ETHNOBOTANICAL ASSESSMENT OF HERBAL MEDICINE PRACTICES FOR CANCER TREATMENT AMONG TRADITIONAL MEDICINE PRACTITIONERS IN KENYA.

JANES OTIENO OUKO

A Thesis Submitted to the School of Public Health Biomedical Science and Technology in Partial Fulfilment of the Requirements of the Award of Degree in Master of Science in Public Health at Masinde Muliro University of Science and Technology.

AUGUST 2025

DECLARATION

This thesis is my original work and it has not been presented for any award of Degree in any higher institution.

Signature……. **Date……**

JANES OTIENO OUKO.

HPH/G/01-70419/2021.

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled **"ETHNOBOTANICAL ASESSMENT OF HERBAL MEDICINE PRACTICES FOR CANCER TREATMENT AMONG TRADITIONAL MEDICINE PRACTITIONERS IN KENYA."**

Signature…… **Date……**

Dr. Maximilla Wanzala, Ph.D.

Department of Public Health.

Senior lecturer, Department of Public Health,

Masinde Muliro University of Science and Technology

Signature…… **Date……**

Dr. Christine Wanjala, Ph.D.

Department of Optometry and Vision science,

Senior Lecturer, Department of Optometry and Vision Science.

Masinde Muliro University of Science and Technology.

COPYRIGHT

This thesis is copyright material protected under the Berne convection, the copyright Act 1999 and other international and National enactments in that behalf, on intellectual property. It may not be produced by any means in full or in part except for short extracts in fair dealing for research or private study, critical scholarly review or discourse with acknowledgement, with written permission of the Director of School of Postgraduate Studies on behalf of both the author and Masinde Muliro University of Science and Technology.

DEDICATION

To my mother Jane Ouko and father Joseph Ouko, who have stood with me through thick and thin providing me with support from beginning to the completion of my Master Degree studies, and also to Dr. Wilberforce Cholo the Chair of Public Health Department for guidance always.

ACKNOWLEDGEMENT

My foremost, I extend my deepest gratitude to God Almighty for the gift of knowledge and wisdom to undertake this research studies. My heartfelt thanks to my able supervisors Dr. Maximilla Wanzala and Dr. Christine Wanjala whom I am profoundly indebted for their important guidance and support throughout this process, indeed your support has really made me to prosper, not forgetting Dr. Lucy Mandillah and Prof. Charles Mutai for their advices on approach to TMPs. In addition to my determined Research Assistants Mr Eugine Ohanga and Mrs Consolata Shilaho (Botanist) who have profoundly assisted me in research data process,in addition Dr. Wilberforce Cholo For Continuos Svvice support on Data Analysis. My sincere acknowledgement to TMPs from the five counties i.e. Kakamega, Bungoma, Nandi, Uasin Gishu and Baringo for their cooperation for me to achieve these results. I would also like to express my gratitude to Traditional medicine practitioners from five counties, Masinde Muliro University of Science Technology, Director of Postgraduate Support, Director of Postgraduate Studies too. Furthermore, I wish to acknowledge the Department of Public Health under school of Public Health Biomedical Science and Technology for their support and accountability towards my studies.

ABSTRACT.

Traditional Medicine Practitioners (TMPs) play a vital role in healthcare delivery across Africa, including Kenya. They frequently use herbal remedies to address various ailments, including cancer. However, this practice raises global public health concerns due to the lack of adherence to established policies and guidelines, which poses risks to users. In low-income countries like Kenya, where conventional cancer treatments are often prohibitively expensive, many patients turn to herbal remedies. This situation underscores the need for standardization and monitoring of traditional medicine practices to mitigate risks associated with contamination, improper dosage, and misdiagnosis. Additionally, there is a significant gap in the systematic documentation and scientific validation of these practices. This study aimed to explore the ethnobotanical knowledge on practices of TMPs in Kenya regarding herbal medicine for cancer treatment. The specific objectives were to: Assess the medicinal plants used by TMPs, assess the Practice TMPs' of cancer treatment in usage of herbal medicines and Determine TMPs' compliance with WHO guidelines for cancer treatment that is the WHO guidelines of guidelines for registration of traditional medicines in the who African region policy 2004-2007. A cross-sectional study design, guided by the plant use value theory, was employed. Purposive and snowballing sampling was used to get counties and TMPs respectively, 53 TMPs from five counties were selected in proportion to the county TMP populations. Data were collected through semi-structured questionnaires and observation check list, ethical approval was attained through MMUST, DPS, ISERC and NACOSTI. Quantitative data were analysed using SPSS version 28, including descriptive statistics, means, standard deviations, figures, and proportions, presented through graphs and tables. The study identified 58 unique plants from 14 families of which *Rutaceae* family was the especial high use culturally. Roots were the most commonly used plant parts (20.6%) for cancer management. Decoctions were the primary preparation method (35%), while poultices were the least used (14.7%). Oral administration was the predominant method. TMPs most frequently treated prostate and throat cancers (20.7%), followed by breast cancer (17.2%). Most new patients (76.9%) were referred by others, with minimal use of modern advertising methods such as social media. Women sought TMP services more than men. Most practitioners (92.3%) planned to pass their knowledge to their descendants. However, compliance with WHO guidelines was low, at only 18.9%. The study highlights the extensive use of herbal remedies by TMPs in Kenya but also reveals significant issues in practice. There is minimal formal supervision and monitoring of traditional medicine practices, and most TMPs lack formal training, relying instead on inherited knowledge. Awareness and compliance to WHO guidelines are notably low.

.

TABLE OF CONTENTS

DECLARATION ..... **II**

COPYRIGHT ..... **III**

DEDICATION ..... **IV**

ACKNOWLEDGEMENT ..... **V**

ABSTRACT. ..... **VI**

TABLE OF CONTENTS ..... **VII**

LIST OF FIGURES. ..... **XIII**

LIST OF TABLES. ..... **XIV**

LIST OF ABREVIATIONS. ..... **XV**

DEFINITION OF TERMS ..... **XVI**

CHAPTER ONE:**INTRODUCTION** **1**

1.1 Background information……1

1.2 Problem Statement. 4

1.3 Objectives of the study. 6

1.3.1 Broad objective. 6

1.3.2. Specific Objective 7

1.4 Research Questions. 7

1.5 Justification of the study. 7

1.6 Significance of the study. 9

1.7 Scope of the Study. 9

1.8 Theoretical model. 10

1.9 Conceptual framework. 11

CHAPTER TWO:**LITERATURE REVIEW** **13**

2.1 Introduction..... 13
2.2 Ethnobotanical plants employed by TMPs for cancer treatment. 13
2.2.1 Anticancer plants in Asia 14
2.2.2 Anticancer plants in Africa 15
2.2.3 Anticancer Plants in Kenya..... 16
2.3 Preparation and Administration of Traditional Medicines (Practice of Traditional Medicine Practitioners in Cancer Management using traditional plants). 18
2.3.1 Methods Diagnosis of cancer by TMPs..... 19
2.3.2 Safety profiles of herbal remedies and potential adverse effects..... 20
2.3.3 Metabolites and mechanism of action pathways 21
2.3.4 Regulatory frameworks governing traditional medicine and herbal remedies in Kenya. 22
2.4 Compliance with WHO guidelines for traditional medicine Practitioners in practice of herbal Medicine in Cancer Treatment..... 23
2.4.1 World Health Organization guidelines on Manufacturing of Herbal medicines 24
2.4.2 Sanitation and hygiene in the Practice of Herbal Medicine by Traditional Medicine Practitioners. 24
2.4.3 Manufacturing processes are clearly defined 25
2.4.4 Complaints and Product recalls by the Clients to the TMPs 25
2.4.5 Self-inspection and Personnel of Traditional Medicine by TMPs..... 26
2.4.6 Training of Traditional Medicine Practitioners in the Practice. 27
2.4.7 Personal hygiene of the Traditional Medicine Practitioners..... 27
2.4.8 Premises for Practice 28

2.4.9 Foreign matter and Contaminants to the herbal medicines and the Practice Premise. . 29

2.5 Literature gaps 31

CHAPTER THREE:MATERIALS AND METHODS. 34

3.1 Study Area. 34

3.2 Study design..... 34

3.3 Study population……...35

3.3.1 Inclusion criteria. 36

3.3.2 Exclusion criteria 36

3.4 Study variables..... 36

3.4.1 Dependent variables..... 36

3.4.2 Independent variables. 36

3.5 Sampling design..... 37

3.6 Sample size Determination. 38

3.7 Data Collection. 39

3.7.1 Data collection Instruments. 39

3.7.2 Data Collection procedure. 40

3.7.3. Reliability..... 40

3.7.4. Validity. 41

3.7.5 Quality Assurance. 41

3.8 Pre-test. 41

3.9 Data Collection 42

3.9.1 Objective 1 42

3.9.2 Objective 2 42

3.9.3 Objective 3 43

3.10 Data Analysis 43

3.10.1 Objective 1 43

3.10.2 Objective 2 43

3.10.3 Objective 3 44

3.11 Ethical Consideration 45

CHAPTER FOUR:RESULTS 46

4.1 Introduction 46

4.2 Demographic profile of Traditional Medicine Practitioners. 46

4.3 Medicinal plants used in cancer management 47

4.4 Practice of TMPs 50

4.4.1 Part used 50

4.4.2 Method of preparation 50

4.4.3 Method of packaging 51

4.4.4 Method of administration 52

4.4.5 Cancer clients managed by TMPs 53

4.4.6 Restrictions to practice 55

4.5 Compliance to W.H.O guidelines 56

CHAPTER FIVE:DISCUSSION 59

5.0 Introduction 59

5.1 Medicinal plants used in cancer treatment 59

5.2 Practice of TMPs in treatment in cancer management 61

5.3 Compliance to WHO guidelines 63

CHAPTER SIX:CONCLUSIONS AND RECOMMENDATIONS 66

6.1 Introduction 66

6.2 Conclusions 66

6.2.1 Medicinal plants used by TMPs for cancer treatments. 66

6.2.2 The practice of TMPs on treatment of cancers in five counties 66

6.2.3 The compliance of TMPs on WHO guidelines on use of Herbal Medicine 67

6.3 Recommendations 67

6.3.1 Recommendations on Medicinal plants that are used to manage cancers by TMPs in Kenya. 68

6.3.2 Recommendations on the Practice of TMPs in cancers management in Kenya. 68

6.3.3 Recommendations on the Compliance of TMPs on WHO guidelines in usage of herbal Medicines in Cancer Management. 69

6.3.4 Recommendation for Policy. 69

6.4 Suggestions for Further Research. 71

REFERENCES 72

APPENDICES 79

APPENDIX I: Map of kenya showing the selected 5 regions for study. 79

APPENDIX II: Consent Form. 80

APPENDIX III: Interview tool (questionnaire). 82

APPENDIX IV: WHO COMPLIANCE CHECKLIST 90

APPENDIX V: CERTIFICATE OF CONFIDENTIALITY. 91

APPENDIX VI: ETHICAL CLEARENCE 92

APPENDIX VII: NACOSTI PERMIT 94

LIST OF FIGURES.

Figure 4. 1 Medicinal plants used in cancer management 48

Figure 4. 2: Preparation method of medicinal plants 51

Figure 4. 3: Administration method of cancer medicines 52

LIST OF TABLES.

Table 3.1: Sampling schedule 35

Table 3.2: Data analysis schedule 40

Table 3.1: Demographic profile 44

Table 4.2: Medicinal plant families used in cancer treatment 45

Table 4.3: Plant parts used to manage cancer 47

Table 4.4: Packaging method of traditional medicine 49

Table 4.5: Client profile 50

Table 4.6: Types of cancer managed by TMPs 51

Table 4.7: Cancer types managed per county 51

Table 4.8: Restrictions to practice 52

Table 4.9: Compliance to WHO guidelines 53

Table 4.10: Level of compliance with WHO guidelines 54

Table 4.11: Association between demographic factors and compliance 54

Table 4.12: Demographic predictors of compliance 55

LIST OF ABREVIATIONS.

AD – After Death of Christ.

GLOBOCAN – Global Cancer Observatory**.**

IARC – International Agency for Research on Cancer

IK **-** Indigenous knowledge.

IPR – Intellectual Property Right.

ISERC – Institutional Scientific and Research Ethics Committee.

MMUST – Masinde Muliro University of Science and Technology.

NCI – National Cancer Institute.

NACOSTI – National Commission of Science and Technology.

PRK –Percentages in Ranks Knowledge.

PGRC – Plant Genetic Resource Conservation.

SDGs – Sustainable Development Goals

SPSS – Statistical Package for Social Sciences.

TMPs – Traditional Medicine Practitioners

WHO - World Health Organization.

DEFINITION OF TERMS.

Anti-cancer – is the treatment to stop or prevent cancer for example through therapy such as chemotherapy, radiation therapy and surgery immunotherapy**.**

Cancer – a large group of diseases that can start in almost any organ or tissue of the body when abnormal cells grow with no limits, go beyond their usual boundaries to invade adjoining parts of the body and/or spread to other organs.

Drug policy – is a policy regarding the control and regulation of psychoactive substances, particularly those that are addictive or cause physical and mental dependence.

Ethnobotany- is the study of interrelations between human and plants.

Ethno botanical Assessment – surveys that focus on the multiplex links between local plants and inhabitants including cultural beliefs and practices linked to several forms of application.

Ethno medicine- is the society cultural knowledge about the management of health and treatments for illness, sickness and diseases.

Herbalist – someone who uses plants/ herbs to treat diseases.

Herbal medicine authentication – a quality assurance process that ensures the correct plant species and plant parts are used as raw materials for herbal medicines.

Indigenous knowledge –it refers to understanding, skills, and philosophies developed by local communities with long histories and experiences of interaction with their natural surroundings.

Traditional medicine practitioner – A person with knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health and the prevention, diagnosis, improvement or treatment of physical and mental illness.

Traditional medicine – is the sum total of knowledge skills and practices based on theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illness.

CHAPTER ONE

INTRODUCTION

1.1 Background information

Traditional Medicine continues to play a vital role in the healthcare systems of many African societies, including Kenya, where traditional knowledge is passed down through generations. With cancer becoming an increasingly prevalent public health challenge in Kenya, many people turn to herbal remedies as an alternative or complement to conventional treatment. In rural areas, where access to modern cancer treatment is limited, traditional herbal medicine is often a primary source of care (Mwangi et al., 2020). The reliance on herbal medicine in Kenya reflects broader trends across Sub-Saharan Africa, where approximately 80% of the population depends on traditional medicine for healthcare (James et al., 2018).

Despite the widespread use of herbal medicine, there is a significant gap in ethnobotanical studies that systematically document the specific plants, preparation methods, and clinical efficacy of these treatments in the context of cancer. Existing research is often fragmented, focusing on individual communities or plant species, which limits our understanding of the diversity and effectiveness of these practices across Kenya (Gakuya et al., 2021). Furthermore, there is a lack of research exploring the socio-cultural and economic factors that influence the use of herbal medicine for cancer care, leaving a critical gap in understanding patient choices and treatment outcomes (Muriuki et al., 2019).

The integration of traditional medicine into Kenya's formal healthcare system remains underdeveloped. Although Kenya has shown a growing recognition of the role of traditional

medicine, particularly in the Kenya Health Policy 2014–2030, there are still no comprehensive guidelines or regulatory frameworks specifically addressing the integration of herbal medicines into cancer treatment (Ministry of Health, Kenya, 2018). Moreover, the absence of standardized quality control and regulatory oversight for herbal products raises concerns about the safety and efficacy of these treatments (Wambugu et al., 2021). These gaps in policy and regulation pose significant risks to patients and may undermine the potential benefits of incorporating traditional knowledge into cancer care.

Cancer poses the greatest burden of cause-specific disability adjusted life years globally, being the second highest cause of mortality; projected to be the leading cause by 2060 (Mattiuzzi et al., 2019). Of the various types of cancers, Lung, liver, and stomach cancers causes the highest mortality in the general population. Prostate and thyroid cancers have the best prognosis, while oesophagus, especially pancreatic cancers have the worst prognosis (Mattiuzzi et al., 2019). At the turn of the century, the long term, over twenty-year, survival rate for cancer patients stood at 51%, attributed to significant improvements in the early detection and management of cancer. However, the global burden of the disease has since grown, with the incidence increasing from 10 million in the year 2000 to 19.3 million in 2020 and fatalities increasing from 6 million to 10 million in the same period (Sung et al., 2021), even with further developments in the field of oncology both in detection, treatment and management.

