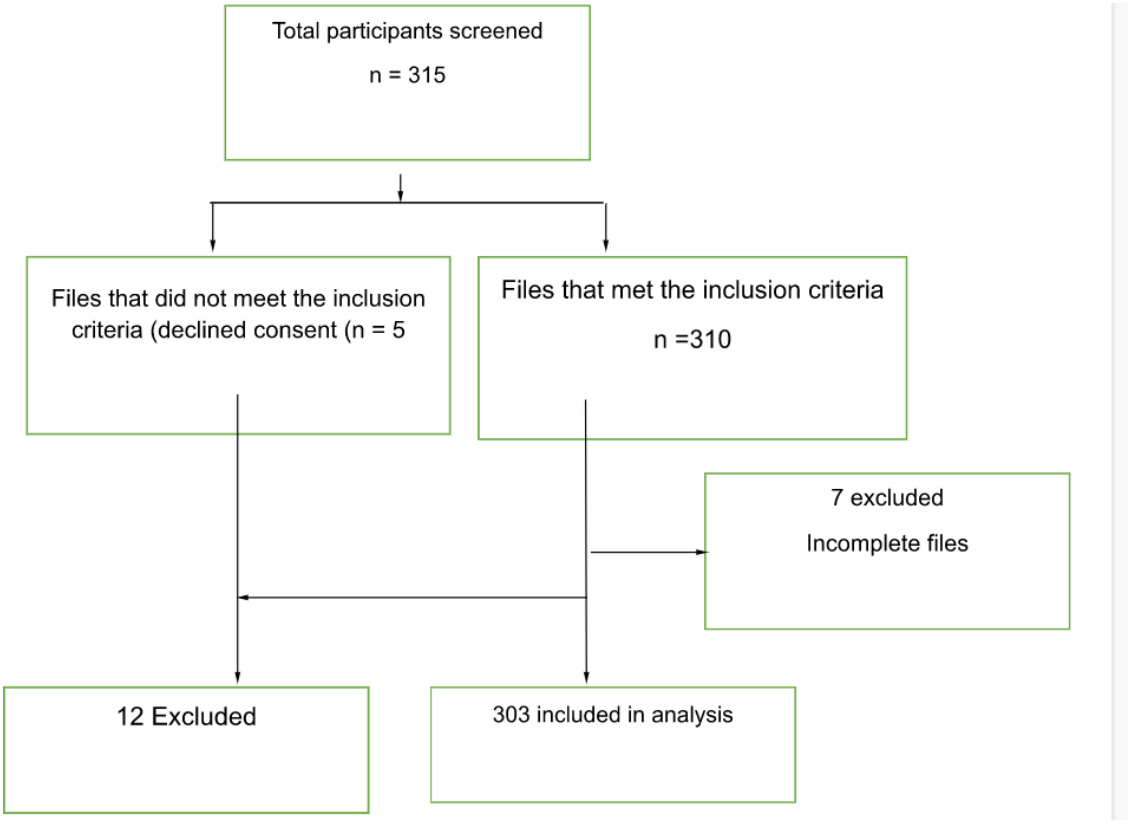
3.11 Data Management and Analysis

The web-based survey anonymized all returned questionnaire before the data were exported to an access-controlled electronic spreadsheet on Microsoft Excel, Microsoft Access, and the latest SPSS to assist in critical analysis and objective interpretation of the primary data through comparison with other findings within the framework of the same research identified in the literature review to reflect viewpoints of other authors. Categorical data were calculated in terms of proportion and the most appropriate tables and diagrams were used according to the research objectives. Continuous variables were analyzed using measures of central tendency. The confidence interval was calculated using a 95% confidence interval. Chi-square test was used for assessment of the association between different categorical variables and statistical significance was set at alpha level =0.05.

4.0 : CHAPTER FOUR: REAULTS

4.1 : Introduction

The study sought to assess general perceptions, attitudes, experience, and key challenges to research faced by the postgraduate medical residents during theses development and completion in Kenya. A total of 303 post-graduate students were targeted in the study analysis. All the targeted sample size was attained and feedback included in data analysis, which represents a 100% response rate.



4.2. Demographic characteristics of postgraduate students at the University of Nairobi School of Medicine

4.2.1. Gender of the respondents

The findings established that 52% (n =158) of the respondents were male while 48 %(n =145) were female as shown in Figure 1.

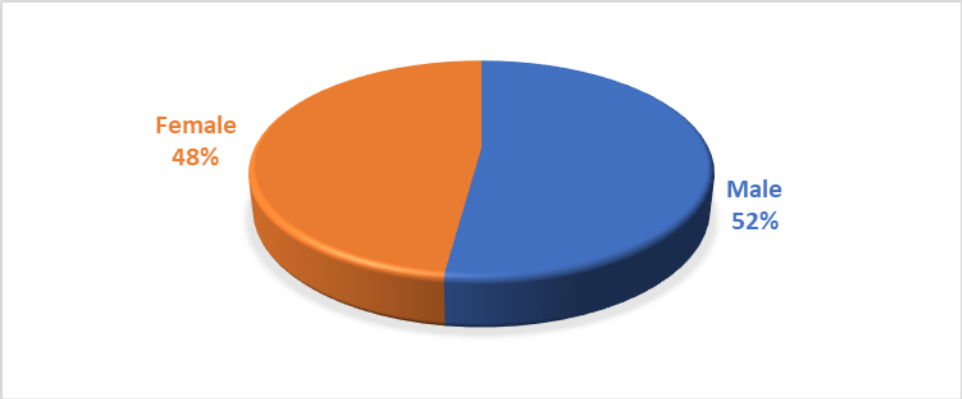


Figure 1: Gender of the respondents

4.2.2. Age of the respondents

The average age of the respondents was 33 (SD±3.04) years. However, the findings also revealed that there were respondents aged more than 40 years who participated in the study as shown in the histogram, Figure 2.

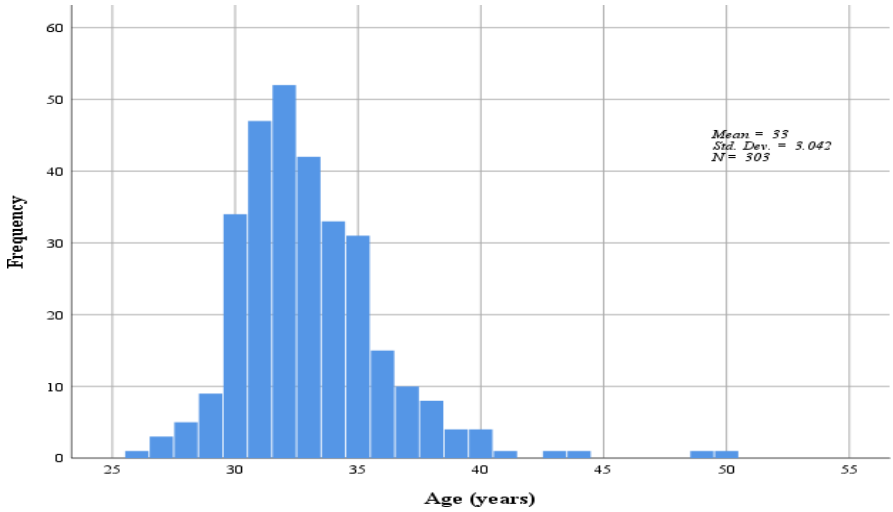


Figure 2: Age of the respondents

4.2.3. Marital status of the respondents

Majority of the respondents, 72%(n =219) were married as shown in Figure 3.