This highlights the need for better drugs and management measures in the prevention, treatment and control of cancers, a situation further complicated by the vast variation observed in the response and recovery from cancer by the site of occurrence as well as across populations. One of the frontiers explored for alternative cancer management, is the

use of local herbal medicines, as it has been highlighted that almost 60% of the drugs in use for cancer treatment use compounds derived from plants (Alonso-Castro et al., 2011). According to the World Health Organization, traditional medicine refers to the knowledge, skills, and practices which are based on the theories, beliefs, and experiences indigenous to different cultures and used in the maintenance of health and the prevention, diagnosis, improvement or treatment (Gakuya et al., 2020). Ethnobotany on the other hand is the study of a region's plants and their practical uses through the traditional knowledge of a local culture and people. Ethnobotanical applications for cancer management, just like traditional medicinal practices are varied by regional, climatic, communal and cultural differences, often driven by local knowledge and the ease of access to these traditional cures as compared to more conventional methods of cancer treatment.

Herbs like ginger and aloe vera are abundant across several ecological zones, and have been used in the vernacular setting for their anti-cancer characteristics across several cultures such as in India, Iran and Mexico (Rahmani et al., 2014). In the sub-Saharan African countries due to variety of reasons, including limited access to healthcare services, cultural norms, and traditional beliefs (Abdullahi et al., 2011), a significant number of patients in these countries combine traditional medicine with conventional medicine, especially those with chronic diseases (Kigen et al., 2013).

Generally speaking, many techniques for preparation include: Extraction-This is prepared with solvent on a weight by volume basis. Sometimes, the solvent is evaporated to a soft mass. The preparation of the herbal medicines might be a threat to the health of an individual in that most of the medicines are prepared in traditionally way, hence the hygiene in preparation, packaging and storage may not be adhered to and even though the herb can

be an effect or causative to other diseases and this is hence a public health concern. The side effects of herbal medicines extract majorly seems to be relatively safe even though restlessness, nausea, diarrhoea, vomiting and dermal sensitivity and headache are some of the most common side effects that have been majorly raised by the clients, this is according to National Toxicology Program Report 2012, also these side effects are majorly seen to those who are overdosing. Due to the risk of loss of undocumented indigenous knowledge on medicinal uses as well as extinction of ethnobotanical plants, the assessment study on the plants is crucial in order to protect the plants under *ex-situ* and *in-situ* conservation and to preserve the associated indigenous knowledge in the selected five (5) regions in Kenya to promote health in better practises and adherence to the policies and guidelines of herbal medicines in terms of preparation, packaging, storage and administering of the medicinal plants.

1.2 Problem Statement.

Traditional Medicine Practitioners play a crucial role in healthcare delivery in Africa, Kenya included, often using herbal remedies to treat various ailments, including cancer. However, this practice is a global Public Health concern because policies and guidelines laid down to are not adhered to by the practitioners hence posing further risks to the users. Chronic illnesses like cancer are a burden particularly in low-income countries, such as Kenya where the high cost of conventional treatment causes some patients to seek for herbal remedies. therefore, there need for standardization and monitoring of this practice to minimize the risks of adverse side effects of herbal remedies that are often caused by contamination, dosage and misdiagnosis.

With an incidence of 1.11 million in 2020, with a WHO projection of an incidence of 2.08 million in 2040, the trend of cancer incidence in Africa is expected to be an upward one for the foreseeable future.

Additionally, the latest projections as of February of 2023 show that Africa will account for nearly 50% of the global childhood cancer burden by 2050(WHO, 2020). In Kenya, the year 2020 alone had 42,116 new case and 27092 fatalities from cancer, with the 5-year prevalence standing at 82,620 (Observatory, 2023). Of these, breast, prostate and cervix uteri cancers account for the top three causes.

Despite this heavy burden of cancer that is increase in death rates, high cost in treatment, economic constraints and burden on purchasing the machines and drugs to the government and the patients, it is documented that there is a significant variation in treatment availability between countries of different income levels; comprehensive conventional treatment is reportedly available in more than 90% of high-income countries but less than 15% of low-income countries(WHO, 2023). Even within national borders in the African region, racial/ethnic, socioeconomic, and geographic disparities in cancer occurrence and outcomes largely show longstanding inequalities in wealth that make access to high-quality health care difficult for some people. Conventional treatment of cancer mainly involves surgery, chemo radiotherapy, and immunotherapy, but has a variable prognosis between patients and cancer types, and as such, identifying an effective adjuvant therapy is urgent.

Globally, over 80% of the world's population depends on herbal medicine. In addition, a significant proportion sorted herbal medicines as a last resort when conventional cures are deemed uncertain (Nketia et al., 2022), highlighting the growing demand for herbal medicines (Rahayu et al., 2020). Historically, traditional herbal medicine has been an

essential complement and at times an alternative medicine, due to its numerous targets, few side effects and substantial therapeutic benefits. Studies on the efficacy of traditional remedies both from Kenya and beyond have reported that quite a number of herbal extracts and prescription medications are effective in their various applications, however the documentation of the ethnobotanical plants used specifically in cancer treatment remains a less explored aspect.

To address these challenges, this study aims to conduct an ethnobotanical assessment of herbal medicine practices for cancer treatment among traditional medicine practitioners in Kenya. The study will focus on documenting the medicinal plants used, assessing the practices surrounding their use, and assessing the compliance of WHO guidelines and policies in usage of Herbal medicines in cancer management the potential and safety of these herbal remedies. By filling these gaps in herbal medicinal plants, assessing the practice and compliance, the study seeks to contribute to the evidence base necessary for integrating traditional medicine into cancer care in Kenya, ultimately improving access to safe and effective treatments for cancer patients and adherence to TMPs on WHO guidelines and policies.

1.3 Objectives of the study.

The study had one key objective and three major objectives as listed below with research questions.

1.3.1 Broad objective.

To assess the practice of Traditional Medicine Practitioners in the usage of herbal medicinal plants for treatment of cancer in five selected Counties in Kenya.

1.3.2. Specific Objective

1. To assess the medicinal plants used by TMPs for cancer treatment in five counties through field surveys and interviews.
2. To determine the practice of TMPs in treatment of cancers within five selected counties using herbal medicine.
3. To assess the compliance of herbal TMPs in usage of Traditional Medicines to WHO guidelines in their practice.

1.4 Research Questions.

i) What are the medicinal plants that are used to treat cancer in the five selected counties?

ii) What is the practice of herbalist on the usage of herbal medicines plants to treat cancer diseases in five selected counties?

iii) Are the TMPs compliant to the WHO guidelines on herbal medicine usage and practice?

1.5 Justification of the study.

Traditional Medicine Practitioners play a significant role in Kenyan communities, particularly in regions with limited access to modern healthcare. These practitioners possess a wealth of indigenous knowledge passed down through generations, which includes the use of herbal remedies and traditional healing practices in treatment of diseases including cancer. Therefore, this study investigated the practice of TMPs in relation to cancer treatment. The study findings provided knowledge on better practices of herbal medicines

among the TMPs. This promoted the safety of both the clients and TMPs in terms of preparation, packaging methods, storage and dosage of these medicinal plants.

This study contributed to the existing body of knowledge by providing quantitative data on the knowledge and practices of TMPs in relation to cancer treatment in Kenya. The quantitative data can help identify specific herbal remedies and treatment methods used by TMPs. This information served as a basis for evidence-based practices in the integration of traditional and modern medicine for cancer treatment. Moreover, by quantifying the knowledge and practices of TMPs, the study compared and contrast these practices across different counties, communities and among different TMPs. This enabled a more comprehensive understanding of the diversity and commonalities in traditional cancer treatments.

By investigating the knowledge and practices of traditional medical practitioners in relation to cancer, the study addressed the gap in knowledge regarding traditional cancer treatments. It provided insights into how traditional practices can complement modern medical approaches, potentially offering more holistic treatment options for cancer patients. In addition, this study offered insights into how these practitioners can be integrated effectively, thereby bridging the gap in knowledge regarding the coexistence and synergy between traditional and modern medical approaches.

Understanding how TMPs operate, their treatment methods, and their adherence to safety standards is informing policy development and public health regulations. The study informed the development of public health interventions in regards to safety of traditional cancer treatments. This helped in promoting practices that minimize harm and maximize therapeutic benefits. It also guided the development of training and education programs for

TMPs. These programs helped the TMPs to enhance their skills and adhere to safe practices, ultimately improving the quality of cancer care they provide.

The researcher filled the gap in practice in cancer treatment using traditional medicine by providing a comprehensive account of the knowledge and practices of traditional medical practitioners, shedding light on their methods of cancer treatment.

1.6 Significance of the study.

The study revealed the trend of practice of TMPs in the usage medicinal plants and their assessment served as a baseline data for future reference in the practise and usage of herbal medicines by TMPs studies that are cancer management and treatment in adherence to WHO guidelines. It also helped the society at large in managing the cancers locally by practicing good practices in herbal medicines in terms of processing, packaging and storage, since herbal medicine is for health promotion and therapy for chronic conditions. Furthermore, the study supported the achievement of Sustainable Development Goals, goal 3 of Good Health and Wellbeing, and also in supporting the Kenyan Government pillar of "Health" its plan of Universal Healthcare to citizens, in addition the study supported the policies implementation, that is The Kenya National Drug Policy Act 1994 and also The National policy on Traditional Knowledge, Genetic Resources and Traditional Expressions 2009 also the WHO recommendations in herbal medicines best practices and policies.

1.7 Scope of the Study.

The study was conducted in 5 selected counties in Kenya, which is western Kenya and Rift Valley regions counties that is Kakamega, Bungoma, Baringo, Uasin Gishu and Nandi, whereby 53 Traditional Medicine Practitioners from different ethnics and culture was

interviewed according to their practice on how they prepare, package, store and treat or manage the cancers diseases at large according to their practices, assessment on the compliance of their practice according to WHO guidelines. The study was limited to medicinal plants that are traditionally used in the five selected counties in Kenya for cancer treatment only and TMPs who manages cancer only. It also involved observations and nature walk to see the source of the Herbal Medicines and assessment of the room for the practice, interviews were carried out with the herbalist with a semi structured questionnaires and descriptive analysis was be done at the end.

1.7.1. Limitations of the study.

The study was limited to medicinal plants that are traditionally used in the five selected counties in Kenya for cancer treatment only, and no other diseases and it was also be limited to plants that are not native to the region and Traditional medicinal practitioners only.

1.7.2 Delimitations of the study.

The study focused on the investigation and documentation of the plants used in treatment of cancers, the plant parts that are majorly used, the methods of preparations and administration of herbal medicines in cancer treatment. In addition, the study assessed the practice of the traditional medicine practitioners only according to WHO guidelines.

1.8 Theoretical model.

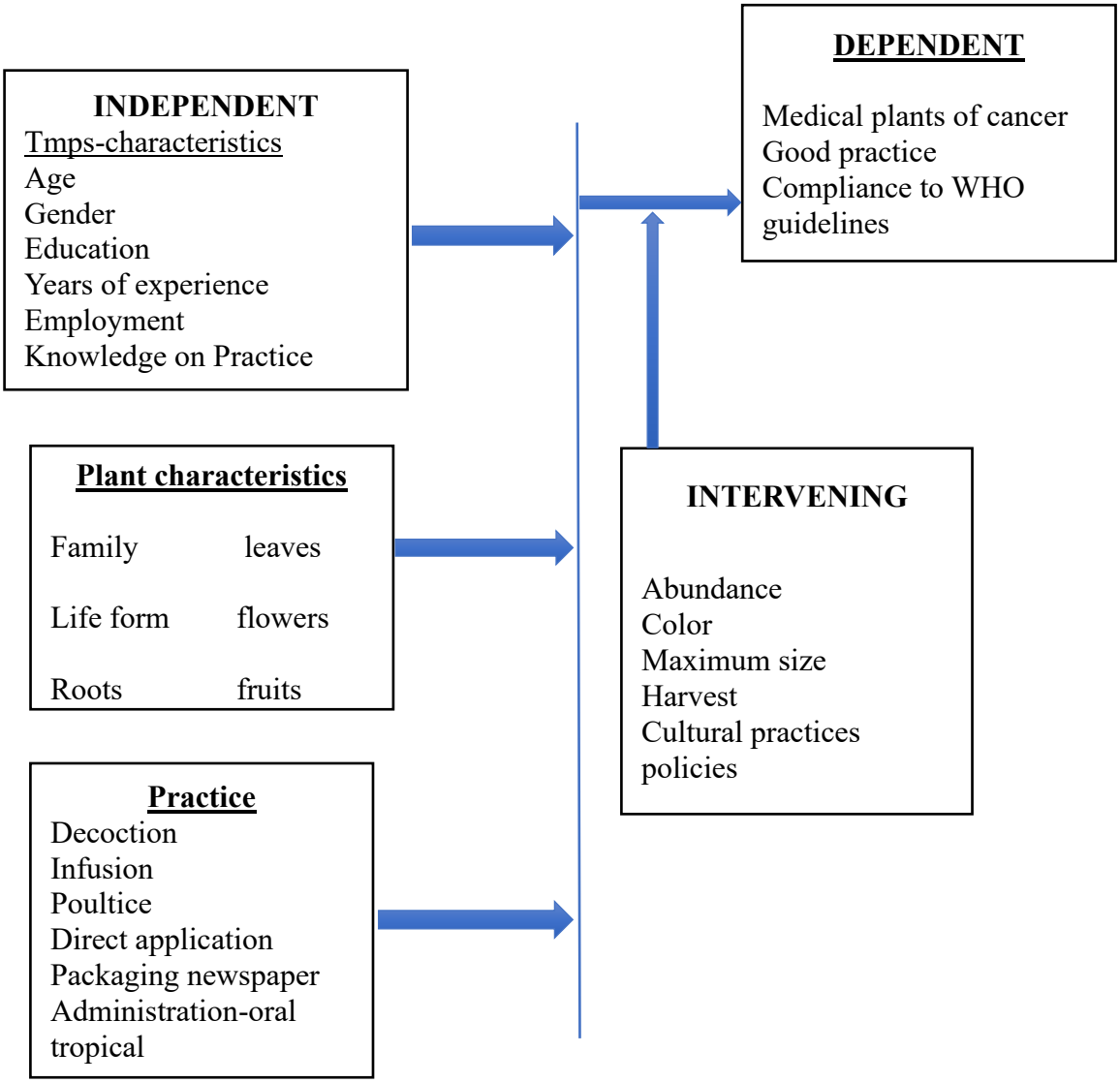
This study was guided by **plant use value theory (**Phillips O., & A.H. Gentry 1993) which states that the usefulness of a plant that is for medicine, food, construction technology or for trade in a given community is directly relating to its botanical family, life form, local abundance (density) and/or maximum size.in the context of the study, this theory will be

applied due to the diversity of plants in the study area. The theory has been used by Albuquerqu et al., 2023 on hypothesis testing in ethnobotany; 30 years after Philips and Gentry seminal work also use or applied by Washington Sources Ferreira Junior, Flavia Rosa Santoro also applied the same theory on the role of individuals in the resilience of local medicinal systems based on the use of the medicinal plants hence the theory fits since local abundance is expected to dictate utilization.

1.9 Conceptual framework.

The conceptual framework of this study as illustrated in figure 1, explores the association between the independent variables, divided into two broad categories, plant characteristics and Traditional medicine practitioners' characteristics, and the dependent variables, the use of herbal medicines for cancer treatment and compliance of TMPs to WHO traditional medicine guidelines. As had been found in the literary search, the association is mediated by factors such as policies and regulations, cultural and individual beliefs about herbal medicine as well as socioeconomic status, thus the study had measures to control for these factors.

Conceptual Framework



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section provides an overview of the research study's relevant literature materials. The part includes a research gap.

2.2 Ethnobotanical plants employed by TMPs for cancer treatment.

Plant biogeography determines the abundance and availability of medicinal plants which in turn determine their use by local communities. The knowledge of the traditional cures is culture specific, and is passed from one generation to another, more often from grandparents and parents(Omara et al., 2022). The tropics seem rife with plants used in cancer treatment. In Brazil, (de Melo et al., 2011) found that Aloe vera, *Euphorbia tirucalli*, and *Tabebuia impetiginosa* are the most cited plants in their ethnobotanical approach to cancer treatment. The three most cited plants were shown to be in widespread use both traditionally as well as being marketed over the internet. Similarly, findings by (de Almeida et al., 2020) found *Zingiber officinale* and *Aloe vera* to be of significance in their use to alleviate negative side effects of chemotherapy. Plants with terpenes, glycosides, lignans, acetogenins were isolated from a 19 types of plants in Mexico, with 41% demonstrating active anti-cancer properties (Alonso-Castro et al., 2011), a finding supported by (Lara Reimers et al., 2019), who identified that leaves from *Asclepias curassavica , Rauvolfia tetraphylla* and *Hamelia patens* were used to treat cancer traditionally in Mexico, and are being increasingly integrated with modern medicines in managing cancer due to the rise in incidence in the region.

2.2.1 Anticancer plants in Asia

In South East Asia, Singaporeans traditionally have used extracts from fresh leaves from *C. lansium, L. indica, P. bleo, S. crispus, V. amygdalina and V. trifolia* for their anti-proliferative action against a range of cancerous cells in the breast, colon, liver, ovaries and even Leukemia(Siew et al., 2019). That these herbs have been used in the vernacular setting for anti-cancer highlights the need for preservation of such information as these may just pave the way to new mainstream cancer treatments. As highlighted by (Shahrajabian et al., 2019), ginger's anti-tumor effects has been known and used in that capacity and beyond in the management of cancer, especially against skin cancer. In India, with an abundance of spices and herbs, several traditional plants are used to manage different cancers. Berberis asiatica for instance is used to treat Daltons's lymphoma, Neem, Ginger, garlic and cumin, just to mention a few are utilised for their anti-cancer properties in the ethnobotanically across the various provinces and districts of the country (Poddar et al., 2020).

In the middle East plants of the *Arum* species, various *Artemisia* species*, Calotropis procera, Citrullus colocynthis, Nigella sativa, Pulicaria crispa,* various *Urtica* species, *Withania somnifera* are broadly used in the treatment of cancers among the communities locally (Abu-Darwish & Efferth, 2018). Several traditionally used anti-cancer herbs in Iran, such as *Brassica nigra,Capparis spinosa,Chrysanthemum coronarium* were documented (Sun et al., 2020) for the various anti-tumor uses across tribes and communities in Iran, with the utilization of herbs like ginger and garlic for the same purpose being ubiquitous across national borders in the region. Furthermore, (Akhtar et al., 2019) documented that in Pakistan, almost 60% of ethnobotanical plants used for cancer management had been successfully tested in vivo for pharmacological viability.

Globally, the oncology field continues to witness significant improvements in management and positive outcomes. Despite this, the continent of Africa has and continues to face challenges in catching up and keeping up with the rest of the world in this aspect. For instance, as pointed out by (Stefan et al., 2015), survival rates are lower in African countries, there are shortages of both facilities and staff, and the high associated cost to effectively manage the continent's cancer burden undermine conventional treatment options. On this background, one may presume that ethnobotanical methods thus play a bigger role in the management of cancer in the continent, especially in rural settings.

2.2.2 Anticancer plants in Africa

In Morocco, a 37% prevalence of herbal use for cancer management was found in the the Beni Mellal-Khenifra region (Mohamed et al., 2022) The most cited plants in the region were *Marrubium vulgare L, Retama monosperma L, Boiss , and Juniperus oxycedrus* majorly for breast and liver cancer treatment. This finding was in line with those of (Alami Merrouni & Elachouri, 2021) in whose earlier study had discovered that 48 out of the 103 plants they analysed, had been used traditionally to treat cancer in the region. In the south west of Nigeria among the Ijebu people, ninety species were identified for use against cancer. *Securidaca longipedunculata* was the most widely used anticancer plant in combination with *Olax subscorpioides* among this population, (Segun et al., 2018) with a 72% ethnobotanical knowledge of these plants. In the Ogun region, (Soladoye et al., 2010) identified 73 plants used by traditional healers and herbalists in treating cancers. The widespread knowledge and the ease of access to these traditional cures as compared to more conventional methods of cancer treatment adds to their appeal, adding to the need for better documentation and the integration of scientific methods to determine efficacy. Furthermore,

in the North of Africa, *Lamiaceae, Asteraceae, Apiaceae*, and *Fabaceae* plant families contributed the most to a set of 83 species used by traditional herbalists in Algeria for a myriad of chronic illnesses, among them, cancer(Benarba, 2016). An extensive study across 11 districts in Ethiopia identified 53 traditionally used remedies to treat cancer- like symptoms (Tesfaye et al., 2020b), chief among them being *Acmella caulirhiza Del , Clematis simensis Fresen., Croton macrostachyus Del*., and *Dorstenia barnimiana Schweinf.* Breast cancer treatment in South Africa, *Pittosporum viridiflorum*, and *Euphorbia ingens* are documented to be used with *Hypoxis hemerocallidea* and *Trifolium pratense* used for prostrate cancer (Raimi et al., 2021). In Zimbabwe (Matowa et al., 2020), *C.sativa, P.maprouneifolia,*and *S.frutescens* are used to manage all cancers while in Uganda, *Annona muricata L., Rhoicissus*, *Erythrococca bongensis Pax*, *Ficus sp,* and *Cannabis sativa L*.were found to be used by TMPs to treat breast cancer (Lutoti et al., 2023).

2.2.3 Anticancer Plants in Kenya

In Kenya, like the rest of the world, TMPs get their knowledge primarily from grandparents and parents, and as such the practice is hereditary in a family, while to a lesser extent, apprenticeship is also a major source of traditional medicine knowledge. Besides this, (Chebii et al., 2020) established that the mean age of the traditional medicine practitioners was 64 years with a range of 30 to 85 years, and the average years of practice being 25, with a minimum of 5 years. Furthermore, most of the traditional medicine practitioners solely depend on income from traditional medicine for livelihood. Older TMPs are more experienced and possess a deeper knowledge of medicines, and as a consequence, are much more recognized and sought after in their communities(Sikuku et al., 2023). Literacy levels

among TMPs is relatively low, with at most some primary level of education, while distribution by gender varies from community to another (Ochwang'i et al., 2014b).

In the majority of Kenyan communities, (Omara et al., 2022) documented ethnobotanical plants from 125 genera, spread across 55 families used for their anti-cancer properties, wherein the most used family of medicinal plants were, in order, from the family: *Fabaceae* with nineteen species, *Asteraceae* with eleven species*, Euphorbiaceae* with eight species, and *Rutaceae* with seven species.

In Western Kenya, the *meliaceae* family, with twenty-two species cited, was found to be the dominant family in the medicinal markets followed by *Apocynaceae*, citing nineteen species, *Fabaceae*, with 17 species, and *Rutaceae* and *Euphorbiaceae* both with ten species, being the most common families, carrying over half of all medicinal plants used in the region for cancer management (Paul, 2020). Against leukemia, (Ochwang'i et al., 2018) identified the viability of *Prunus Africana* extracts while *Clerodendrum Myricoides* is deployed against a wide range of cancerlike symptoms. In the Tana river region, 9.7% of the herbal remedies deployed by TMPs are used in the treatment of breast cancer. (Kaingu et al., 2013). Among the Embu community, the most cited anti-cancer plants, all of which are used to treat breast and prostate cancer, are *Fagaropsis angolensis,* known as Mukuria Hungu by the local community, *Prunus Africana*, Mwiria to the local community and *H. solmsiana*, Ndonga to the local community (Misonge et al., 2019).

In the western region of Kenya, among communities in the county of Kakamega, *Spathodea campanulata P. Beauv. ssp. nilotica* (Seem)*, Microglossa pyrifolia* (Lam.) *Kuntze, Harungana madagascariensis Lam. ex poir, Prunus africana* (Hook. f.) *kalkman, Cyphostemma serpens* (A. Rich*), Catharanthus roseus (L.) G. Don* and *Aloe volkensii Engl*

were found to be used widely to treat different cancers and cancer like symptoms, especially breast cancer and skin carcinomas (Ochwang'i et al., 2014b). Knowledge of the ethnobotanical remedies is highly retained within the traditional setup of these communities. Across majority of the literature, breast cancer is the most common type of cancer treated by TMPs in the country. Whether this is a consequence of successful management by TMPs or a consequence of the demand given that breast cancer has the highest incidence in the country is unclear from the available literature.

2.3 Preparation and Administration of Traditional Medicines (Practice of Traditional Medicine Practitioners in Cancer Management using traditional plants).

Majority of the plants used by TMPs in the country are wild, with trees and shrubs providing the bulk of the medicines,(Omara et al., 2022) with leaves, roots and stem bark being the most commonly used parts for anticancer herbal remedies, the leaves being the most used part. Preparation method for the medicines is dictated by primarily the fragility of the parts used; these are: **infusion,** which is a dilute solution of easily soluble constituents of the raw drug substance. The process of infusion is carried out by immersing the plants parts in an amount of cold or boiled water, then allowed to stand for up to 15 minutes and subsequently filtered. This process is used for soft for parts like fresh shoots, flowers and leaves, with the oral route being the most common means of administration. **Decoction** is used for active ingredients that doesn´t modify with temperature. In this process the plant part is boiled in water depending on how hard, and the plant or the active ingredient to extract (Romm et al., 2010).

The resultant mixture is then cooled and strained, and administered orally often. Decoction is a method suitable to harder parts like roots. **Poultices** are the direct application of the crude, fresh herb to the skin. This method is used with very soft and fresh plant parts like flowers, and is a very common method of extraction and administration of anti-cancer traditional medicines (Omara et al., 2022). Among a community's TMPs, prescription is fairly standard, however dosage was established to vary between practitioners (Ochwang'i et al., 2014).

2.3.1 Methods Diagnosis of cancer by TMPs

Due to the glaring lack of scientific laboratory methods in traditional medicine practice, misdiagnosis is a very real threat in treatment of cancer by TMPs. One documented way TMPs use to ascertain cancer diagnosis is by using the medical record of their patients, as has been found in Malawi(Tembo et al., 2021) and Uganda for breast cancer(Lutoti et al., 2023). The second method of diagnosis is one where traditional healer rely on their intuition, the chronicity and growth of external mass, as a means to diagnose a range of cancers. Symptoms that included breast swelling, breast pain, color changes in the nipple, pus from breast, and wounds on breast are used to diagnose breast cancer (Lutoti et al., 2023) whereas as noted (Tesfaye et al., 2020) in Ethiopia, Skin and breast cancer are the most commonly diagnosed cancers using the presence of a lumpy growth in the affected area using patient symptoms.

Lung cancer diagnosis was found to be arrived at by the presence of persistent coughing and swelling on the neck, differentiated from throat cancer by the lack of blood in the phlegm and rather the swelling of the throat(Tesfaye et al., 2020a). These represent the two ways through which traditional medicine practitioners diagnose cancer.

2.3.2 Safety profiles of herbal remedies and potential adverse effects.

There has been observed a high and increasing prevalence of traditional medicine use among cancer patients, with estimates being higher across low- and middle-income countries. In these communities, the relative affordable nature of herbal medicines compared to clinical interventions(Nketia et al., 2022)are a significant driver of the utilization of ethnobotanical remedies for cancer, subject to the severity of the condition as people are often are less willing to use herbal medicines for extremely severe conditions as a first resort. Interestingly, a significant proportion will to sought herbal medicines as a last resort when conventional cures are deemed uncertain, giving a sense of hope, often for hospice care (Asiimwe et al., 2023). Despite this, these remedies carry with them risks which may be detrimental to the recovery from cancer. For instance, garlic, *Allium sativum L.* and green tea, *Camellia sinensis L.* ,both staples of traditional anti-cancer treatment methods across the world, have been shown to possess anti platelet activity which may result in excess bleeding in cancer patients with bone marrow suppression (Ben-Arye et al., 2016); additionally, with garlic use, excess garlic ingestion has been reported to cause contact dermatitis and morbid spontaneous spinal epidural hematoma.

A common anti-cancer remedy in the North African region, *Xylopia aethiopica,* which has proven effective against a range of carcinomas, osteosarcomas and leukemia also has the risk of inducing miscarriages and still births in pregnant users (Choumessi et al., 2012). Vomiting, dizziness and potential to cause birth defects are a common side effects of a majority of the common ethnobotanical medicines. Additionally, because there are no set standards around dosage when using traditional medicines, there remains a high risk of fatality resulting from accidental poisoning and overdoses.

2.3.3 Metabolites and mechanism of action pathways

The various plants and herbs used in the management of cancer contain different active anti-cancer compounds, which act on different pathways to combat different kinds of cancers. In their study, (Alonso-Castro et al., 2011) identified that extracts from *Justicia spicigera* leaves induced apoptosis in leukemia TF-1, human cervical cancer CaLo and InBl cell lines as determined by TUNEL reaction. A methanol extract of *Phaseolus vulgaris* seeds decreased the number of human cervical cancer HeLa cells in the G0/G1 phase and increased apoptosis. This finding supports the results of the study by (Siew et al., 2019) that maceration methanolic extract of *L. indica* was very effective against a majority of the cancers, including cervical, liver, and ovarian cancer. Likewise, (de Melo et al., 2011) Discovered that a diterpenic alkaloid known as taxol from the *Taxus brevifolia* Nutt., pacific yew acts against advanced ovarian cancer while. β-lapachone and lapachol, extracted from the bark of *Tabebuia impetiginosa* is used for treating a variety of neoplasia. A common anticancer herb across most if not all cultures has been observed to be aloe vera. This plant contains active compounds such as Rhein, sennoside, aloin, bisacodyl, aloin and sennidin (Sanders et al., 2018) which have various effects on cancerous cells such as inhibition of cell proliferation, migration, and invasion; cycle arrest; induction of cell death; mitochondrial membrane and redox perturbations; and modulation of immune signalling, as determined by the cell type.

The second most cited traditionally used anticancer herb, ginger, contains gingerols, shogaols, zingiberene, and zingerone (Rahmani et al., 2014), which act by cytotoxic effect against cancer cell lines and enzyme inhibitory action. The third most common plant is garlic, which contains allicin, diallyl sulfide, diallyl disulfide, diallyl trisulfide, alliin, S-

allylcysteine, and S-allylmercaptocysteine, that act on various stages of carcinogens enrichment of several AGE-specific organosulfur compounds, which has a proven action neoplasts (Farhat et al., 2021).

2.3.4 Regulatory frameworks governing traditional medicine and herbal remedies in Kenya.

The operation of TMPs in Kenya is currently under the regulation of the ministry of education, which since the promulgation of the new constitution has continued to improve the management of the sector. The Traditional Medicine and Medicinal Plants Bill of 2010 defined traditional medicine as a finished and labelled medicinal product that contains an active ingredient, aerial or underground plant parts in crude or processed form. On the other hand, a medicinal plant was defined as a plant that contains a therapeutic substance or a plant that serves as a precursor for the synthesis of useful drugs. Subsequent to this bill, the Protection of traditional knowledge and cultural expressions act, no. 33 of 2016 made provisions for the protection of traditional medicine knowledge, genetic resources and biological diversity, propelled by the health Bill of 2015 which showed the utility of traditional medicine in terms of transfer of knowledge, skills and practices in the provision of healthcare.

The act was predicated on the recognition that most of the traditional knowledge is passed orally passed from one generation to another and can easily be distorted or lost entirely. Then came the health act no. 21 of 2017 which empowered the department of Health to provide policies and regulatory institutions that guide the practice of traditional and alternative medicine. The regulatory bodies created therein were required to provide guidance on registration, licensing and standards, and ensure compliance. The act further

provided mechanisms for Traditional Health Practitioners to refer patients to health care facilities. In 2019, Kenya passed the Health Laws Act No. 5 of 2019, which recognizes traditional medicine as a health product. The act provided for training, registration and licensing of traditional and alternative health practitioners and spelt out regulatory and disciplinary guidelines. It also made provisions for the development of the Traditional and Alternative Health Practitioners Council (TAHPC) with two registered traditional health practitioners with over 10 years of experience as members of the council (Chebii et al., 2020) .

2.4 Compliance with WHO guidelines for traditional medicine Practitioners in practice of herbal Medicine in Cancer Treatment.

The WHO defines traditional medicine as the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness(Organization, 2023). At the time of writing this paper, the WHO is implementing its second Traditional Medicine Strategy 2014-2023, focused on developing norms, standards and technical documents based on reliable information and data to support Member States in providing safe, qualified and effective traditional and complementary medicine services, and their appropriate integration into health systems.