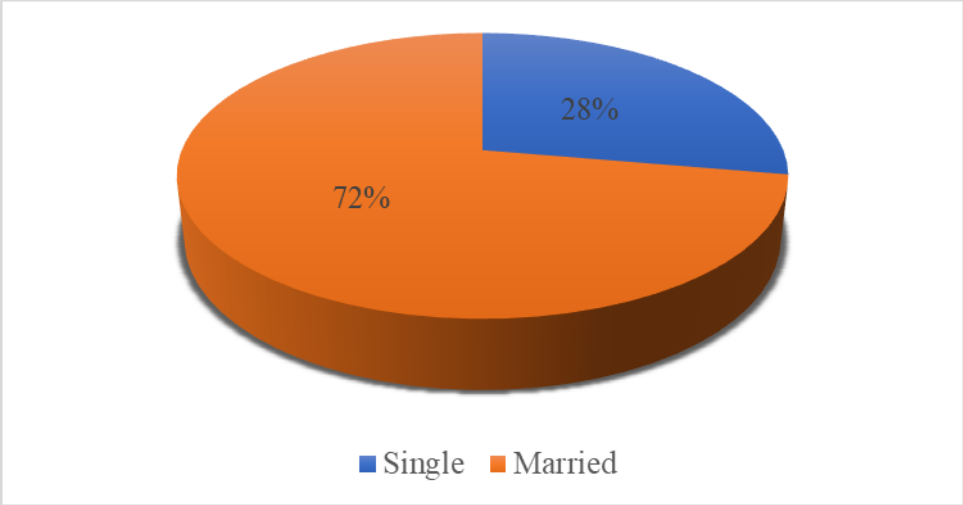


Figure 3: Marital status of the respondents

4.2.4. Level of study

The findings established that 42.2 %(n =128) were year 2 students, 40.3% (n =122) were year 3 students while 17.5% (n =53) were year 4 and above as shown in Figure 5.

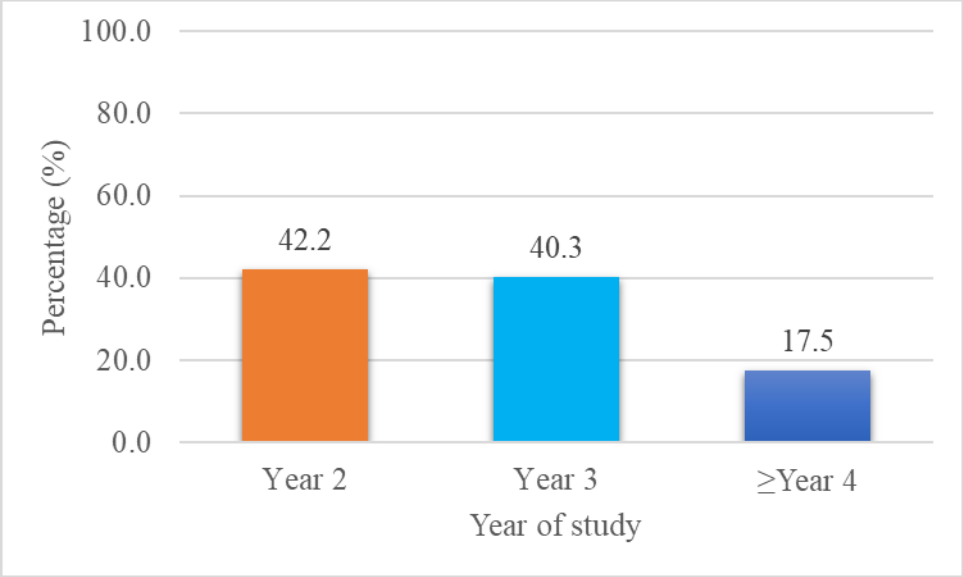


Figure 5: Level of study

4.2.5. Time taken to enroll for post-graduate course

The average time taken from undergraduate completion to enrolment in postgraduate course was 8 (SD±2.1) years as shown in Figure 6.

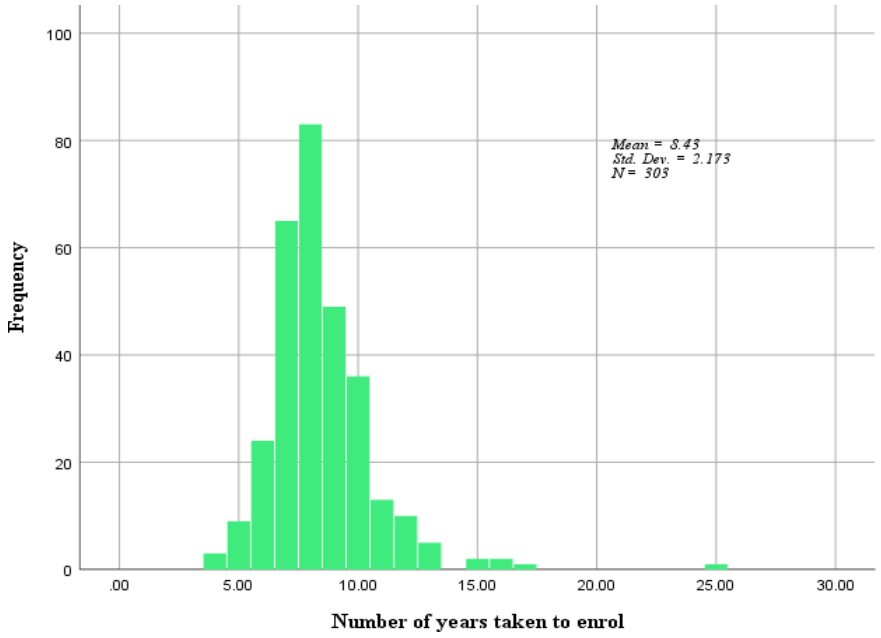


Figure 6: Time taken to enroll for a postgraduate course

4.2.6. Other qualifications related to research

The findings revealed that 23.1 %(n =70) had a diploma certificate while 2.6 %(n =8) of the respondents had MPH as shown in Table 1.

Qualifications	Frequency	Percent
None	225	74.3
Diploma certificate	70	23.1
MPH	8	2.6

.

4.3. Perceptions and attitudes of residents towards research at the University of Nairobi School of Medicine

Perception and attitude of residents towards research was assessed, 82.8 %(n =251) affirmed that conducting medical research during the residency program is an important educational tool, 84.8 %(n =257) stated that medical research promotes critical thinking. Further, 95.4 %(n =289) affirmed that research is essential in the practice of evidence based medical practice. However, 13.9 %(n =42) stated that there is sufficient medical research being conducted in Kenya, 90.4% chose their research topic themselves as shown in Figure 7.

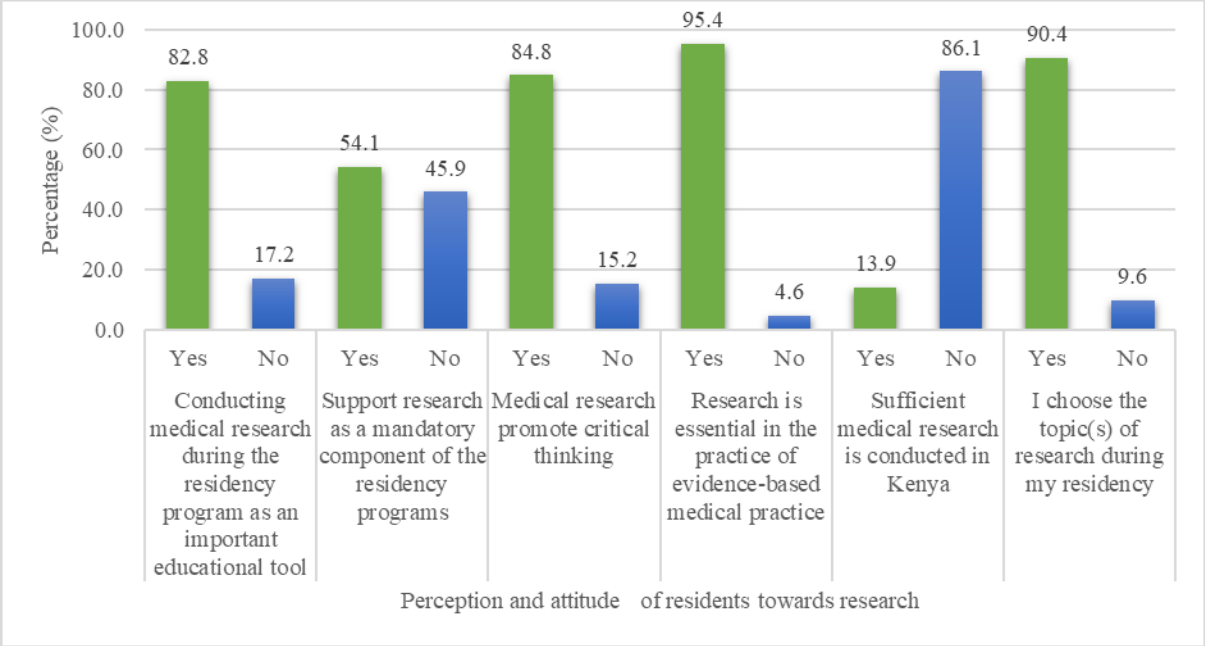


Figure 7: Perception and attitude of residents

4.3.1. Areas of preference in research among residents

The findings also revealed that 70.7% (n =214) prefer doing research in their chosen specialty only as shown in Figure 8.