Currently, individual countries are required to develop appropriately integrated approaches to traditional medicine. In Kenya, with the devolution of health services in the country, each county is left to set its own county-by-laws regarding health, encompassing the TMPs. In the

western region of Kenya, these laws were found to not be significantly different, and were adequately observed by the practicing traditional medicine practitioners as is required in order to freely trade or practice traditional and alternative medicine (G. Kigen et al., 2013) . Better yet, the majority of the TMPs were in favour of regular monitoring and checks in the area of traditional medicine and quality control.

2.4.1 World Health Organization guidelines on Manufacturing of Herbal medicines

In a bid to provide WHO Member States with general and minimum technical requirements for quality assurance and control in the manufacture of herbal medicines the WHO provides a supplementary guideline to complement the manufacturing guidelines for pharmaceuticals specifically to the production and control of herbal medicines, insofar as they mainly focus on identifying the critical steps needed to ensure good quality. These include:

2.4.2 Sanitation and hygiene in the Practice of Herbal Medicine by Traditional Medicine Practitioners.

Because of their origin, herbal materials may contain microbiological contaminants. Furthermore, during the course of harvesting and processing, herbal products that may be especially prone to microbiological contamination are produced. To avoid alterations and to reduce contamination in general, a high level of sanitation and hygiene during manufacture is necessary. Water supply to the manufacturing unit should be monitored, and, if necessary, treated appropriately to ensure consistency of quality, and the Waste from the manufacturing unit should be disposed of regularly so as to maintain a high standard of hygiene in the manufacturing area. Clearly marked waste-bins should be available, emptied and cleaned as needed, but at least daily.

2.4.3 Manufacturing processes are clearly defined

All manufacturing processes should be systematically reviewed for associated risks in the light of scientific knowledge and experience Scientifically, the manufacturing processes used to create the drugs administered by TMPs need to be shown to be capable of consistently producing products of the required quality that comply with specifications. However, in the country and beyond given the fragmented and secretive nature of traditional medicine, compliance to this guideline is not well undocumented. Few traditional medicine practitioners are willing to disclose important information about the specifics of the traditional medicine (Lutoti et al., 2023) they use, noting that unique knowledge makes them stand out among others.

Comprehensive records are maintained for all receipts, storage, issues and distribution. The records should include information such as the date, name and description of the product, expiry date etc., which TMPs often do not keep (Chebii et al., 2020), citing issues around secrecy,(Gakuya et al., 2020), labeling of drugs as required by the WHO is rarely done, however instructions and procedures are written in clear and unambiguous language

Specifically applicable to the facilities provided ,TMPs have been shown to more often than not ensure to give comprehensive instructions on dosage and usage to their patients (Chebii et al., 2020), in compliance with this guideline, however, the caveat is that the instructions are often given orally.

2.4.4 Complaints and Product recalls by the Clients to the TMPs

There are basically two types of complaint, product quality complaints and adverse reactions/events. The first type of complaint may be caused by problems such as faulty manufacture, product defects or deterioration as well as, adulteration of the herbal material.

These complaints should be recorded in detail and the causes thoroughly investigated. There should also be written procedures to describe the action to be taken. To address the second type of complaint, reports of any adverse reaction/event should be entered in a separate register in accordance with national and international requirements. An investigation should be conducted to find out whether the adverse reaction/event is due to a quality problem and whether or not such reactions/events have already been reported in the literature. In either case, complaint records should be reviewed regularly to detect any specific or recurring problems requiring special attention and possible recall of marketed products.

The product recall procedure depends very much on the national regulations. There should be a standard operating procedure (SOP) for storage of recalled herbal medicines in a secure segregated area while their fate is decided. As documented (Lutoti et al., 2023) in Uganda, TMPs do not refer their patients or document fatalities in a bid to maintain their clientele, which is reliant on their reputation. To this regard, they do not recall their products. However, where patients report side effects (Matowa et al., 2020), often TMPs readily change medication, even though they do not document these instances.

2.4.5 Self-inspection and Personnel of Traditional Medicine by TMPs

As per the WHO guidelines, at least one member of the self-inspection team should possess a thorough knowledge of herbal medicines. The release of herbal medicines should be authorized by a person who has been trained in the specific features of the processing and quality control of herbal materials, herbal preparations and finished herbal products. Personnel dealing with the production and quality control of herbal medicines should have adequate training in the specific issues relevant to herbal medicines. Since TMPs get their knowledge primarily from grandparents and parents, and as such the practice is hereditary in

a family, while to a lesser extent, apprenticeship is also a major source of traditional medicine knowledge, this knowledge is deemed sufficient to practice in their communities. This guideline is thus sufficiently followed.

2.4.6 Training of Traditional Medicine Practitioners in the Practice.

The personnel should have adequate training in appropriate fields such as pharmaceutical technology, taxonomic botany, phytochemistry, pharmacognosy, hygiene, microbiology and related subjects (such as traditional use of herbal medicines). Training records should be maintained and periodic assessments of the effectiveness of training programs should be made. In Kenya (Chebii et al., 2020) noted that most of the traditional medicine practitioners learnt their traditional medicine knowledge from their grandmothers, fathers, mothers, aunts, with a few being self-trained and others learnt from field researchers, in line with those by (Matowa et al., 2020) in Zimbabwe. Given the findings by (Ochwang'i et al., 2014a) that knowledge of these remedies is highly retained within the traditional setup of these communities, this training is often adequate to practice traditional medicine in the local communities, thus this guideline is partially observed.

2.4.7 Personal hygiene of the Traditional Medicine Practitioners

Personnel entrusted with the handling of herbal materials, herbal preparations and finished herbal products should be required to have a high degree of personal hygiene and to have received adequate training in maintaining appropriate standards of hygiene. The personnel should not work if they have infectious diseases or skin diseases. Written procedures listing the basic hygiene requirements should be made available. Additionally, Personnel must be protected from contact with toxic irritants and potentially allergenic plant materials by means of adequate protective clothing. In Kenya, it has been observed that despite minimal

physical examination of patients, herbalists did not practice hand washing before dispensing of the formulations to the patients. The equipment used is rinsed with water only and sometimes bar soap and water. Furthermore, work Surfaces were cleaned only with water, no disinfectants were used, which is in violation of this guideline(Chege et al., 2018).

2.4.8 Premises for Practice

As a general principle, premises should be designed, located, constructed, adapted and maintained to suit the operations to be carried out according to WHO good manufacturing practices for pharmaceutical products: main principles. Because of their potential for degradation and infestation with certain pests as well as their sensitivity to microbiological contamination, production, and particularly storage, of herbal materials and herbal preparations assume special importance.

Storage areas should be well organized and tidy. Special attention should be paid to cleanliness and good maintenance. Any accidental spillage should be cleaned up immediately using methods that minimize the risk of cross contamination of other materials, and should be reported. The areas should be well labelled and materials stored in a such a way as to avoid any risk of cross -contamination. An area should be identified for the quarantine of all incoming herbal materials. Where materials are stored in bulk, to reduce the risk of mold formation or fermentation it is advisable to store them in aerated rooms or containers using natural or mechanical aeration and ventilation. These areas should also be equipped in such a way as to protect against the entry of insects or animals, especially rodents. Effective measures should be taken to limit the spread of animals and microorganisms brought in with the plant material and to prevent cross-contamination.

TMPs despite their knowledge of the ethnobotanical plants used to treat cancers, have little know how in the preservation and packaging of the medicines, often packaging them in used water bottles (Bunalema et al., 2014). Freshly picked herbs that require drying are often air dried under a shade (Chege et al., 2018), in violation of the guidelines of the WHO, while the selection of unwanted material or gabling is done manually in line with the WHO requirements. It thus emerges that adherence to this guideline is partial at best and varies between TMPs.

WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues.

2.4.9 Foreign matter and Contaminants to the herbal medicines and the Practice Premise.

Foreign matter found in a sample of herbs and herbal materials, including insects and other animal contamination including animal excreta, as well as other species of plants should not exceed limits set in national, regional or international pharmacopoeias. In general, any substance other than the acceptable sample of good quality medicinal plant material is regarded as foreign matter. A pure sample is seldom found and there is always some foreign matter present, however no poisonous, dangerous or otherwise harmful foreign matter should be allowed, thus following the GACP should help to ensure that contamination is kept to a minimum. Removal of larger pieces of foreign matter from whole and cut plants is often done by hand-sorting after macroscopic examination. Finished products should also be examined for foreign materials. As found in Kenya (Chege et al., 2018), TMPs carry out the selection of unwanted material or gabling manually in line with this WHO requirement.

The maximum amounts of toxic metals and non-metals in medicinal plant materials can be given based on the provisional tolerable intake values. These values should be established on a regional or national basis. Direct investigation of this guideline has not been found in the literature search, however, studies (Bunalema et al., 2014) and (Chege et al., 2018) have demonstrated adherence to guidelines on selection and harvesting of both cultivated and wild medicinal plants, which reduces the risk of contamination from these sources.

The amount of exposure to radiation depends on the intake of radionuclides and its significance depends in turn on other variables such as the age, metabolic kinetics and weight of the individual who ingests them (dose conversion factor). Since the level of contamination might be reduced during the manufacturing process, no limits for radioactive contamination are proposed in these guidelines. Herbal materials should be tested on a case-by-case basis according to national and regional standards if there are concerns. In such a process, national regulation on the limits could be set based on risk management, but not risk assessment. In the current context however, the national guidelines that ought to set the daily acceptable doses remain undefined at the national level, thus it limits the evaluation of the level of compliance of TMPs to this guideline.

Mycotoxins and, when appropriate, endotoxins should be tested for using an appropriately validated and sensitive method, and amounts should be below the limits set in national or regional standards. It is recommended that in performing analyses for mycotoxins particular care should be taken, in line with good practice guidelines such as WHO good practices for national pharmaceutical control laboratories. Bacteria such as *Salmonella* and *Shigella* species must not be present in herbal medicines intended for internal use, at any stage. Other microorganisms should be tested for and should comply with limits set out in regional,

national or international pharmacopoeias. Different pharmacopoeias have different testing requirements and these should be consulted when making the appropriate choice for the selected herbal materials and herbal product. Used preservatives to prevent microbial growth. The use of natural preservatives such as *Tamarindus indica* (tamarind) and *Eriobotrya japonica (*loquat) as well as non-natural ones such as sodium benzoate was documented (Matowa et al., 2020) among TMPs in Kenya, in line with the guidelines of the WHO.

Specific to cancer management, the WHO gives guidelines (Organization, 2023) on three key areas: Analgesia of cancer pain**:** This addresses the choice of analgesic medicine when initiating pain relief and the choice of opioid for maintenance of pain relief, including optimization of rescue medication, route of administration, and opioid rotation and cessation, Adjuvant medicines for cancer pain: This includes the use of steroids, antidepressants and anticonvulsants as adjuvant medicines and Management of pain related to bone metastases: This incorporates the use of bisphosphonates and radiotherapy to manage bone metastases. Definitive data on the compliance of TMPs to these guidelines in Kenya is not available, however, findings such as significance in their use of aloe vera and ginger to alleviate negative side effects of chemotherapy (de Almeida et al., 2020) ,the role of TMPs in hospice care (Asiimwe et al., 2023) and that people resort to TMPs as a last resort (Nketia et al., 2022) give a hint on the potential that TMP integration into general oncology holds in management of cancer.

2.5 Literature gaps

An extensive research was carried out (Omara et al., 2022) which focused on reviewing the ethnobotanical knowledge on the use of wild and cultivated plants as remedies for cancer

treatment in Kenya as well as their phytochemical composition and reported anticancer activities. The study however used an ethnopharmacological overview approach, which relied on indexing of the databases used for retrieving the reports reviewed in the study. As a consequence, some reports may have not been encountered and therefore not included in their review. Additionally, depending on the age of the articles they used, it is possible that the study may have include plants that have since gone extinct or no longer in use. The current study thus will use a cross-sectional survey aiming to capture current accurate data on the ethnobotanical plants used in cancer management.

The survey by (Paul, 2020) aimed to assess the common traditional medicine traded in the local medicine markets and used for treating common diseases, among them, cancer. The study successfully identified medicinal plants used in cancer treatment, however, the study covered a large geographical area with small sample sizes, and had a focus on the traded plants. Consequently, the results may not be accurately representative of the plants used in the management of cancer in the region. The current study aims to focus solely on ethnobotanical plants as used by the TMPs in the communities studied in the five counties under study.

The study in 2018 (Ochwang'i et al., 2018), focused on the in vitro cytotoxic potential medicinal plants in Kakamega towards sensitive and multidrug-resistant cancer cell lines. While the study results went a long way to substantiate the traditional use of these plants to treat cancer, it was limited to the county of Kakamega only, as well a heavy leaning towards the phytochemical aspect of the compounds found in a few medicinal plants from the community. This limits generalization of the results to the region on the basis of the small

relative sample size. The current study aims to cover a larger area with a proportionately large sample to address this shortcoming.

Furthermore, the literary search has not found any study that outlines the process through which the TMPs diagnose cancer. This provides an opportunity for the current study to explore this frontier and add to the known information regarding TMPs' treatment of cancer.

The available literature shows that while efforts have been made to document the plants used traditionally to treat not only cancer but also other illnesses, the research into and documentation of the active ingredients in these plants, their action pathways, efficacy and side effects remains a very widely unexplored territory especially in the country. In addition to this, the adaptation and implementation of new policies seeking to integrate traditional into modern medical practice is slow, exposing users of these alternatives to risks such as misdiagnosis. Standards need to be put in place, backed by nationally universal policies to guide diagnosis and prescription as well as reign in on non-qualified TMPs.

CHAPTER THREE

MATERIALS AND METHODS.

3.1 Study Area.

The study was conducted in 5 counties in Kenya: that is Kakamega, Bungoma, Baringo, Uasin Gishu and Nandi counties due to availability of trees species and tropical rain forest of Kakamega (The Kakamega Forest). The study was conducted in within five counties with plants abundancy according to Kiarie Njoroge 2016 Report on Kenya Forestry Cover, hence the counties are: Kakamega, Bungoma, Uasin Gishu, Nandi and Baringo.

The mean annual rainfall ranges between 1100 and 1700 mm with two peaks in April to May and August to October for Western, South Rift. Temperature ranges between 14°C and 27°C with an average of 21°C. Soils are thin, drain freely, and have layers of cellular iron stone. The main human activities within the study areas include livestock grazing, pastoralism, and crop and dairy farming. Baringo is full of acacia species with little growth, it is in the lowlands area of Kenya. Kakamega has a population of 1.8 million, Baringo has 666,763, Uasin Gishu over 1.6 million, Bungoma also over 1.6 million and Nandi 885,771, this is according to 2019 Kenya Population and Housing Census. The main tribes in these counties are Luhya,Teso and Kalenjin communities found in western and Rift valley parts of Kenya.

3.2 Study design

This study utilized a cross-sectional study design to provide a comprehensive evaluation of the practices of Traditional Medicine Practitioners (TMPs). The quantitative aspect of the ethnobotanical assessment used several indices, including: User Reports (Nur): Measured

the prevalence and variety of herbal remedies reported by TMPs. Percentage of Respondents with Knowledge (PRK): Provided the proportion of TMPs knowledgeable about specific herbal treatments. Informant Consensus Factor (Fic): Assessed the level of agreement among TMPs on the use of particular plants. Fidelity Level (FL): Reflected on the consistency in the use of specific plants for treating certain ailments. Percentage Ranks (PR): Ranked herbal remedies based on their reported significance and effectiveness. Direct Matrix Ranking (DMR): Evaluated plants based on criteria such as efficacy, safety, and availability.

3.3 Study population.

The study focused on Traditional Medicine Practitioners (TMPs) from selected counties who met the following criteria: Practicing and Registered by any known institution that is the TMPs were required to be actively practicing and registered members of Traditional Medicine Men in Kenya and known by the society for their practice. Consent: Only those who provided informed consent were included in the study. Access to Herbal Medicine Sources: Participants needed to have an access to their own or can show their sources of herbal medicines to ensure they could provide accurate and relevant information about their practices

.

3.3.1 Inclusion criteria.

The study included the TMPs operating in the selected five counties in Kenya. TMPs whom have been actively practicing for at least five years and who had an access to Herbal Medicines and are of sound mind and who provided informed consent to participate in the study. In addition the TMPs who are only managing cancerous illnesses and the traditional medicinal plants that are used in cancer management only will be collected.

3.3.2 Exclusion criteria

The study excluded: TMPs who do not provide informed consent to participate in the study. TMPs that do not have access to any sources of herbal medicine used for cancer treatment and not practicing at the moment.

3.4 Study variables.

The study variables are the attributes of the aspects of the study that was used to assess the practice of the TMPs on herbal medicine used in cancer treatments in five selected areas in Kenya. These includes;

3.4.1 Dependent variables.

The dependent variables were Medical plants of cancer, Good practice and Compliance to WHO guidelines in Traditional Medicine Practices.

3.4.2 Independent variables.

The variables were; TMPs characteristics, Age, Gender,Education,Years of experience, Employment and Knowledge on practice; Plant Characteristics:Family leave, Life form flowers, Roots , fruits, Barks and flowers.Practice :Decoction,Infusion, Poultice, Packaging-newspaper. Administration-oral, topical, Direct Application

3.5 Sampling design.

The study targeted communities native to the study areas, focusing on individuals with extensive knowledge and experience with ethnobotanical medicinal plants. To identify and sample these individuals, a purposive sampling method, specifically expert sampling, was employed.

3.5.1 Sampling Process:

Expert Sampling was employed in this study; thus, it was guided by recommendations from knowledgeable elders, local authorities, and development agents, who identified Traditional Medicine Practitioners (TMPs) with significant expertise in medicinal plants. TMPs, being custodians of indigenous knowledge, were considered key participants in the study.

Snowball Sampling was employed, Given that TMPs often do not comply with government regulations requiring registration, a snowball sampling technique was used to reach the necessary sample sizes within each county. The process began with a seeding phase facilitated by local administrators, such as village administrators and chiefs, who were familiar with the locations of TMPs.

For participant Selection that is TMPs, after the initial seed sample was established with the help of local administrators, subsequent participant selection was carried out using a random approach. Participants were selected based on referrals from initial contacts to ensure a broader and more representative sample of TMPs. This approach combined expert and

snowball sampling methods to effectively identify and recruit TMPs with the highest levels of knowledge and experience, while minimizing selection bias through random participant selection following the seeding phase.

3.6 Sample size Determination.

The sample sizing was done according to Fischers et, al. 1998.

The test was done at 95% confidence interval level.

Population proportion was assumed to be 5% that is 5% of the people in the population are traditional medicine healers or practitioners.

Therefore; sample size determination equation will be; E^2

$$n= \frac{Z^2 X\, p(1-p)}{E\hat{}2}$$

n = Sample size.

$Z^{2\,=}$ Confidence interval.

$E^{2\,=}$ Margin error

P $^{=}$ population proportion, which was assumed to be 5 % of the people in the population of traditional medicine healers/herbalist.

$$n = \frac{1.96^2 \text{ x } 0.035 \text{ x} 0.95}{0.05^2} = 51.0933 = 52$$

n (sample size) = 52; attrition of 5% was added i.e. 5% of 52 = 2.6, that was **3**

Hence sample sizewas52+ 3 = **55.**

The sample was distributed in proportion to the total population of each of the counties as shown in table 3.1.

Table 3.1: Sampling schedule

County	Population	Percentage	Sample proportion
Baringo	666,763	10.91	7
Kakamega	1,800,000	29.43	16
Bungoma	1,600,000	26.16	14
Nandi	885,771	14.48	8
Uasin Gishu	1,163,186	19.02	10
Total	**6115720**	**100**	**55**

3.7 Data Collection.

To achieve the goals of this research study, a well-thought –out data collection procedure was crucial. This section provides an overview of the overview of the methods and tools that was used to gather the required information.

3.7.1 Data collection Instruments.

To obtain a comprehensive data on ethnobotanical knowledge and practices on Traditional Medicine Practitioners in the selected counties in relation to the use herbal medicine for cancer treatment, a combination of quantitative and qualitative data collection was employed. A semi structured questionnaire was used in that it was designed and administered to the participants that was the TMPs. This tool included both closed-ended and open-ended questions to collect quantitative data on various aspect, such as the types of medicinal plants used for cancer treatment, their methods of preparation, dosages and treatment outcomes. Additionally, the questionnaire included the sections to assess the knowledge and compliance of TMPs with WHO guidelines in cancer treatment.

Data collection team: a team of trained and experienced researchers was responsible for collecting the data using these instruments. They underwent a thorough training to ensure consistency and accuracy in data collection.

3.7.2 Data Collection procedure.

Data was collected over a period of one month with the help of research assistants, who were recruited and trained based on the criteria that they have a minimum of a diploma in public health or any other related field. They were also experience in data collection from previous studies and are able to speak and write in both Swahili and English, also local language was an added advantage. The selected research assistants were taken through a training period of three days. The main areas of training were research ethics, data handling techniques, data collection tools, communication skills, questionnaire administration and interview skills. The purpose of the training was to harmonize concepts of the study design and content of the tools before being used in data collection.

Data collection was done by the research assistants including Botanist using the semi-structured questionnaires. The research assistant began by greeting the respondent for rapport development. The respondents were then be informed of the study objectives, the risks and benefits involved. The participants were then assured of confidentiality and anonymity of their responses. Thereafter, the participants were asked if they agreed to be part of the study or not. A written informed consent was presented to respondents who agreed to participate in the study. It took approximately 30-40 minutes to complete administering the semi structured questionnaire.

3.7.3. Reliability.

This measured the accuracy of the quality of the instrument; also it measured the stability of the responses to multiple coders of the data set. The field notes were taken during the interview. Observers, the research instruments were evaluated through Test-retest reliability

method during the Pre-test study. A correlation coefficient of 0.89 was derived from analysis, which is considered acceptable.

3.7.4. Validity.

The validity of the study was ensured through well designed and pre-testing tool with five research assistants. The instruments of research were designed according to conceptual frame work of the objectives of the study. Delphi method was used whereby experts answered the questionnaires in 1 to 4 rounds, in this, experts from MMUST in public health department and social sciences answered the questionnaire and the performance checklist for 4 rounds was done per day, the research instruments were numbered in a sequential order.

3.7.5 Quality Assurance.

Quality assurance was adhered to whereby each respondent was conducted for at least two weeks times for the same ideas and validity of the information was proved and recorded, and in case when the idea of the respondent deviated from original information, it was rejected because it was regarded as irrelevant information, that was any relevant data was taken into account and statistically analysed. In addition, data quality was ensured through training of the research assistant, pretesting of instruments also checking of the missing data, data cleaning and double entry was checked and done accordingly, and careful data analysis was adhered to.

3.8 Pre-test.

The pre-test of the research tools was conducted in Busia County, this is because Busia has similar characteristics based on the selected area of study which is equivalent of comprehensive herbalist in western region that is the abundance of the plant species and

tropical rainforest that partly border Kakamega and Bungoma Counties, of which 10% of the sample size was selected for pretesting. This majorly was to evaluate the feasibility of recruitment, retention, new methods and randomization of the study; this was according to Andrew C. Leon et al., 2010. Pre-test also examined the feasibility of an approach that was intended to be used in larger scale, it helped in testing the difficulty in understanding the questions, later on unclear items were reviewed, adjusted and reconstructed to made final tool.

3.9 Data Collection

3.9.1 Objective 1

For our first objective, aimed to gather data on the medicinal plants used by Traditional Medicine Practitioners (TMPs) for cancer treatment in five selected Kenyan counties. To achieve this, field assessment was conducted in these regions, where research team observed and documented the various plants used by TMPs for cancer treatment. In addition to field surveys, was conducted to obtain detailed information about the specific plants employed for this purpose.

3.9.2 Objective 2

The second objective was to determine the practice of Traditional Medicine Practitioners (TMPs) regarding the treatment of cancers. To achieve this, a semi-structured questionnaire was used. These instruments encompassed a series of questions designed to evaluate the knowledge of TMPs concerning cancer, its treatment, and their use of herbal remedies in cancer treatment. To verify on this, screening of cancers was done by the TMPs based on the records from the referrals from doctors from the health facilities by their clients based on the

records from the referrals from doctors from their respective health facilities by their clients as evidence to show that they are treating cancers using herbal medicines.

3.9.3 Objective 3

Our third objective focused on assessing the compliance of Traditional Medicine Practitioners (TMPs) with WHO guidelines in the practice of herbal medicine for cancer treatment. This aspect was also addressed using the Observation Checklist, which contained specific inquiries related to adherence to WHO guidelines for cancer treatment.

3.10 Data Analysis

3.10.1 Objective 1

Once the data was collected, SPSS version 28 was employed for analysis. In this phase, we utilized descriptive statistics to summarize the types of medicinal plants used, their frequency of use, and any additional pertinent information. Specifically, we calculated frequencies, percentages, and means to provide a comprehensive overview of the medicinal plants' utilization by TMPs. Furthermore, we explored associations between variables, such as the types of plants used and the counties in which they are predominantly found, through cross-tabulations and contingency tables.

3.10.2 Objective 2

For the analysis of the data related to this objective, SPSS version 28 was employed for analysis. The approach began with the calculation of descriptive statistics, such as mean scores and standard deviations, to gauge the overall level of knowledge among TMPs. Additionally, it employed inferential statistical tests like Pearson correlation or t-tests to

identify potential relationships, such as correlations between knowledge levels and other factors, providing a deeper understanding of the knowledge held by TMPs.

3.10.3 Objective 3

To analyse the data pertaining to the objectives, we did rely on SPSS version 28. Our analysis began with the computation of frequencies and percentages, allowing us to summarize the responses regarding compliance with WHO guidelines. In addition, we utilized cross-tabulations to discern any patterns or associations between compliance and other variables, such as the type of training received by TMPs, offering valuable insights into the adherence to established guidelines.

Table 3.2: Data analysis schedule

Objective	**Data collection method**	**Analysis method**
To assess the medicinal plants employed by TMPs for cancer treatment in five Kenyan counties	• Field surveys in these regions, documenting the various plants used by TMPs for cancer treatment. • semi-structured questionnaire	•Frequencies, percentages, and means •cross-tabulations and contingency tables
To determine the Practice of TMPs in the treatment of cancers.	• semi-structured questionnaire	•Means, standard deviations and standard errors •Pearson correlation or
To assess the practice ethical compliance of herbal medicine by TMPs according to WHO guidelines.	Observation checklist	•Frequencies, percentages,graphs

3.11 Ethical Consideration

The ethical approval was sought out from Masinde Muliro University of Science and Technology Institutional Scientific Ethics and Research Committee (ISERC) Licence number **MMUST/ISERC/026/2024**. Intellectual Property Right (IPR) issues that may arise during this study was managed in accordance with MMUST IPR policy. The permission to carry out this, research was enviable from the National Commission for Science and Technology (NACOSTI) Licence number **NACOSTI/P/24/34831**. All the herbalist entry protocols were observed and adhered to. The confidentiality was guaranteed by avoiding writing the details or names of the participants on the research tools rather codes was used to represent them. Informed consent was guaranteed to the participants and participation was free to withdraw at any time without damage or loss of any benefit or privileges. All the data was analysed and published in a way that do not reveal the identification of the participant.

The following ethical principles was upheld in the study: **Confidentiality:** The study participant's information was kept confident; a Certificate of confidentiality was provided to the Traditional Medicine practitioners to ensure confidentiality of their information. For analysis, the names of participants were kept confidential throughout the data analysis and presentation, during data collection, the use of codes was applied. **Beneficence and maleficence**: the study did not involve any form of invasive procedures or risks to the participants, the benefits for participating in the study was explained to the participants and informed consent was comprehensively affirmed to them. **Autonomy**: The participants was informed of the study methodology benefits, procedures objectives, thereafter they were voluntarily invited to sign the informed consent to participate in the study. Further inquiries in the study which may arise, the participant was given contact of the Principal Investigator

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter summarizes the findings of the study. The researcher assessed the Practice of TMPs on plants used to treat cancer, the plants used to treat cancer in the study area as well as the compliance of the traditional practitioners to WHO guidelines on traditional medicine preparation and dispensation. The key findings are presented beginning with the demographic profile of the sample, then chronologically as per the objectives of the study in this chapter.

4.2 Demographic profile of Traditional Medicine Practitioners.

The study consisted of 53 TMPs, of which 18 (40%) were in Kakamega county, 24% were from Bungoma county,13.2% were from Nandi, while Uasin Gishu and Baringo County had 17% and 11.3% respectively. There were more male TMPs (56%), than females (43%), with a mean of 59 years and a standard deviation of 17 years, however, the mean age among female TMPs was higher (M = 63.2, SD = 15.7) compared to their male counterparts (M = 55.3, SD = 17.2). most of the TMPs had at least a primary level of education n= 49(92.5%), of these, n= 13(26.5%) had a tertiary level of education.

For just over a quarter of the TMPs (28.3%), the income from the practice was the primary source of income, followed by farming n=14(26.4%). The vast majority of the TMPs acquired their knowledge through heredity (71.7%), and the modal years of experience were 1-10 years and 11-20 years, accounting for almost half of the TMPs as shown in table 4.1.

Table 4.1: Demographic profile of Traditional Medicine Practitioners.

Factor	Frequency	Percentage
Gender		
Male	30	56.6
Female	23	43.4
County		
Kakamega	18	34.0
Bungoma	13	24.5
Nandi	7	13.2
Uasin Gishu	9	17.0
Baringo	6	11.3
Education completed		
None	4	7.5
Primary	23	43.4
Secondary	13	24.5
Tertiary	13	24.5
Primary income source		
Traditional medicine	15	28.3
Farming	14	26.4
Business	13	24.5
Formal Employment	11	20.,8
Duration of practice		
1-10 years	13	24.5
11-20 years	13	24.5
21-30 years	9	17.0
31-40 years	8	15.1
Above 40 years	10	18.9
Knowledge source		
Hereditary	38	71.7
Apprenticeship	15	28.3

4.3 Medicinal plants used in cancer management

From this study, a total of 58 unique plants from 14 families as shown in table 4.2. The *Rutaceae* family was the most represented, followed by the *Asteraceae* and *Fabaceae* families.

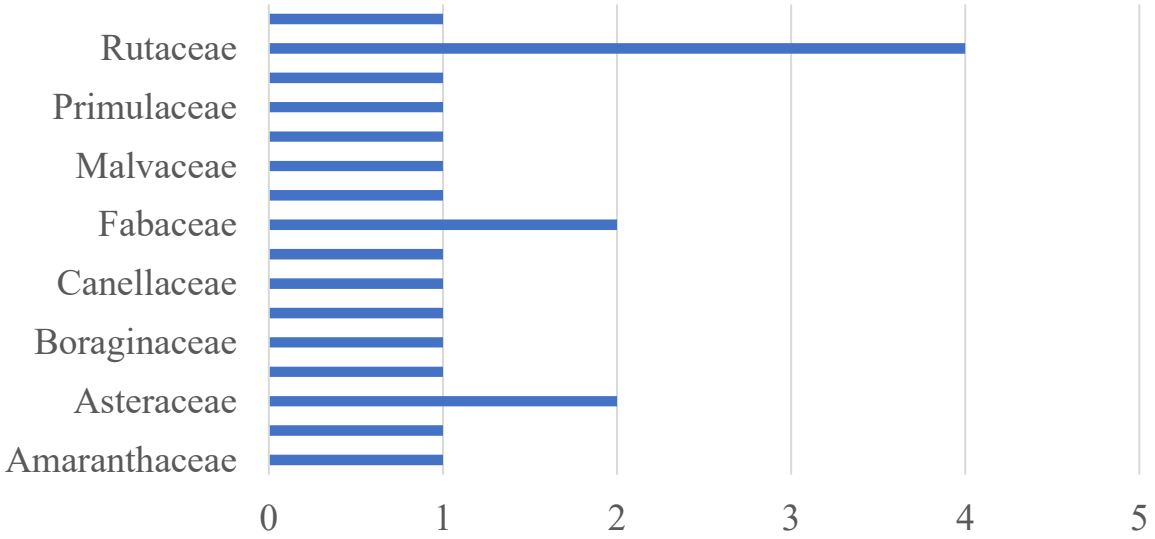


Figure 4. 1 Medicinal plants used in cancer management

Table 4.2: Medicinal plant families used in cancer treatment

Location	**Plant name Local**	**Plant name Scientific**	**Cancer type**	**Part used**
Baringo	Sinendet	*Periplocaceae linearifolia*	Breast, cervical, prostate	Roots
	Sirwo	*Rhus natalensis*	All types	Roots
	Sirwop boiyon	*Rhus longispes*	All types	Roots
	Kelwon	*Acokanthera schimperi*	All types	Fruit
	Kelelwa	*Croton dichogamus*	All types	Not specified
	Timonwo	*Prunus Africana*	All types	Not specified
	Cherabonyet		All types	Not specified
	Embunya	*Clausena anisata*	Prostrate	Leaves,Bark
	Enguu	*Microglossa pyrifolia*	All types	Leaves
	Kumunyakasia		All types	Not specified
	Pineeapple	*Ananas sativus*	All types	Leaves
Kakamega	Shingululusi	*Zanthoxylum rubescens*	Prostrate, lung	Bark
	Munyama	*Trichilia emetica*	All types	Bark
	Libungu Lihali		All types	Not specified
	Honey	*Apis mellifera*	Breast, throat	Not specified
	Kigplia	*Kigelia africana*	All types	Not specified
	Omupeli	*Albizia*	Skin,testicular,General	Flowers,leaves,