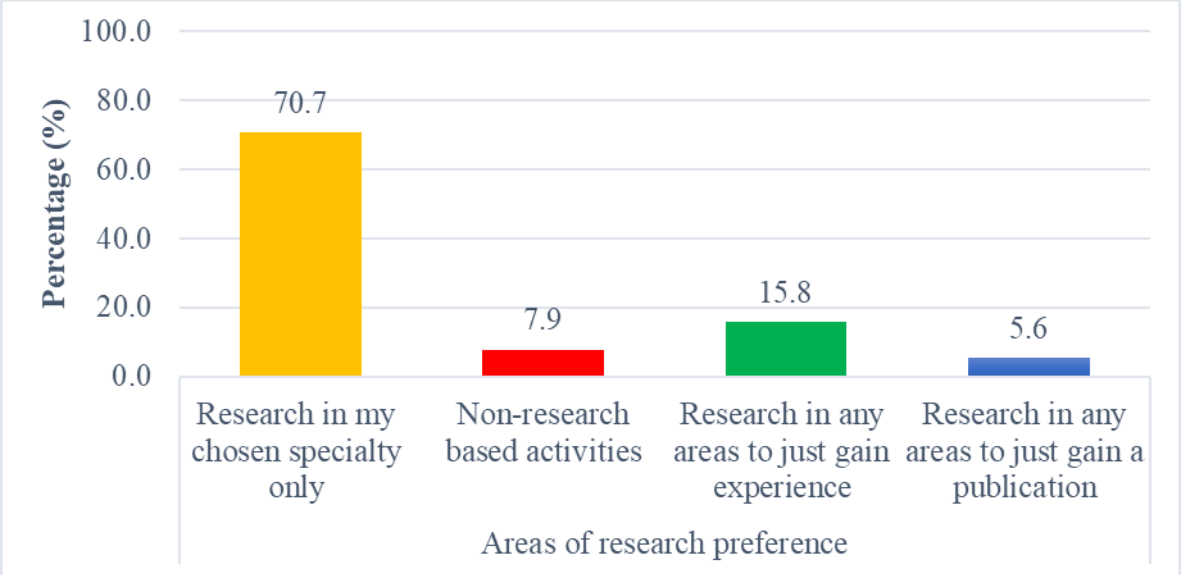


Figure 8: Areas of preference in research among residents

4.4. Past experience and participation in scientific research programs among postgraduate students at the University of Nairobi School of Medicine

4.4.1. Participation in research activity before enrolment for current residency program

The respondents were asked whether they have participated in any research activity prior to enrolment in the current program, 35.3 %(n =107) affirmed to have participated in research before as shown in Figure 9.

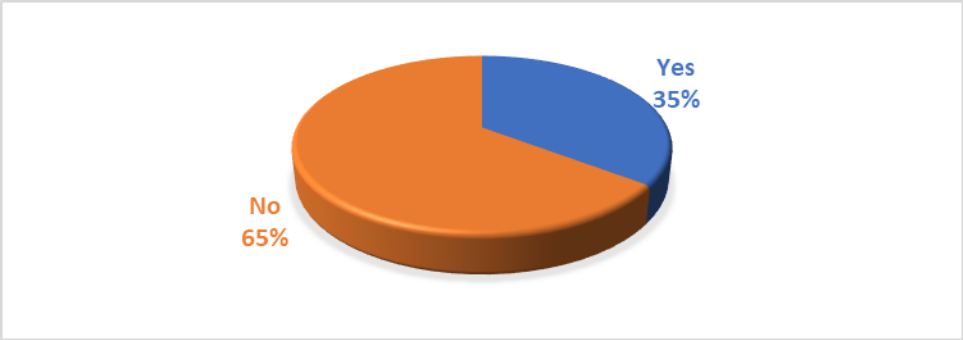


Figure 9: Participation in research before enrolment into residency program

4.4.2. Reasons for not being involved in research

Respondents who had not participated in any research activities before were asked to rank on a scale of 1 – 5 **where 1=most important;5=least important** factors that prevented them from being involved in research activity. The findings revealed that the majority of the respondents cited lack of time as the main problem (M =4.51, SD=0.114).Most of the respondents agreed with the statement that being 'not interested in research' was another reason for not being involved in research (M = 2.51, SD =0.541) as shown in Table 2.

Table 2: Reasons for not being involved in research

Reasons	Mean	SD
Not Interested in research	3.51	0.541
Lack of time	4.51	0.114
Don't know how to write research	3.89	0.221
Lack of funding	3.61	0.141

4.4.3. Areas of research participated prior to enrolment

Among those who had participated in research activities before, 74.1 %(n =75) were case reports, 14 %(n =15) were clinical trials, 11.2 %(n =12) were reviews of literature whereas 4.7 %(n =5) were involved in all of the categories considered. (Figure 10).

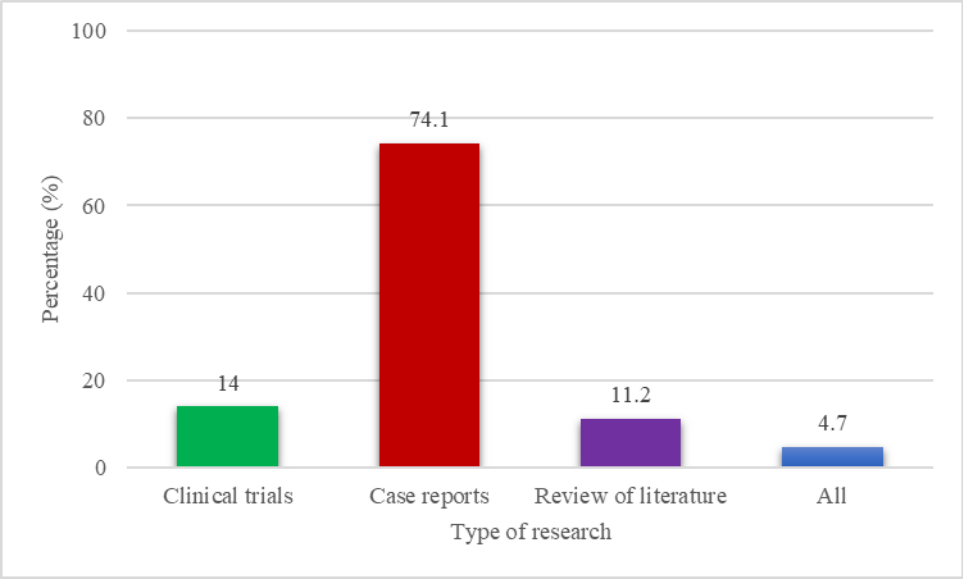


Figure 10: areas of research participated before by residents

4.4.4. Status of prior research activities

Among respondents who had participated in prior research, 81.3% had their research submission accepted, 5.6% had their research rejected.