		grandibracteata		Bark, roots
	Omutali	*Prunus Africana*	Prostate,breast,skin	Bark
	Omurabe	*Gigalia africana*	Breast, General	Bark
	Omtembe	*Erithria Melanacantha*	Prostate,breast	Root,stem
	Omwilima	*Diospyros*	All types	Not specified
	Eshikhuma	*Zanthoxylum usambarensis*	Breast, cervical,prostate	Bark,Fruit
	Emucherera khunga	*Sterculia Appendiculata*	All types	Roots
	Mukhuwa	*Tamarindus Indica*	Breast,General	Not specified
	Apachi	*Warburgia Ugandensis*	Stomach,testicular,cervical,troat	Bark,
Bungoma	Chakula ya nyoka	*Cymbopogon citratus*	Throat	Not specified
(mt. **Elgon)**	Mokoyweti		All types	Not specified
	Taboswet	*Croton macrostachyus*	All types	Not specified
	Chakula ya nyoka	*Cymbopogon citratus*	Throat	Not specified
	Chaptengande	*Croton dichogamus*	All types	Not specified
	Einendet	*Periploca Linearfolia*	All types	Not specified
	Mkuyu	*Ficus sycomorus*	All types	Not specified
	Honey	*Apis mellifera*	All types	Not specified
	Kwarasyet		All types	Not specified
	Chemeeonteet	*Houttugnia cordata*	All types	Not specified
	Mowoobwarwa		All types	Not specified
	Bitonyonteet		All types	Not specified
	Kabokoit	*Balanites aegyptiaca*	All types	Not specified
Uasin Gishu	Ketemwo	*Toddalia asiastic*	All types	Not specified
	Cheptiyeet	*Diaspyros abyssinica*	All types	Not specified
	Sayineet	*Periploca Linearfolia*	All types	Not specified
	Somborweet	*Ambrosia artemisiifolia*	All types	Not specified
	Armoitit	*Dracaena ellenbeckiana*	Throat,General	Not specified
	Pumutet	*Terminalia brownii*	All types	Not specified
	Mororwet	*Ehretia cymosa Thonn*	All types	Bark
Nandi	Chilkotwet	*Platycladus*	All types	Not specified

		orientalis		
	Tamuryekiat	*Carissa edulis*	All types	Roots
	Chepkilas	Sacamore punctulata	All types	Roots
	Momoniat	*Verbascum thapsus*	Prostate, skin, stomach,throat	Roots,leaves,flowers
	Mbogiat	*Amaranthus graecizans L*	Breast, Lung	Seeds, bud
	Chepkotiwot	*Bidens pilosa L*	Skin, throat	Leaf,root,bark
	Kaloswet	*Terminalia brownii*	All types	Bark
	kibabustanyiet	*Maesa lanceolata*	Breast,colon,lung,liver	Not specified
	Ketemwet	*Toddalia asiatica*	Throat	Roots

4.4 Practice of TMPs

4.4.1 Part used

Roots were the most used plant parts 20.6%, in cancer management. Barks 17.7%, were the second most used part, while fresh buds were the least used as presented in table 4.3.

Table 4.3: Plant parts used to manage cancer

Part used	%Proportion
Bark	17.65
Bud	5.88
Flower	8.82
Fruit	14.71
Leaves	14.71
Not specified	17.65
Roots	20.59

4.4.2 Method of preparation

Decoction was the most used method of preparation for the medicinal plants used in cancer management. Poultices 14.7% were the least prepared, while for a further 11.8% of the medicinal plants, the method of preparation was not specified. Figure 4.2 shows the results.

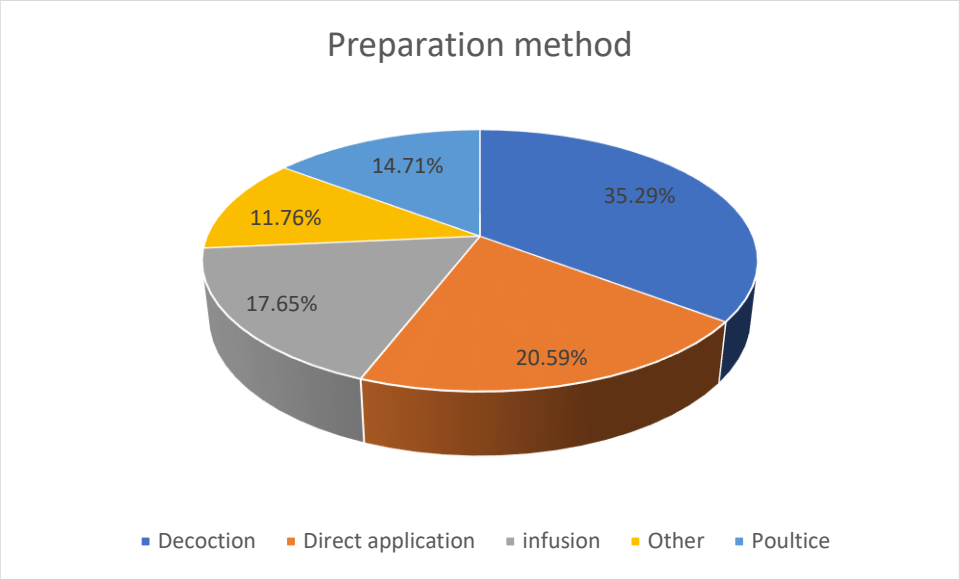


Figure 4. 2: Preparation method of medicinal plants

4.4.3 Method of packaging

The majority of TMPs used bottles to package the medicines, accounting for over half of the packaging methods n=31(57.7%), about a quarter of the medicines were packaged using old newspapers and branded containers each, 26.9%. 3.8% of the medicines were not packaged, as shown in table 4.4.

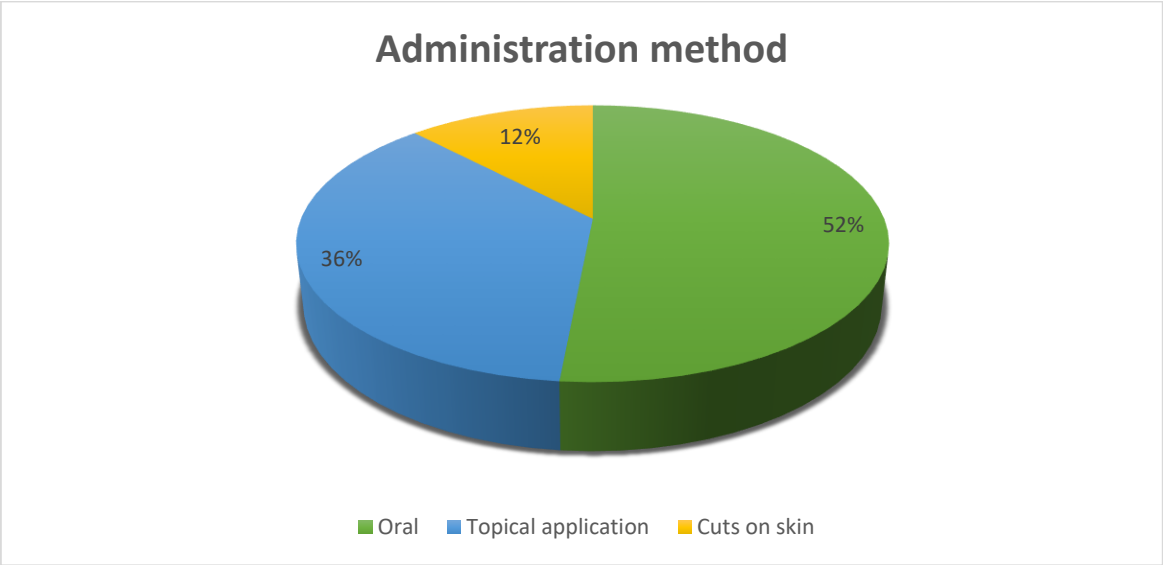
Table 4.4: Packaging method of traditional medicine

Factor	Frequency	Percentage
Methods of packaging		
Bottles	31	37.3
Plastic bags	19	22.9
Old newspapers	15	18.0
Branded containers	15	18.0
No packaging	3	3.6

4.4.4 Method of administration

The most used method of administration was oral 52%, followed by direct topical application on the skin and under skin cuts, with 36% and 12% respectively, as illustrated in figure 4.3.

Figure 4. 3: Administration method of cancer medicines



4.4.5 Cancer clients managed by TMPs

Among the practitioners, referrals by their previous clients (76.9%) were the most used method of access to new patients, while radio was the least used. Women sought TMP services more than men, representing 42.3%. Other than cancer, bacterial infections, swelling and wounds, and bleeding were the conditions treated by the majority of the practitioners, as shown in table 4.5.

Table 4.5: Client profile

Factor	Frequency	N (%)
Access to clients		
Referrals	43	81.1
Radio	7	13.3
Advertise	13	24.6
Gender difference in Seeking TM		
Male	11	20.8
Female	23	43.4
Equal	19	35.9
Other Conditions treated		
Bacterial infections	41	77.4
Swelling and wounds	41	77.4
Bleeding	41	77.4
Childhood diseases	29	54.7
Infertility	37	69.8
Allergies	23	43.4
Diabetes	9	17.0

Presented in table 4.6, prostrate and throat cancers, representing two fifths of the cancer types treated cumulatively were the most treated types of cancer, seconded by breast cancer 17.2%, whereas testicular cancer was the least treated type of cancer.

Table 4.6: Types of cancer managed by TMPs

Cancer type	**(N=%)**
Prostate	20.70
Throat	20.70
Breast	17.20
Cervical	10.30
Skin	10.30
Lung	7.30
Stomach	8.50
Testicular	4.90

As presented in table 4.7, TMPs in Kakamega County treated the majority of prostate cancer cases (36.4%), Cervical (60%), and breast (33.3%), in which it was similar to Bungoma.

Table 4.7: Cancer types managed per county

Cancer type	**Kakamega**	**Bungoma**	**Nandi**	**Uasin Gishu**	**Baringo**	**Chi (p value)**
Prostate	4(36.4)	2(18.2)	2(18.2)	1(9.1)	2(18.2)	1.60(0.81)
Throat	2(18.2)	3(27.3)	2(18.2)	2(18.2)	2(18.2)	1.91(0.75)
Breast	3(33.3)	3(33.3)	1(11.1)	0	2(22.2)	3.36(0.50)
Cervical	3(60)	0	0	1(20.0)	1(20.2)	3.58(0.47)
Skin	1(20)	2(40)	1(20)	0	1(20)	2.35(0.67)
Lung	1(25)	1(25)	0	2(50)	0	3.79(0.44)
Stomach	1(25)	1(25)	1(25)	0	1(25)	2.01(0.73)
Testicular	2(50)	0	2(50)	0	0	7.05(0.13)

4.4.6 Restrictions to practice

As presented in table 4.7, 38.5% of the respondents indicated no cultural restrictions to the practice of traditional medicine, while among those who had restrictions, gender was the major restriction 34.6%. Almost all 92.3% of the practitioners intended to pass their knowledge to their children and grandchildren. Half of the practitioners observed the restriction to the times of harvest of the herbs, which was reported to be either early in the morning or late in the evening.

Table 4.8: Restrictions to practice

Factor	Frequency	Percentage
Knowledge inheritance		
(Grand)Children	49	92.5
Not specified	4	7.5
Restrictions to practice		
Gender	19	35.8
Marital status	10	18.7
Age	4	7.5
None	20	37.3
Restrictions to Harvest		
Time (Morning/Evening)	27	50.9
Not raining	7	13.2
Not whole plant	3	5.7
Not after funeral	3	5.7
Not a woman on periods	3	5.7
None	10	18.9

4.5 Compliance to W.H.O guidelines

As presented in table 4.9, Overall, the level of compliance to the WHO guidelines was low, at 27%. When analyzed per item, the most adhered to guideline was that which requires that dispensing of the medicine be authorized by persons trained in the processing and quality control of herbal materials, in which 94.3% were found compliant. Almost half (47%) disposed waste water from production unit regularly, 43% thoroughly cleaned the equipment after use, and 42% had well organised storage areas. On the other hand, only 3.8% of the TMPs had clearly marked waste bins in the production area, 5.7% had written procedures on basic hygiene, and similarly, 5.7% maintained records of batch preparations.

Table 4.9: Compliance to WHO guidelines

Item	**YES**	**No**
	N (%)	N (%)
Treated water used for manufacturing the medicines	20(37.7)	33(62.3)
Waste water from production unit regularly disposed of	25(47.2)	28(52.8)
Clearly marked waste-bins available at the production unit	2(3.8)	51(96.2)
Drug production processes are defined	6(11.3)	47(88.7)
Records are maintained such as the date, name and description of the product, receipts, storage, and expiry dates	3(5.7)	50(94.3)
Product defects or deterioration recorded in detail and the causes thoroughly investigated.	7(13.2)	46(86.8)
Reports of any adverse reaction/event are entered in a separate register	11(20.8)	42(79.2)
The dispensing of herbal medicines is authorized by persons trained in the processing and quality control of herbal materials	50(94.3)	3(5.7)
Records of training are maintained, with periodic assessments of the effectiveness of training programs	6(11.3)	47(88.7)
Personnel are protected from contact with toxic irritants and potentially allergenic plant materials using PPEs when manufacturing.	13(24.5)	40(75.5)
Written procedures listing the basic hygiene requirements are made available.	3(5.7)	50(94.3)
Practitioners observe hand washing before handling the formulations and contact with the patients.	12(22.6)	41(77.4)
The equipment used is thoroughly cleaned after use	23(43.4)	30(56.6)

Storage areas are well organized and tidy	22(41.5)	31(58.5)
Storage areas are well labelled and materials stored in a such a way as to avoid cross -contamination	5(9.4)	48(90.6)
A standard is set for the maximum amount of foreign matter, e. g insects, soil, animal excreta, allowable in the collected herbs	21(39.6)	32(60.4)
AGGREGATE	**27%**	**73%**

Considering the low level of compliance to a number of the WHO guidelines, TMPs who scored at least 40% average compliance were considered to have high level of compliance. 18.9% of the TMPs showed a high level of compliance as shown in table 4.10.

Table 4.10: Level of compliance with WHO guidelines

Compliance level		
Level	**Frequency**	**Percent**
Low	43	81.1
High	10	18.9

A significant association was found between the level of education and compliance, $\chi^2(3,53 = 19.48, p=0.000)$, primary income source $\chi^2(3,53 = 9.95, p=0.02)$ and duration of practice $\chi^2(4,53 = 28.84, p=0.000)$, as presented in table 4.11

Table 4.11: Association between demographic factors and compliance

Factor	**Chi-Square**	**p value**
Gender	3.20	0.07
County	2.35	0.67
Education level	19.48	0.00
Primary income source	9.95	0.02
Duration of practice	28.84	0.00

TMPs who had a tertiary level of education were found to be 3.12 times more likely to be compliant to WHO guidelines compared to those who had no formal education (OR= 3.12, 95% ci =0.64-15.21). Furthermore, TMPs whose primary income source was traditional medicine were found to be 3.56 times more likely to be compliant than those in formal employment, while those whose main income was farming were 1.8 times as likely as the reference to be compliant (OR= 1.8, 95% ci= 1.21-2.39). Compared to those who had practiced for over 40 years, TMPs with 21-30 years of experience were more than three times as likely to be compliant (OR= 3.24, 95% ci= 1.5-4.98), as presented in table 4.12

Table 4.12: Demographic predictors of compliance

Factor	**Category**	**OR (95% ci)**	**p value**
Gender	Male	0.21(0.03-1.16)	0.07
	Female	Ref	
County	Kakamega	5.85(0.26-11.44)	0.27
	Bungoma	7.73(0.29-15.17)	0.22
	Nandi	2.56(0.03-5.09)	0.68
	Uasin Gishu	12.02(0.27-23.77)	0.20
	Baringo	Ref	
Education	Tertiary	3.12(0.64-15.21)	0.001
	Primary	0.29(0.03-2.75)	0.28
	Secondary	0.43(0.02-7.73)	0.56
	None	Ref	
Income source	Traditional medicine	3.56(0.4-6.72)	0.004
	Farming	1.8(1.21-2.39)	0.04
	Business	0.84(0.23-1.45)	0.02
	Formal Employment	Ref	
Years of practice	1-10 years	0.49(0.02-0.96)	0.65
	11-20 years	0.57(0.22-0.92)	0.29
	21-30 years	3.24(1.5-4.98)	0.01
	31-40 years	0.66(0.037-1.28)	0.78
	Above 40 years	Ref	

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter discusses the results presented in chapter four, providing a critique of the existing literature in comparison to the findings of study as they attain to the knowledge and practice of herbalist in the usage of herbal medicinal plants for treatment of cancer.