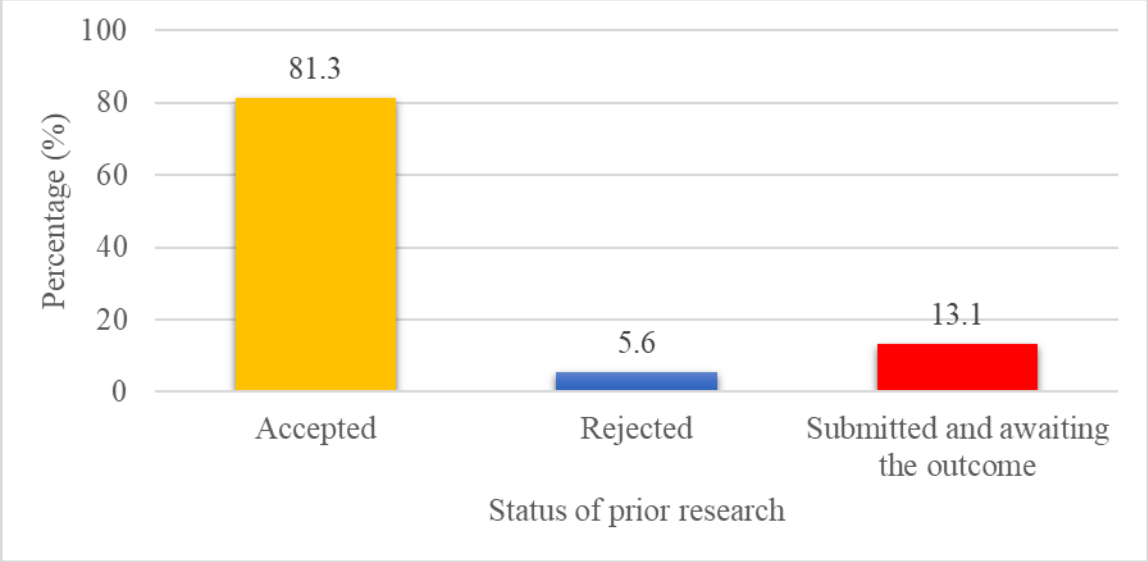


Figure 11: Status of prior research

4.4.5. Use of research journals by residents

The findings revealed that 66% (n =200) of the respondents occasionally read original journal articles, 76.2% (n=231) of the respondents stated that they occasionally read journals to improve knowledge. Respondents were also asked about search engines they used to access research articles, 49.6% (n =150) of the respondents stated they use online bibliographic databases such as PubMed. Regarding gaining access to original research articles, 77.9% (n =236) use open access journals. Majority of the respondents, 76.2% (n =231) frequently have difficulties in gaining access to original research articles as shown in Figure 12.

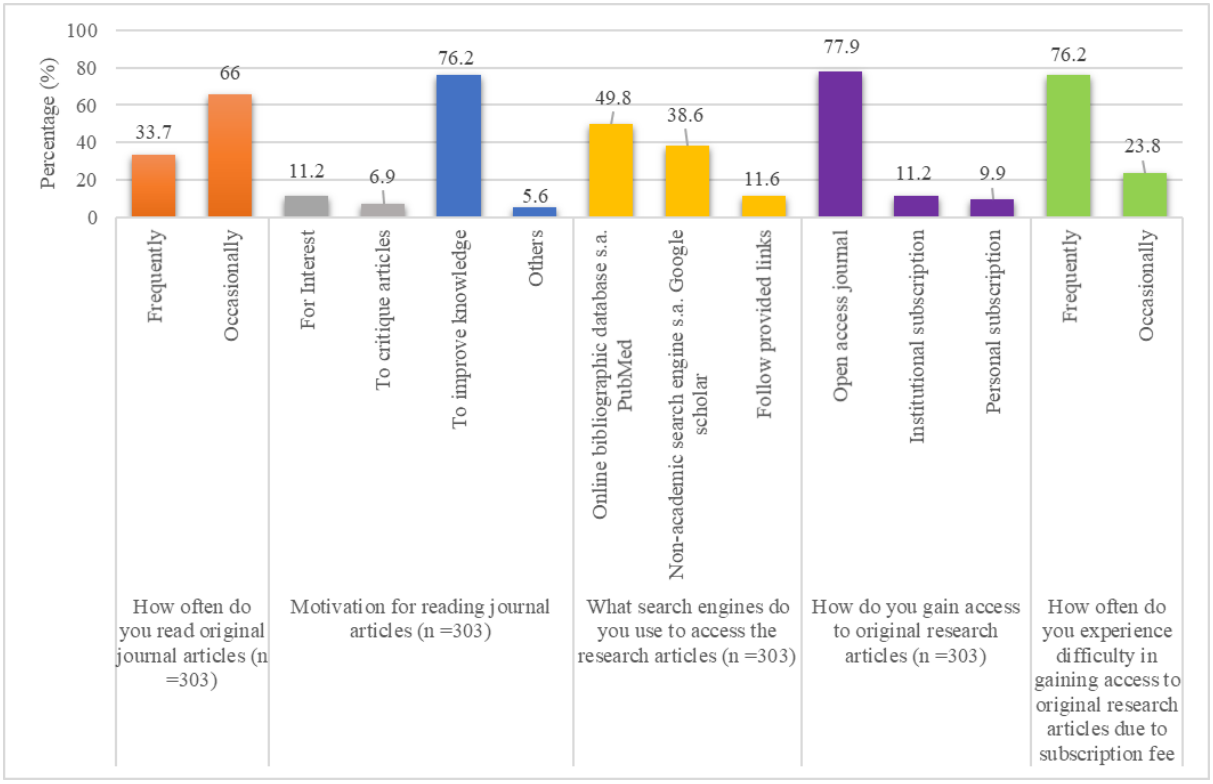


Figure 12: Use of research journals

4.4.6. Experience in research process among residents

Half of the respondents, 50.8 %(n =154) stated that they have never been formally taught how to write a research paper, 86.8 %(n =263) stated that they cannot confidently submit a research article without supervision. Majority of the respondents, 84.5 %(n=256) have never made any presentation on research at a conference. Almost all of the respondents, 91 %(n=276) agreed that participation in research is beneficial to their medical education. The results also established that 66.3 %(n =201) of the respondents have never attended research conferences and workshops. The areas of improvement that were identified include protected time for research, more research conferences and training as well as research grants as shown in Figure 13.

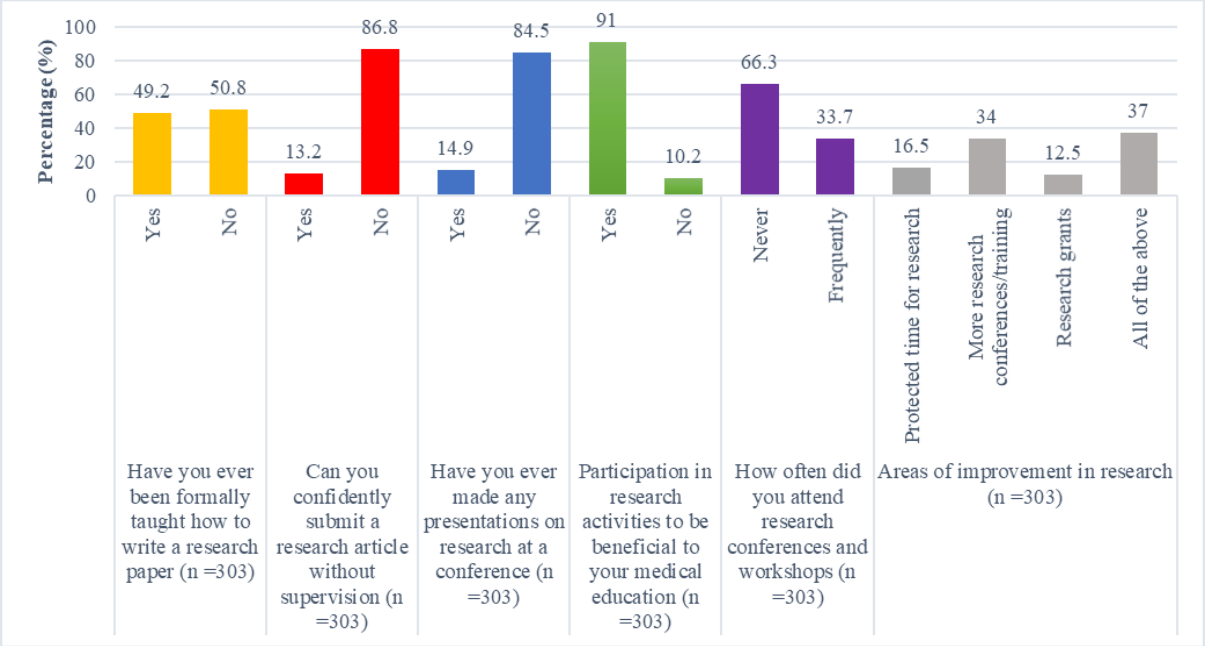


Figure 13: Experience in research process among residents

4.4.7. Key reasons for involvement in research

The findings showed that 86 %(n =261) of the respondents are involved in research because it is mandatory, 43.9 %(n =133) stated that it improves their skills while 22.6 %(n =69) cited that it will add positive achievement to their CV as shown in Figure 14.