5.1 Medicinal plants used in cancer treatment

In this study, 58 plants from 14 plant families and 20 species were identified that were used to treat cancer. By comparison, in Pakistan, (Khan et al., 2021) found 159 plants, from 69 families, with *Lamiaceae* and, *Asteraceae* being the majority. Their study, however, covered a larger area with more respondents. The study in Mexico by (Alonso-Castro et al., 2011) identified more plant families, finding 90 families, however, they used a different methodology, utilizing a Bibliographic investigation of databases, with a time span of five decades prior.

In Morrocco, 33 botanical families were identified using a similar methodology, however, the target population was the general public, with the *Lamiaceae* being the most used family (Mohamed et al., 2022). The most cited plants in the region were *Marrubium vulgare L, Retama monosperma L, Boiss , and Juniperus oxycedrus* majorly for breast and liver cancer treatment. By comparison, in the south west of Nigeria, ninety species were identified for use against cancer (Segun et al., 2018) with a high level of local ethnobotanical knowledge of the plants. However, the study focused on cancer treatment in general, unlike the current study which is limited to breast cancer. Nevertheless, it showed a high level of knowledge

among the general population, which may imply a similarly high level of use of ethnobotanical plants in cancer treatment. Further, in the Ogun region, (Soladoye et al., 2010) identified 73 plants used by traditional healers and herbalists in treating cancers. This study had a similar target population to the current study, and also discovered widespread knowledge and ease of access to traditional plants among the traditional medicine practitioners.

Specific to breast cancer treatment, in South Africa, (Raimi et al., 2021) documented the use of *Pittosporum viridiflorum*, and *Euphorbia ingens* while in Uganda, *Annona muricata L., Rhoicissus*, *Erythrococca bongensis Pax*, *Ficus sp,* and *Cannabis sativa L*.were found to be used by TMPs to treat breast cancer (Lutoti et al., 2023) demonstrating the diversity in the ethnobotanical plants used in breast cancer. A finding close to this study's were those by (Omara et al., 2020) in Uganda, who found 24 botanical families with 29 species, even though they utilized a systematic review approach.

As in this study, the *Asteraceae* family was among the most used anti-cancer families as was identified by (Ochwang'i et al., 2014) in Kakamega. In the western region of Kenya, among communities in the county of Kakamega, *Spathodea campanulata P. Beauv. ssp. nilotica* (Seem)*, Microglossa pyrifolia* (Lam.) *Kuntze, Harungana madagascariensis Lam. ex poir, Prunus africana* (Hook. f.) *kalkman, Cyphostemma serpens* (A. Rich*), Catharanthus roseus (L.) G. Don* and *Aloe volkensii Engl* were found to be used widely to treat different cancers and cancer like symptoms, especially breast cancer and skin carcinomas (Ochwang'i et al., 2014b), showing some overlap with the current study. The pattern of utilization of these medicinal plants shows a variation in the families used depending on the abundance of the

species. A small overlap is found in the anti-cancer medicinal plants used in the study area and the neighbouring countries with similar climatic conditions.

5.2 Practice of TMPs in treatment in cancer management

In this study, herbs and shrubs were the predominant life forms used for cancer management, aligning with previous findings in Kenya (Ochwang'i et al., 2014; Omara et al., 2022). The most frequently used plant parts were roots, barks, and leaves, with roots being the most common. This mirrors findings from Pakistan (Khan et al., 2021) and partially agrees with studies from Mexico (Alonso-Castro et al., 2011), where leaves and barks were also commonly used for cancer treatment. In Ethiopia, while shrubs and herbs were prevalent, leaves and roots were preferred due to their perceived higher concentrations of active ingredients (Mohamed et al., 2022). Similarly, studies in Uganda (Omara et al., 2020) and Kenya (Ochwang'i et al., 2014; Omara et al., 2022) have shown that leaves and roots are favored plant parts for medicinal use.

The study found that roots and barks, which are hard plant parts, were most frequently prepared using decoctions, with oral administration being the most common method. This preparation method is consistent with findings from Omara et al. 2022 and Ochwang'i et al. (2014). In contrast, studies where leaves were the predominant plant part, such as Khan et al. (2021) and Mlilo et al. (2022) in South Africa, found direct topical applications to be more suitable. This suggests that the preparation method often depends on the type of plant part used.

The study identified throat, prostate, and breast cancers as the most frequently treated types of cancer by TMPs, aligning with national cancer statistics (Cancer Institute, 2024) which

show prostate and breast cancers as the most prevalent among men and women, respectively. The increased incidence of throat cancer in the study area, as reported by Menya et al. 2018, further supports these findings. However, while throat cancer was not previously noted in Ochwang'i et al. 2014, Omara et al. 2022 also reported similar findings, indicating a continued prevalence of these cancers. Other cancers treated included cervical, skin, lung, and stomach cancers, which align with findings from Omara et al. (2022) and Ochwang'I et al., 2014. Notably, this study uniquely identified the treatment of testicular cancer, a finding not observed in studies from Pakistan (Khan et al., 2021) or Morocco (which highlighted breast and liver cancers).

Almost three-quarters of TMPs acquired their knowledge through hereditary means, with 92% intending to pass their knowledge to future generations. This hereditary transmission of knowledge is consistent with findings by Chebii et al.2020). However, TMPs' understanding of plant and medicine production was less advanced, with most using plastic bottles and paper bags for packaging—practices also observed by Ouoba et al. 2023. Furthermore, over two-thirds of practitioners adhered to strict harvesting times, and 12% avoided harvesting after rain to reduce contamination. This practice aligns with Chege et al. (2018), which reported manual selection of unwanted materials to minimize contamination from foreign matter, insects, and animal excreta.

Even though studies have documented that a way TMPs use to ascertain cancer diagnosis is by using the medical record of their patients, such as was found in Malawi(Tembo et al., 2021) and Uganda for breast cancer(Lutoti et al., 2023) the current study did not directly test for this. Despite this, it was found that half of the TMPs had at least a secondary level of formal education which may influence their ability to comprehend medical diagnosis

reports. Moreover, studies have shown that an equally common method of diagnosis is one where traditional healers rely on their intuition, the chronicity and growth of external mass, as a means to diagnose a range of cancers. Symptoms that included breast swelling, breast pain, color changes in the nipple, pus from breast, and wounds on breast are used to diagnose breast cancer (Lutoti et al., 2023).

5.3 Compliance to WHO guidelines

The WHO requires that treated water used for manufacturing the medicines. A 38% compliance rate was found in this study. Albeit slightly higher, this is comparable to the compliance rate in Malawi, which was determined to be 41% Mponda et al., 2024), and significantly higher than the 18% recorded in Nigeria Adigwe et al.,2024 Secondly, it is recommended that the equipment used in the manufacture of the herbal medicine are regularly cleaned. In this study, the compliance rate to this guideline was 43.4%, a rate which despite being less than half, is higher than the 31% found by Mponda et al.,2024. Further, the WHO recommends that the dispensing of the medicines be approved by a person trained in the processing and quality control of herbal materials.

A high level of compliance to this guideline was found, 94.3%. As Chege et. al 2018 pointed out, the TMPs maintain a high level of secrecy around their work thus they keenly oversee the dispensation of their medicines, hence the high adherence. At 47% the compliance to disposing of waste water from the production unit regularly was low, in line with the findings of Adigwe et al. 2022, whose study found challenges around water sourcing by the practitioners.

The WHO further recommends, with regards to handling and storage of the medicines, that adequate, clean, well-labelled storage is provided, as to minimize the risk of cross contamination. Even though the compliance to tidiness of storage areas was high, 42%, by comparison, only 9.4% were compliant of the labelling requirement. Furthermore, a low 5.7% compliance rate was recorded for written procedures listing the basic hygiene requirements. By comparison, Mponda et al., 2024 found a 27.6% compliance rate to the adequacy of clean storage, and a 6.9% rate for adherence to the provision of written SOPs. Similarly, the compliance to the requirement of standard operating procedures for dispensing and recall of the medicines was 13%, comparable to that in Malawi and Nigeria (Mponda et al., 2024), even though there was found a higher rate of compliance, 21%, to record keeping in this study.

Education level, income source, and years of experience played significant roles in the compliance of traditional medicine practitioners to WHO guidelines. TMPs who had a tertiary level of education were found to be over three times more likely to be compliant to WHO guidelines compared to those who had no formal education. At the time of this research, there is very limited literature on the association between education and compliance among TMPs. However, by comparison, among physicians, it was found (Sasaki et al., 2020) that those who had received education related specifically to clinical practice guidelines were more likely to be follow the guidelines.

Similarly, (Tudor Car et al., 2019) found that continuous education and training programs are crucial for improving compliance, and that tailored training for different occupational roles within the healthcare setting is particularly effective. These findings, even though the target is different, tend toward a similar outcome to those of this study. This implies that as

the level of formal education increases, so does the likelihood of compliance to WHO guidelines among TMPs.

Compared to those who had practiced for over 40 years, TMPs with 21-30 years of experience were more than three times as likely to be compliant. By contrast, (Alhumaid et al., 2021) found that more years of experience was associated with higher levels of compliance among healthcare workers. However, it has also being shown that factors such as workload and age influence this relationship (Brooks et al., 2021). For instance, younger practitioners may be more flexible to adapting to new guidelines and thus be more compliant to guidelines. Furthermore, TMPs whose primary income source was traditional medicine were found to be over three and a half times more likely to be compliant, while those whose main income was farming were almost twice as likely as those in formal employment. As at the time of publishing, there is a lack of published literature exploring how having an alternate income source affects compliance.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The present study aimed to assess knowledge and practice of herbalist in the usage of herbal medicinal plants for treatment of cancer five selected counties in Kenya. This chapter presents a summary of the study findings, suggestions for areas future studies.

6.2 Conclusions

6.2.1 Medicinal plants used by TMPs for cancer treatments.

This study finds 58 plants from 14 plant families and 20 species were identified that were used to treat cancer in the five counties studied. The family of Rutaceae was the most presented as followed by Asteracea family of plants Herbs and shrubs are the most common life form, with roots, barks and leaves being the most used plant parts in cancer management.

Most of TMPs of could not identify the plants scientific names and a few could also not identify the traditional names, this is a challenge.

6.2.2 The practice of TMPs on treatment of cancers in five counties

Throat, prostate, and breast cancers are the three leading types treated using medicinal plants, accounting cumulatively for almost two thirds of the cancer types treated by traditional medicine practitioners in the study area and testicular cancer was the least type of cancer managed by the TMPs.

Decoction was the most used method of herbal preparation and empty bottles and plastic bags were the most method of packaging of herbal medicines as Oral administration method of drug was the most preferred.

Most TMPs did not have labelling of their herbal medicines in terms of the date of manufacture, the names of the plants used in preparing herbal, expiry date and cancer they treat, this may be a challenge in practice maybe because of trainings.

The longer the period in practice the more the compliance to the WHO guidelines and more cancers being managed. Kakamega and Bungoma counties seems to manage more cancers as compared to the other counties.

Females were the most gender that seeks for help in cancer management using herbal medicines, this is due to many types of cancers found in female gender while male were few.

There are restrictions of practice in terms of Gender and harvesting of herbal medicines. Most TMPs prefer to pass their knowledge and practice to their grandchildren,

6.2.3 The compliance of TMPs on WHO guidelines on use of Herbal Medicine

The level of compliance to the WHO guidelines on traditional medicines harvesting, preparation and dispensing was low, at 27%. There is a significance association between the level of education, source of income and duration of practice and compliance in the practice.

6.3 Recommendations

The findings of this study have been descriptive of practice of herbalist in the usage of herbal medicinal plants for treatment of cancer. Following its findings, the following recommendations are made.

6.3.1 Recommendations on Medicinal plants that are used to manage cancers by TMPs in Kenya.

Rutaceae family plants needs to be documented and more efficacies studies to be done on cancer plants.

The plants parts of this *Rutacea* family of plants need to be document to know their relevance to cancer treatment and control.

Documentation of the Herbal Medicines or traditional medicinal plants for cancer management need to be put down clearly and made aware to the TMPs and even to the entire society for future research and reference.

Ministry of Forestry and wild life needs to partner with the Education sector in the institutions such as higher learning education to provide programmes such as Herbal Medicine in management of diseases just like the other health workers are being trained such as pharmacologist, therefore this will promote the use of herbal medicines in cancer management.

6.3.2 Recommendations on the Practice of TMPs in cancers management in Kenya.

The health act policy no. 21 of 2017 which empowered the department of Health to provide policies and regulatory institutions that guide the practice of traditional and alternative medicine. The regulatory bodies created therein should provide guidance on registration, licensing and standards, and ensure compliance of TMPs.

TMPs also needs to be more trained on the important of safety of the clients as they use herbal medicines.

There is need to provision of processing of machines for herbs, in addition, the TMPs should be trained more on the methods of packaging, storage, premises sanitations and even the toxicity of the herbal medicine or the processed drug and administration of drugs and diagnosis to prevent cross infection in the middle of practice.

There is need to implement integration frameworks between traditional Medicine and modern Medicine in Kenya.

6.3.3 Recommendations on the Compliance of TMPs on WHO guidelines in usage of herbal Medicines in Cancer Management.

World Health Organization in partner with ministry of health should provide training to the TMPs in order to promote health to the locals so that practitioners to have modern skills in terms of processing of medicines, packaging, storage, administration and even know the efficacy of the herbs that they are administering. When this is done it will sustain the practice and therefore even the clients go to herbal medicines their safety is guaranteed

6.3.4 Recommendation for Policy.

Traditional Medicine Practitioners in usage of herbal medicine in cancer management, compliance to policies and World Health Organization guidelines needs to adhere to the following policies and recommendations.

6.3.4.1 Policy Recommendation based on plants used in cancer Treatment by TMPs in Kenya.

Ministry of Education and Ministry of Health in Kenya needs to collaborate in ensuring the clear documentation of the herbal medicine plants that are used to manage the cancer as

found by this study to further more research on the plants and carry out more research on in vivo efficacy and efficiency of these herbal plants.

6.3.4.2 Policy Recommendations the Practice of Herbal Medicines in Kenya.

The Kenya National Drug Policy Act 1994 needs to be implemented by TMPs to promote sustainable use traditional knowledge.

The Ministry of Health should build a framework between the herbal medicine and the Modern medicines**.** The Ministry of Health Under Public Health Surveillance needs to monitor the practice of TMPs in usage of Herbal Medicines in Cancer Treatment to manage the safety of the clients.

In addition, Ministry of Health should create awareness in Practice of traditional Medicines to the citizens and also offer training support for the TMPs, this will promote the adherence to compliance guidelines.

6.3.4.3 Policy Recommendations based on the WHO compliance of TMPs on use of herbal Medicines in cancer treatment.

The National Policy on Traditional Knowledge, Genetics Resources and Traditional Expressions 2009 which emphasizes on preservation, protection, and promotion of sustainable use of Traditional Knowledge, genetic resource and traditional cultural expression in Kenya needs to be implemented to promote the practice of TMPs and across the country.

Traditional Medicine Practitioners need to implement the policies and WHO guidelines in the usage of Traditional medicines and knowledge in cancer management, this is in terms processing, packaging, storage and administration of the herbal Medicines.