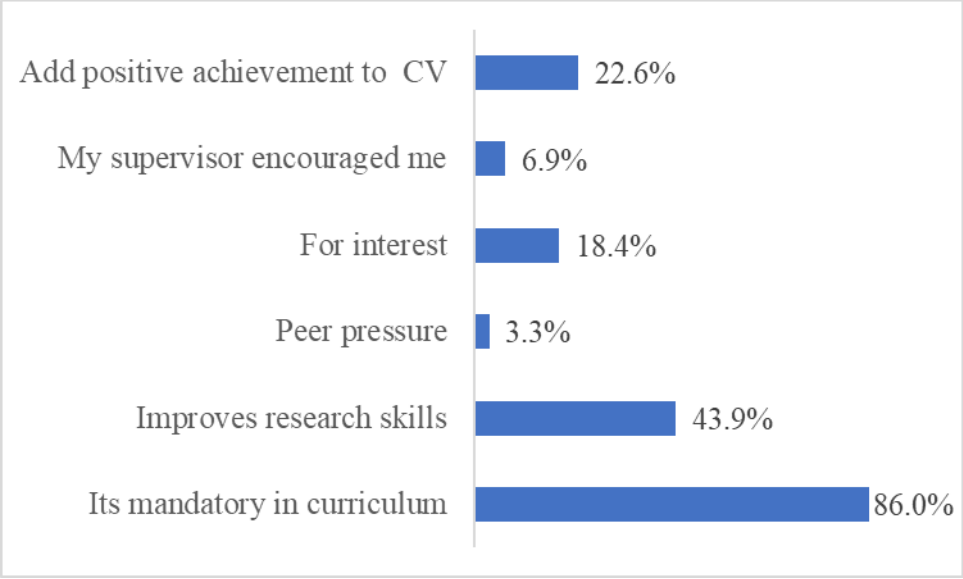


Figure 14: Key reasons for involvement in research

4.4.8. Postgraduate resident skills to carry out medical research

The findings revealed that only 30%(n =91) of residents stated they were sufficiently skilled to successfully carry out medical research as shown in Figure 15.

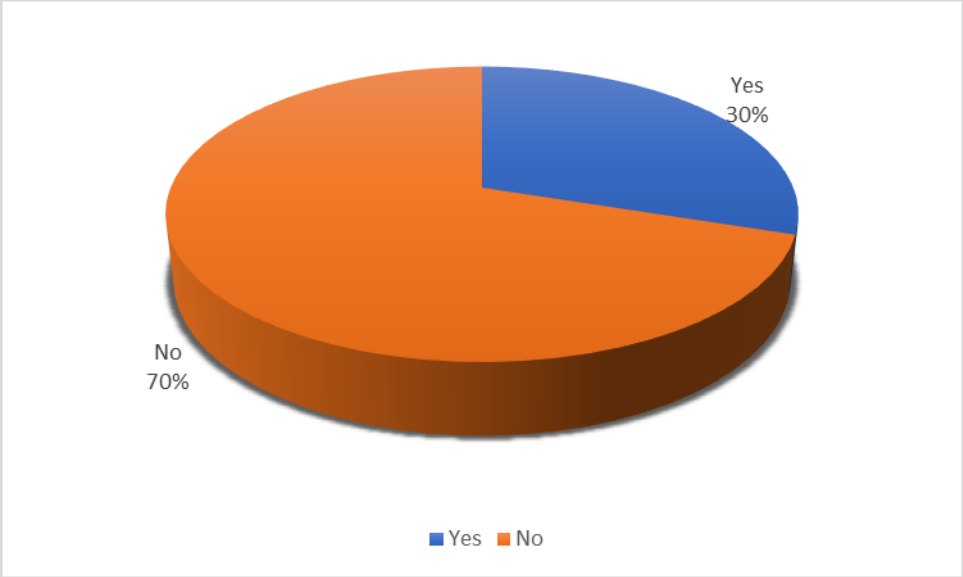


Figure 15: Efficiency in carrying out medical research

4.5. Key challenges to thesis development and completion faced by residents during the residency program

4.5.1. Key barriers among study respondents

The respondents were asked to identify key barriers to their thesis development and completion, 81 %(n =245) of the respondents stated overwhelming clinical duties, 65 %(n =197) stated inadequate training while 55 %(n =167) cited lack of funding as shown in Figure 15.

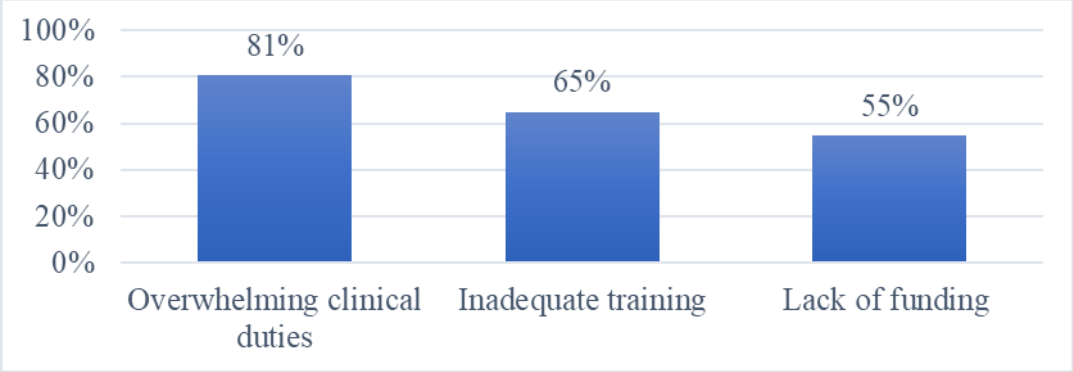


Figure 15: Key barriers among study respondents

4.5.2. Access to scientific journals

The findings established that 70 %(n =212) of the respondents have access to scientific journals as shown in Figure 16.

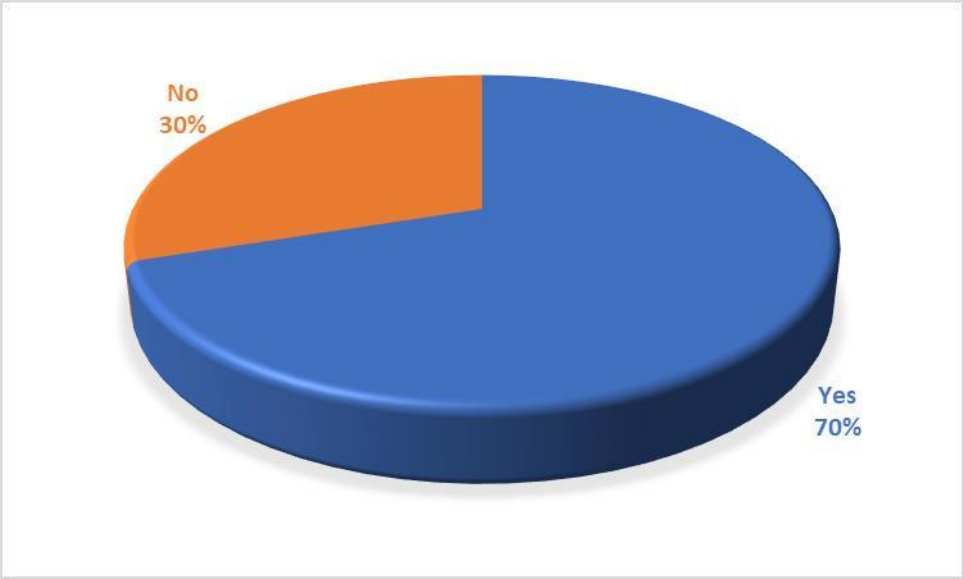


Figure 16: Access to scientific journals

4.5.3. Other Alternative access to research articles

Of those who were unable to access scientific journals through the university library, alternative sources of research articles for their literature review included online sources, 97.2% (n =295) and external library articles, 14.5%(n =44). (Figure 17).

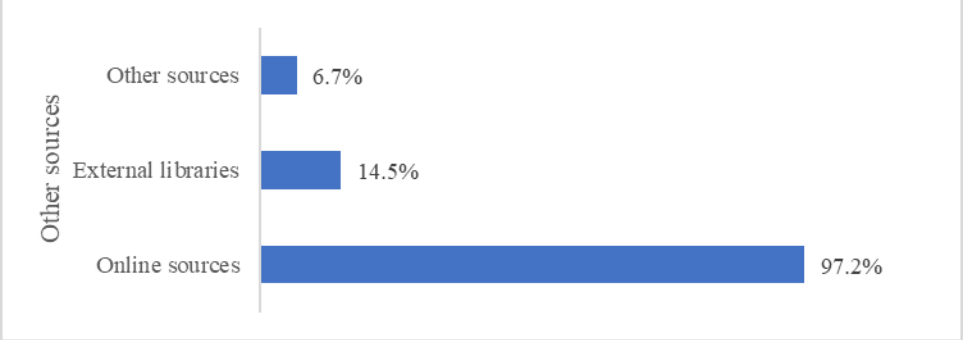


Figure 17: Other sources

4.5.4. Other Challenges to thesis development and completion faced by residents

Challenges to thesis development and completion were assessed as shown in Table 4.The findings revealed that 85.1%(n =258) of the respondents were not satisfied with their institutional support, 53.2%(n =161) stated that their relationship with their supervisors/mentors need improvement, 61.8%(n =187) stated that there are formally structured programs for research training/lectures at their institution of training, 72.7%(n =220) agreed that institution have a Journal club where residents review and critique research activities by fellow residents, 53.8%(n =163) often attend journal club meetings.

Regarding collaborative research 64.7 %(n =196) of the respondents stated that their institution does not encourage collaborative research activity. Majority of the respondents, 93.4 %(n =283) stated that they have never had an opportunity to undertake collaborative research.

Most of the respondents, 75.6 %(n =229) feel motivated by our study survey to start seeking out opportunities to conduct or participate in research activities.

Table 4: Key challenges to thesis development and completion faced by residents during the residency program

		Frequency	Percent
Satisfied with your institutional support to do research	Yes	45	14.9
	No	258	85.1
Rate your relationship with your research supervisors/mentors	Good	142	46.9
	Needs improvement	161	53.2
Formally structured programs for research training/lectures at your institution of training	Yes	187	61.8
	No	116	38.3
Institution have a Journal club where residents review and critique research activities by fellow residents	Yes	220	72.7
	No	83	27.4
How often do you attend journal club	Never attended	71	23.4
	Often	163	53.8
	Rarely	69	22.8
Officially assigned mentors	Yes	265	87.5
	No	38	12.5
The adequacy of resources (infrastructure/equipment) required for your research activity at your institution?	Adequate	84	27.7
	Inadequate	219	72.2
Does your institution encourage collaborative research while undertaking a research thesis	Yes	76	25.1
	No	196	64.7
	I don't know	31	10.2
Have you ever had an opportunity to undertake collaborative research during your research activities	Yes	20	6.6
	No	283	93.4
Did this survey make you think you should start seeking out opportunities to conduct or participate in research activities	Yes	229	75.6
	No	74	24.4

5.0 DISCUSSION

Positive research culture and self-driven motivation to actively participate in scientific research activities forms fundamental pillar towards promoting and fostering best clinical practice through evidence-based medicine among future generations of healthcare professionals

In our study, there is generally a positive perception and attitude by postgraduate students toward research with the majority of respondents affirming research as an important educational tool and promoting critical thinking in the practice of evidence-based medical practice. This is a good sign that encourages

residents to participate in research and the finding goes in line with many study findings including those by Fitz-Gerald et al, Sahib et al(25), and Amin et al(21). Similar findings were demonstrated by Silcox et al(10),Kazantseva(36),Saeeds(53) and Alguire et al(35).

Regarding participation in research activities prior to enrolment for residency programs, the majority of residents have never participated in any research activities citing lack of time and research-writing skills. Few respondents read and use research journal articles properly in their daily clinical practice, despite the majority agreeing that participating in research is important to their medical education. This can be attributed to the limited exposure to research activities throughout the undergraduate and internship years, as well as to major obstacles to research, such as a lack of funding, time, and training, which have a negative impact on the research culture. However, the wide range of research activities that respondents participated in such as clinical trials, case studies, and literature reviews, suggests that they had the ability to select from a wide spectrum of research topics. Residents were free to choose a research topic within their chosen specialization, and the majority of those who participated had their research submissions accepted. These findings are comparable to those of a study by Fitz-Gerald et al. on the psychiatry resident's participation in research, in which half of the residents took part and majority of them said they selected the research project's topic and specialty(54). In a study by Griffin et al. on the publication practices of medical students at a British medical school, the majority of students chose research projects in the career they desired to pursue(45). In an African set up similar findings have been reported by Hoving et al in his study among African emergency care providers' attitudes and practices towards research(47).

Respondents' experience in research prior to enrolment for residency were very limited. Nearly half of the residents lack research-writing skills and as a result, lacked the motivation to participate in research activities. Majority of them did not attend any research conferences or seminars, present any research, or submit any research-related articles for publication. This is concerning as it harbors negative research culture and deprives future generations of physicians the opportunity to take an active role in scientific research activities which is universally accepted as the backbone of evidence-based medicine and best clinical practice. This finding is comparable with findings by Fitz-Gerald et al., where the majority of respondents agreed they could not submit an article without supervision and only a third believed they had been taught how to write a paper and an abstract, respectively(54). Only 17% of residents participated in scientific meetings, with the lack of experience and knowhow on article writing and submission cited as a cause.
It is important to note that in our study findings residents who had past experience in research activities either through research-related qualifications or through active participation in research programs had fewer challenges to research during residency programs. It's therefore a wakeup call for the Faculty to be aware of this and make early necessary interventions that inculcate positive research culture among residents either through introduction of teachings in key research methodologies in the undergraduate curriculum including research article writings and submissions or introduce elective period in research-related field.
Among key reasons identified for participation in research during residency included research as a mandatory component of postgraduate residency programs. Obligatory participation in research activities improve perceptions and attitudes of students toward research as well as their medical knowledge and research writing skills(55).

A considerable number of key barriers to research among residents have been identified. Overwhelming clinical duties was the major barrier to thesis development and completion followed closely by inadequate training and lack of funding. Hoving et al have documented similar findings on emergency care providers' attitudes and practices towards research in Africa where major perceived barriers relate to lack of research-related funding, training and time(47). In a study by Hames et al on

barriers to research among residents in radiology, a major limiting factor identified was time constraints, which students attributed to studying demand, on-call demand and daily clinical duties(34). Similar findings have reported by other studies(11,17,18,20–23) across various medical specialties suggesting they are universal barriers to conducting research by residents during residency programs. These barriers have been the reasons for inequitable research output in Africa and a number of strategies have been implemented to promote positive research culture. Such strategies were aimed at improving one's attitude toward research (both for the individual and for the environment in which they work) and one's capacity to learn research skills, which in turn led to the production of more (and better) publications(47).

Although there are official mentorship programs in our study, it is important to note the majority of residents were not satisfied with the mentorship programs and that their relationship with research supervisors needs improvement. Without a doubt, mentorship has a positive impact on the results mentees achieve. Programs for residency training should be designed in a way that motivates mentors and senior research supervisors to share their knowledge with their mentees and actively oversee residents' research initiatives. Other related barriers identified including lack of adequate training ,research funding and lack of opportunity to undertake collaborative research need to be adequately addressed by the Faculty .The training programs' curricula should endeavor to organize and encourage residents to attend formal scientific research workshops and conferences as well as provide opportunities for collaborative research. These techniques will guarantee a positive research culture and will enable residents to produce high-quality research projects.

6.0: CONCLUSION

Our findings demonstrated residents have strong positive perceptions and attitudes towards research; however, they face a myriad of obstacles during residency programs including a lack of dedicated time due to overwhelming clinical duties, lack of training on research, and lack of research grants. To increase residents' research participation and research output, a strategy to address these challenges is required. This plan must center on allocating protected time for residents' research, improving mentorship programs, and offering in-depth research training programs, as well as adequate research funding.

7.0: STUDY LIMITATION

The findings in this study is based solely on the views given by the postgraduates students about research activities performed or offered to them and may be skewed. They are not contrasted with objective data or views obtained directly from the faculty members or from the Dean's office.
Besides, our study only targeted postgraduate students studying at University of Nairobi and hence generalizations of our findings to the rest of the world may not be possible and we recommend further research that covers wider geographic regions outside Kenya

8.0: RECOMMENDATION

1. Introduce robust training program on basic research methodology and research writing skills
2. Avail more research funding for postgraduate students
3. Organize and encourage students to attend scientific research conferences and workshops

4. Introduce protected time for research so that residents get ample time dedicated to undertaking quality research activities
5. Improve mentor-students relationship
6. Enforce mandatory attendance and active participation of residents in journal club

7. Encourage robust institutional support to do research including collaborative research during residency program

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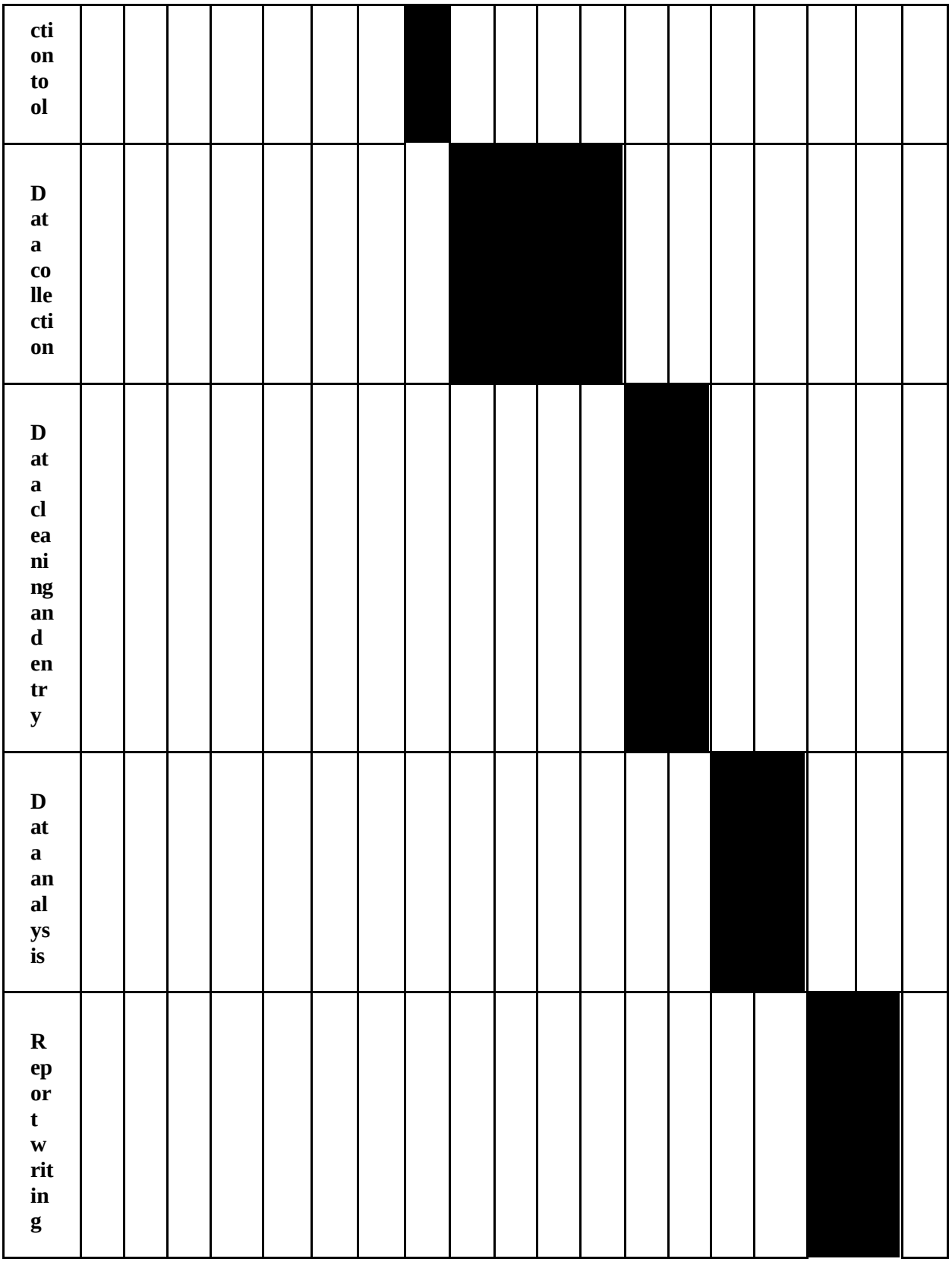
STUDY TIMELINE AND TIMEFRAMES

STEP	Dec20	Jan21	Feb21	March21	April21	May21	June21	July21	Aug21	Sep21	Oct21	Nov21	Dec21	Jan22	Feb22	March22	April22	May22	June21
Proposal development																			
Ethics review and corrections																			
Piloting of data colle																			


ction tool
Data collection
Data cleaning and entry
Data analysis
Report writing

Dissemination of research findings and publications																		

BUDGET

Proposed Budget Items Directly Tied To This Study

Description/Item	**Quantity**	**@ (Kshs)**	**Total cost (Kshs)**
Statistician	1	30,000	30,000

Data Entry Clerk	1	10,000	10,000
Communications(Airtime, Data Bundles)	-	10,000	10,000
Pens	1 box	1,000	1,000
Document Folders 200	10	200	2,000
Questionnaire Forms		30,000	30,000
Computer	1	60,000	60,000
Publication Cost	1	50,000	50,000
Printing and Binding		30,000	30,000
Ethics Fee		2,000	2,000
Data Analysis		50,000	50,000
Professional Conference		20,000	20,000
Indirect Costs		50,000	50,000
Total cost			**345,000**

APPENDICES

Appendix I: Email to Departmental Heads of All Specialty Requesting Assistance in My Study

Greetings,

I hope this email finds you well

I am Dr. Alnur Salat Hassan, part II radiology resident at the University of Nairobi.

I am conducting my research thesis on "Perceptions, attitudes, experiences and key challenges to postgraduate residents in Kenya in relation to thesis development and completion during residency programs at the University of Nairobi"

I am writing to request your assistance in creating awareness among the residents under your program about the importance of this unique study and encourage them to participate in this study

I have the ethical review committee approval for this study -KNH/UON/ERC APPROVAL NO---

The ideal participant will be postgraduate students year 2 and above enrolled for a Master's degree who will be expected to undertake the mandatory thesis during their residency program.

Your kind consideration will be highly appreciated

Please let me know if have you have any questions or need any additional information on 0725020205/Email:alnur.hassanhaji@gmail.com or my lead supervisor Dr. Onyambu on email:konyambu@yahoo.com

Best regards,

Dr.Alnur Salat Hassan

Specialty programs marked for study survey and to each email will be sent to:

1. Anaesthesiology
2. Anatomic Pathology
3. General surgery

4. Orthopaedic surgery
5. Thoracic and cardiovascular surgery
6. Veterinary medicine
7. Urology
8. Neurosurgery
9. Plastic and reconstructive surgery
10. ENT surgery
11. Maxillofacial surgery,
12. Psychiatry
13. Dental
14. Pharmacy
15. Imaging and Diagnostic Radiology
16. Internal Medicine
17. Obstetrics and Gynaecology
18. Paediatrics and Child Health
19. Master's in Public Health

Appendix II: Consent Form

Introduction

My name is Dr. Alnur Hassan, a medical resident in the radiology department at the University of Nairobi. I am conducting research to assess perceptions, attitudes, experience, and key challenges postgraduate residents face while undertaking a research thesis during the residency program at the University of Nairobi and would like to request your participation.

Study purpose

The purpose of this study is to assess perception, attitude, experience, and key challenges to research by postgraduate medical students at the University Of Nairobi School Of Medicine.

Study Procedure

Your participation in this study survey is entirely voluntary and if you decide to participate, you are free to withdraw at any time without any repercussion with regards to your academic and professional training at the University of Nairobi. Your anonymity as a participant and confidentiality of all information gathered will be observed. No information will be included in publications, presentations, or reports that could be used to personally identify you, and the data so obtained will be stored in a very secure location. There will be no compensation provided for participating in this study. The study will be an online survey among medical residents in the various specialty programs currently training at KNH teaching hospitals. If you choose to participate you are required to answer some questions pertaining to the study title.

Potential Benefits of the Study

Your participation is very important and helps us generate valuable information on medical residents' perceptions, attitudes, experiences, and key challenges to research during the residency program at the University of Nairobi. The principal investigator will share the study findings and any recommendations emanating from the study with the Dean school of medicine and the chairpersons of the various departments who in turn could utilize the information gathered to enhance and promote positive research culture among the medical residents during the residency program.

Risk and Discomforts

A potential risk of the study may be concerns regarding the privacy of the information you share in which case you can be assured that every shared information will be kept as confidential as possible with a code number being the only identifier in a password-protected computer database.

Confidentiality

No name or any other personal identifier will be used in any report or publication arising from this study. The data collected will be stored in a password-protected computer which will only be accessible to the principal investigator, supervisor, and statistician.

Additional Information

In case you need any clarification, you can contact me Dr. Alnur Hassan, the principal investigator on **0725 020 205**,Email:**alnur.hassanhaji@gmail.com** or Dr. Callen Onyambu the lead supervisor on Email:**konyambu@yahoo.com** and Dr. Timothy Mutala on Email: **Mutala@uonbi.ac.ke**

You can also contact the secretary KNH-UON-ERC Tel.Nos---2726300 ext.44102 email: **uonknh_erc@uonbi.ac.ke**

As a researcher, I declare that I have no conflict of interest in this study.

Appendix III: Questionnaire Form

Please Answer All the Questions

This Questionnaire will take approximately 5 minutes to fill.

Participant's Statement

I have read and fully understood the information provided in the consent form. The risk and benefit has been explained to me. I understand my participation in this study is voluntary and that I may choose to withdraw at any time. I understand that all efforts will be made to keep information regarding my personal identity confidential. I freely agree to participate in this research study. By clicking **YES** I understand I have not forsaken the legal rights that I have as a participant in this research study

1. I agree to participate

- Yes
- No

Part A: Biodata

Tick where appropriate

- Age (years)
  - .....
- Gender
  - Female
  - Male
- Marital status
  - Single
  - Married
- I am currently a
  - Radiology resident
  - Non-radiology resident
- My level of study?
  - Year 2

- Year 3
- Year 4

- Which year did you graduate from the medical school?
  - ? ---------- (specify)

· What other academic qualification related to research do you have in addition to the medical degree?
  - Certificate
  - Diploma
  - Degree

Part B: Perceptions, Attitudes and Past Experiences on Research?

1. Do you consider conducting medical research during the residency program as an important educational tool?
- Yes
- No

2. Do you support research as a mandatory component of the residency programs?
- Yes
- No

3. Do you agree medical research promote critical thinking
- Yes
- No

4. Do you consider research as essential in the practice of evidence-based medical practice?
- Yes
- No

5. Do you agree sufficient medical research is conducted in Kenya?
- Yes
- No

6. Do you agree as a postgraduate resident you are sufficiently skilled to carry out medical research?
- Yes
- No

7. I chose/will choose the topic(s) of research during my residency.
- Yes
- No

8. During your medical education have you ever participated in any research activity before enrolling for current residency programs? If no proceed to Q 11
- Yes

- o No

If YES what category of research activity did you participate in?

- o Case reports
- o Review of literature
- o Clinical trial

If YES hat was the outcome of your submission/s? Tick where appropriate

- o Accepted
- o Rejected
- o Submitted and awaiting the outcome

9. If you have never been involved in any research activity, please rank on a scale of 1–5 (1=most important; 5=least important), factors that prevented you from involving in research activities?

- o Not interested
- o No opportunity encountered to involve in research activities
- o Lack of time due to other commitments
- o Done research but not submitted one as an article
- o Didn't know how to write a research article

10. What research topic do you prefer to pursue if given the opportunity?

- o Clinical research
- o Laboratory research

11. What areas of research do you prefer to focus on for your research activities?

- o Research in my chosen specialty only
- o Non-research based activities
- o Research in any areas to just gain experience
- o Research in any areas to just gain a publication

12. Do you consider pursuing non-research activities as an alternative to academic research?

- o Yes
- o No

13. How often do your mentors encourage you to involve in research activities?

- o Never
- o Often
- o They do not practice research

14. Would you like more opportunities to take part in research activities?

- o Yes
- o No

15. How often do you read original journal articles?

- o Frequently
- o Occasionally
- o Never

16. What motivates you to read journal articles?

- o Interest
- o To improve knowledge
- o To critique articles

If not, why?

- o Too difficult to understand
- o Not interested
- o Have not been encouraged to do so
- o Do not feel it's a good place to gain knowledge

17. What search engines do you use to access the research articles?

- o Online bibliographic database s.a. PubMed
- o Non-academic search engine s.a. Google scholar
- o Follow provided links

18. How do you gain access to original research articles?

- o Open access journal
- o Institutional subscription
- o Personal subscription

19. How often do you experience difficulty in gaining access to original research articles due to subscription fee?

- o Frequently
- o Occasionally
- o Never

20. Have you ever been formally taught how to write a research paper?

- o Yes
- o No

21. Can you confidently submit a research article without supervision?

- o Yes
- o No

22. Why do you think it is important to publish an article on research? Please rank on a scale of 1–5 (1=most important; 5=least important)?

- o To improve career
- o For interest
- o Peer pressure
- o To relay information
- o Important skill to learn

23. Have you ever made any presentations on research at a conference?

- o Yes
- o No

If so how many (please indicate) ------

Where were they? ….

- o International Conference
- o National meeting
- o Audit meetings at a local hospital

24. Do you agree participation in research activities to be beneficial to your medical education?

- o Yes
- o No

If YES in what way do you consider research activities to be beneficial?

- o Career progression
- o Job opportunities
- o Potential to improve practice

If NO what are the MAIN reasons for your non-participations in research activities?

- o Lack of institutional motivation
- o Lack of funding/resources
- o Lack of time

25. What is your KEY motive for being involved in conducting research?

- o It's mandatory in the curriculum
- o Improves research skills
- o Peer pressure
- o For interest
- o My supervisor encouraged me to
- o Add to positive achievement on my curriculum vitae

26. How often did you attend research conferences and workshops?

- o Frequently
- o Never

27. What areas of improvement do you suggest to facilitate a better research experience?

- o Protected time for research
- o More research conferences/training
- o Research grants

<u>Part C: Barrier to Research, Institutional Support, and research collaboration</u>

28. What factors do you consider to be a major barrier to your theses development/completion during the residency program?

- o Limited time
- o Overwhelming clinical duties
- o Inadequate mentorship
- o Inadequate training in research
- o Lack of research funding
- o Language barrier

29. Which of the following do you consider to have taken up most of your time hampering your research activity?

- o Studying demand
- o On-call demand
- o Clinical duties
- o Others

30. How do you describe your internet connectivity at home for conducting research activity?

- o No internet
- o Slow
- o High speed

31. How do you rate your general skills in the English language (writing, reading, and speaking?)

- o Poor
- o Good
- o Excellent

32. Do you feel satisfied with your institutional support to do research?

- o Yes
- o No

If no what areas do you feel dissatisfied?

- o Training
- o Mentorship
- o Research resource/funding

32. How do you rate your relationship with your research supervisors/mentors?

- o Good
- o Need improvement

34. What motivates you to pursue research?

- o Mentorship by faculty
- o Career progression
- o Financial incentives

35. Do you get access to various scientific journals through the university library?

- o Yes
- o No
- o Not aware of its existence

If the answer is no how else do you get access to research articles for your literature review?

- o Online sources
- o External library articles

36. Are there formally structured programmes for research training/lectures at your institution of training?

- o Yes
- o No

37. Does your institution have a journal club where residents review and critique research activities by fellow residents?

- o Yes
- o No

How often do you attend journal club?

- o Rarely
- o Often
- o Never attended

38. Have you ever had an opportunity to attend a capacity building in research methodologies during your residency organized by your university?

- o Yes
- o No
- o Never came across one

39. Are there officially assigned mentors to facilitate your research proposal development and guide you through its completion?

- o Yes
- o No

40. How do you rate the adequacy of resources (infrastructure/equipment) required for your research activity at your institution?

- o Inadequate
- o Adequate

41. Have you ever heard or known about collaborative research?

- o Yes
- o No

42. Does your institution encourage collaborative research while undertaking a research thesis?

- o Yes
- o No

43. Have you ever had an opportunity to undertake collaborative research during your research activities?

- o Yes
- o No

44. Did this survey make you think you should start seeking out opportunities to conduct or participate in research activities?

- o Yes
- o No

Thank you for sparing your precious time to participate in my study

Perceptions, Attitudes, Experience and Key Challenges To Research By Postgraduate Medical Residents In Kenya: A Single Centre Study Survey

ORIGINALITY REPORT

11%	8%	4%	5%
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