Moreover, The World Health Organization (WHO) National Policy on Traditional Medicine and Regulation of herbal Medicine of 2005 needs to be employed by TMPs for good practice and safety to the cancer clients.

6.4 Suggestions for Further Research.

The study was based on the parts of Rift valley and Western Regions of the country. It greatly contributed to the assessing of plants, practice and compliance of the TMPs in the usage of herbal Medicines in cancer treatment. The study therefore recommends a similar study to be carried out in other parts of the country like the lowlands of Kenya to overcome the geographical constraints of this study. There is need also for further research to determine the compliance level of TMPs and the practice in future for comparison.

In addition, further research needs to be carried out on in vivo efficacy of the ethnomedicinal plants identified needs to be further investigated in order to substantiate the utilization of the remedies used to treat cancer.

REFERENCES

Abdullahi, A. A. (2011). Trends and challenges of traditional medicine in Africa. *African journal of traditional, complementary and alternative medicines, 8*(5S).

Abu-Darwish, M. S., & Efferth, T. (2018). Medicinal plants from near east for cancer therapy. *Frontiers in pharmacology, 9*, 56.

Adigwe, O. P., Builders, P. F., Alfa, J., & Oladosu, P. (2022). Dynamics of herbal medicine processing and production in Benue State Nigeria. *African Journal of Pharmacy and Pharmacology*, *16*(7), 110-116.

Akhtar, M. F., Saleem, A., & Saleem, M. (2019). A comprehensive review on ethnomedicinal, pharmacological and phytochemical basis of anticancer medicinal plants of Pakistan. *Current cancer drug targets, 19*(2), 120-151.

Alami Merrouni, I., & Elachouri, M. (2021). Anticancer medicinal plants used by Moroccan people: Ethnobotanical, preclinical, phytochemical and clinical evidence. *Journal of ethnopharmacology, 266*, 113435. doi:https://doi.org/10.1016/j.jep.2020.113435

Alhumaid, S., Al Mutair, A., Al Alawi, Z., Alsuliman, M., Ahmed, G. Y., Rabaan, A. A., Al-Tawfiq, J. A., & Al-Omari, A. (2021). Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. *Antimicrobial Resistance & Infection Control*, *10*(1), 86. https://doi.org/10.1186/s13756-021-00957-0

Alonso-Castro, A. J., Villarreal, M. L., Salazar-Olivo, L. A., Gomez-Sanchez, M., Dominguez, F., & Garcia-Carranca, A. (2011). Mexican medicinal plants used for cancer treatment: Pharmacological, phytochemical and ethnobotanical studies. *Journal of ethnopharmacology, 133*(3), 945-972. doi:https://doi.org/10.1016/j.jep.2010.11.055

Asiimwe, J. B., Nagendrappa, P. B., Atukunda, E. C., Nambozi, G., Tolo, C. U., Ogwang, P. E., & Kamatenesi, M. M. (2023). The meaning of caring for patients with cancer among traditional medicine practitioners in Uganda: A grounded theory approach. *PLOS Glob Public Health, 3*(7), e0001764. doi:10.1371/journal.pgph.0001764

Ben-Arye, E., Samuels, N., Goldstein, L. H., Mutafoglu, K., Omran, S., Schiff, E., . . . Silbermann, M. (2016). Potential risks associated with traditional herbal medicine

use in cancer care: A study of Middle Eastern oncology health care professionals. *Cancer, 122*(4), 598-610. doi:https://doi.org/10.1002/cncr.29796

Benarba, B. (2016). Medicinal plants used by traditional healers from South-West Algeria: An ethnobotanical study. *J Intercult Ethnopharmacol, 5*(4), 320-330. doi:10.5455/jice.20160814115725

Brooks, S. K., Greenberg, N., Wessely, S., & Rubin, G. J. (2021). Factors affecting healthcare workers' compliance with social and behavioural infection control measures during emerging infectious disease outbreaks: rapid evidence review. *BMJ Open*, *11*(8), e049857. https://doi.org/10.1136/bmjopen-2021-049857

Bunalema, L., Obakiro, S., Tabuti, J. R., & Waako, P. (2014). Knowledge on plants used traditionally in the treatment of tuberculosis in Uganda. *Journal of ethnopharmacology, 151*(2), 999-1004.

Chebii, W. K., Muthee, J. K., & Kiemo, K. (2020). The governance of traditional medicine and herbal remedies in the selected local markets of Western Kenya. *Journal of ethnobiology and ethnomedicine, 16*(1), 1-24.

Chege, I. N., Okalebo, F. A., Guantai, A. N., Karanja, S., & Derese, S. (2018). Herbal product processig practices of traditional medicine practitioners in Kenya-key information interviews.

Choumessi, A. T., Danel, M., Chassaing, S., Truchet, I., Penlap, V. B., Pieme, A. C., . . . Valette, A. (2012). Characterization of the antiproliferative activity of Xylopia aethiopica. *Cell Division, 7*(1), 8. doi:10.1186/1747-1028-7-8

de Almeida, E. M., Ferreira, H. J., Alves, D. R., & da Silva, W. M. B. (2020). Therapeutic potential of medicinal plants indicated by the Brazilian public health system in treating the collateral effects induced by chemotherapy, radiotherapy, and chemoradiotherapy: A systematic review. *Complementary Therapies in Medicine, 49*, 102293. doi:https://doi.org/10.1016/j.ctim.2019.102293

de Melo, J. G., Santos, A. G., de Amorim, E. L. C., Nascimento, S. C. d., & de Albuquerque, U. P. (2011). Medicinal Plants Used as Antitumor Agents in Brazil: An Ethnobotanical Approach. *Evidence-Based Complementary and Alternative Medicine, 2011*, 365359. doi:10.1155/2011/365359

Fischer, J., Smith, A., & Johnson, L. (1998). Title of the article. *Journal Name, 15*(3), 123-145. https://doi.org/xxxxxx

Gakuya, D. W., Okumu, M. O., Kiama, S. G., Mbaria, J. M., Gathumbi, P. K., Mathiu, P. M., & Nguta, J. M. (2020). Traditional medicine in Kenya: Past and current status, challenges, and the way forward. *Scientific African, 8*, e00360. doi:https://doi.org/10.1016/j.sciaf.2020.e00360

Gakuya, D. W., et al. (2021). Ethnobotanical survey of medicinal plants traditionally used in Kenya for cancer treatment. *Journal of Ethnopharmacology, 278*, 114303.

James, P. B., Wardle, J., Steel, A., & Adams, J. (2018). Traditional, complementary and alternative medicine use in Sub-Saharan Africa: a systematic review. *BMJ global health*, *3*(5), e000895.

Kaingu, C. K., Mbaria, J., & Oduma, J. A. (2013). Ethnobotanical study of medicinal plants traditionally used in Tana River County for management of illnesses.

Khan, A., Ali, S., Murad, W., Hayat, K., Siraj, S., Jawad, M., Khan, R. A., Uddin, J., Al-Harrasi, A., & Khan, A. (2021). Phytochemical and pharmacological uses of medicinal plants to treat cancer: A case study from Khyber Pakhtunkhwa, North Pakistan. *Journal of Ethnopharmacology*, *281*, 114437. https://doi.org/https://doi.org/10.1016/j.jep.2021.114437

Kenya. Ministry of Health. (2014). *Kenya health policy 2014-2030*. Ministry of Health

Kigen, G., Ronoh, H. K., Kipkore, W., & Rotich, J. K. (2013). Current trends of Traditional Herbal Medicine Practice in Kenya: A review. *The African Journal of Pharmacology and Therapeutics, 2*.

Mwaka, A. D. (2022). Sociocultural Influences on Cancer Care in Sub-Saharan Africa. *Global Perspectives in Cancer Care: Religion, Spirituality, and Cultural Diversity in Health and Healing*, 249.

Mwangi, J. W., et al. (2020). Utilization of herbal medicine in rural Kenya: Implications for health and policy. *BMC Complementary Medicine and Therapies, 20*(1), 165.

Lara Reimers, E. A., Lara Reimers, D. J., Chaloupkova, P., Zepeda del Valle, J. M., Milella, L., & Russo, D. (2019). An ethnobotanical survey of medicinal plants used in Papantla, Veracruz, Mexico. *Plants, 8*(8), 246.

Lutoti, S., Kaggwa, B., Kamba, P. F., Mukonzo, J., Sesaazi, C. D., & Katuura, E. (2023). Ethnobotanical Survey of Medicinal Plants Used in Breast Cancer Treatment by Traditional Health Practitioners in Central Uganda. *Journal of Multidisciplinary Healthcare*, 635-651.

Matowa, P. R., Gundidza, M., Gwanzura, L., & Nhachi, C. F. (2020). A survey of ethnomedicinal plants used to treat cancer by traditional medicine practitioners in Zimbabwe. *BMC Complementary Medicine and Therapies, 20*(1), 1-13.

Mattiuzzi, C., & Lippi, G. (2019). Current Cancer Epidemiology. *J Epidemiol Glob Health, 9*(4), 217-222. doi:10.2991/jegh.k.191008.001

Misonge, O. J., Kamindu, G. N., Sabina, W., & Muita, G. (2019). An ethnobotanical survey of plants used for the treatment and management of cancer in Embu County, Kenya. *J. Med. Plants, 7*, 39-46.

Mohamed, A., Karima, S., & Nadia, O. (2022). The use of medicinal plants against cancer: An ethnobotanical study in the Beni Mellal-Khenifra Region in Morocco. *European Journal of Integrative Medicine, 52*, 102137.

Mponda, J. S., Muula, A. S., Choko, A., Ajuwon, A. J., & Moody, J. O. (2024). Traditional medicine regulation status and challenges in Malawi and Nigeria.

Nketia, A., Nakua, E., Tetteh, A. W., Thomford, K. P., Boadu, K. O., Thomford, A. K., & Amo, R. (2022). Herbal medicine practice in Ghana: A cross-sectional study to understand the factors influencing patient utilization of herbal medicine services. *International Research Journal of Public and Environmental Health, 9*(1), 16.

Ochwang'i, D. O., Kimwele, C. N., Oduma, J. A., Gathumbi, P. K., Kiama, S. G., & Efferth, T. (2018). Cytotoxic activity of medicinal plants of the Kakamega County (Kenya) against drug-sensitive and multidrug-resistant cancer cells. *J Ethnopharmacol, 215*, 233-240. doi:10.1016/j.jep.2018.01.004

Ochwang'i, D. O., Kimwele, C. N., Oduma, J., Gathumbi, P. K., Mbaria, J. M., & Kiama, S. G. (2014a). Medicinal plants used in treatment and management of cancer in Kakamega County, Kenya. *Journal of ethnopharmacology, 151 3*, 1040-1055.

Ochwang'i, D. O., Kimwele, C. N., Oduma, J. A., Gathumbi, P. K., Mbaria, J. M., & Kiama, S. G. (2014b). Medicinal plants used in treatment and management of cancer in Kakamega County, Kenya. *Journal of ethnopharmacology, 151*(3), 1040-1055. doi:https://doi.org/10.1016/j.jep.2013.11.051

Omara, T., Odero, M. P., & Obakiro, S. B. (2022). Medicinal plants used for treating cancer in Kenya: an ethnopharmacological overview. *Bulletin of the National Research Centre, 46*(1), 148. doi:10.1186/s42269-022-00840-x

Organization, W. H. (2023, October 2023). Traditional medicine. Retrieved from https://www.who.int/news-room/questions-and-answers/item/traditional-medicine

Ouoba, K., Lehmann, H., Zongo, A., Semdé, R., & Pabst, J.-Y. (2023). Phytopharmaceutical practices of traditional health practitioners in Burkina Faso: a cross-sectional study. *BMC Complementary Medicine and Therapies*, *23*(1), 215

Paul, J. O. (2020). Herbal Remedies for Cancer by Various Indigenous Kenyan Communities: A Review of Ethnobotanical Surveys and Anticancer Studies. *International Journal of Science and Healthcare Research, 5*(4), 292-298. Retrieved from https://ijshr.com/IJSHR_Vol.5_Issue.4_Oct2020/IJSHR_Abstract.0038.html

Poddar, S., Sarkar, T., Choudhury, S., Chatterjee, S., & Ghosh, P. (2020). Indian traditional medicinal plants: A concise review. *International Journal of Botany Studies, 5*(5), 174-190.

Raimi, I. O., Kopaopa, B. G., Mugivhisa, L. L., Lewu, F. B., Amoo, S. O., & Olowoyo, J. O. (2021). An ethnobotanical survey of medicinal plants used by traditional healers for the treatment of cancer in Hammanskraal and Winterveld, Tshwane Metropolitan Municipality, South Africa. *African Health Sciences, 21*(4), 1746-1753.

Romm, A., Ganora, L., Hoffmann, D., Yarnell, E., Abascal, K., & Coven, M. (2010). CHAPTER 3 - Fundamental Principles of Herbal Medicine. In A. Romm, M. L. Hardy, & S. Mills (Eds.), *Botanical Medicine for Women's Health* (pp. 24-74). Saint Louis: Churchill Livingstone.

Sasaki, N., Yamaguchi, N., Okumura, A., Yoshida, M., Sugawara, H., Shin, J.-h., Kunisawa, S., & Imanaka, Y. (2020). Factors affecting the use of clinical practice guidelines by hospital physicians: the interplay of IT infrastructure and physician attitudes. *Implementation Science*, *15*(1), 101. https://doi.org/10.1186/s13012-020-01056-1

Segun, P. A., Ogbole, O. O., & Ajaiyeoba, E. O. (2018). Medicinal plants used in the management of cancer among the ijebus of southwestern Nigeria. *Journal of Herbal Medicine, 14*, 68-75. doi:https://doi.org/10.1016/j.hermed.2018.04.002

Shahrajabian, M. H., Sun, W., & Cheng, Q. (2019). Clinical aspects and health benefits of ginger (Zingiber officinale) in both traditional Chinese medicine and modern industry. *Acta agriculturae scandinavica, section b—Soil & Plant Science, 69*(6), 546-556.

Siew, Y.-Y., Yew, H.-C., Neo, S.-Y., Seow, S.-V., Lew, S.-M., Lim, S.-W., . . . Ali, A. (2019). Evaluation of anti-proliferative activity of medicinal plants used in Asian Traditional Medicine to treat cancer. *Journal of ethnopharmacology, 235*, 75-87.

Sikuku, L., Njoroge, B., Suba, V., Achieng, E., Mbogo, J., & Li, Y. (2023). Ethnobotany and quantitative analysis of medicinal plants used by the people of Malava sub-county, Western Kenya. *Ethnobotany Research and Applications, 26*, 1-20.

Soladoye, M. O., Amusa, N., Raji-Esan, S., Chukwuma, E., & Taiwo, A. (2010). Ethnobotanical survey of anti-cancer plants in Ogun State, Nigeria. *Annals of biological research, 1*(4), 261-273.

Stefan, D. C. (2015). Cancer Care in Africa: An Overview of Resources. *Journal of Global Oncology, 1*(1), 30-36. doi:10.1200/jgo.2015.000406

Sun, W., Shahrajabian, M. H., & Cheng, Q. (2020). Traditional Iranian and Arabic herbal medicines as natural anti-cancer drugs. *Agrociencia, 54*(1), 129-142.

Tembo, N., Lampiao, F., Mwakikunga, A., & Chikowe, I. (2021). Ethnobotanical survey of medicinal plants used for cervical cancer management in Zomba District, Malawi. *Scientific African, 13*, e00941. doi:https://doi.org/10.1016/j.sciaf.2021.e00941

Tesfaye, S., Belete, A., Engidawork, E., Gedif, T., & Asres, K. (2020a). Ethnobotanical Study of Medicinal Plants Used by Traditional Healers to Treat Cancer-Like Symptoms in Eleven Districts, Ethiopia. *Evidence-Based Complementary and Alternative Medicine, 2020*, 7683450. doi:10.1155/2020/7683450

Tesfaye, S., Belete, A., Engidawork, E., Gedif, T., & Asres, K. (2020b). Ethnobotanical study of medicinal plants used by traditional healers to treat cancer-like symptoms in eleven districts, Ethiopia. *Evidence-Based Complementary and Alternative Medicine, 2020*.

Tudor Car, L., Soong, A., Kyaw, B. M., Chua, K. L., Low-Beer, N., & Majeed, A. (2019). Health professions digital education on clinical practice guidelines: a systematic review by Digital Health Education collaboration. *BMC Medicine*, *17*(1), 139. https://doi.org/10.1186/s12916-019-1370-1

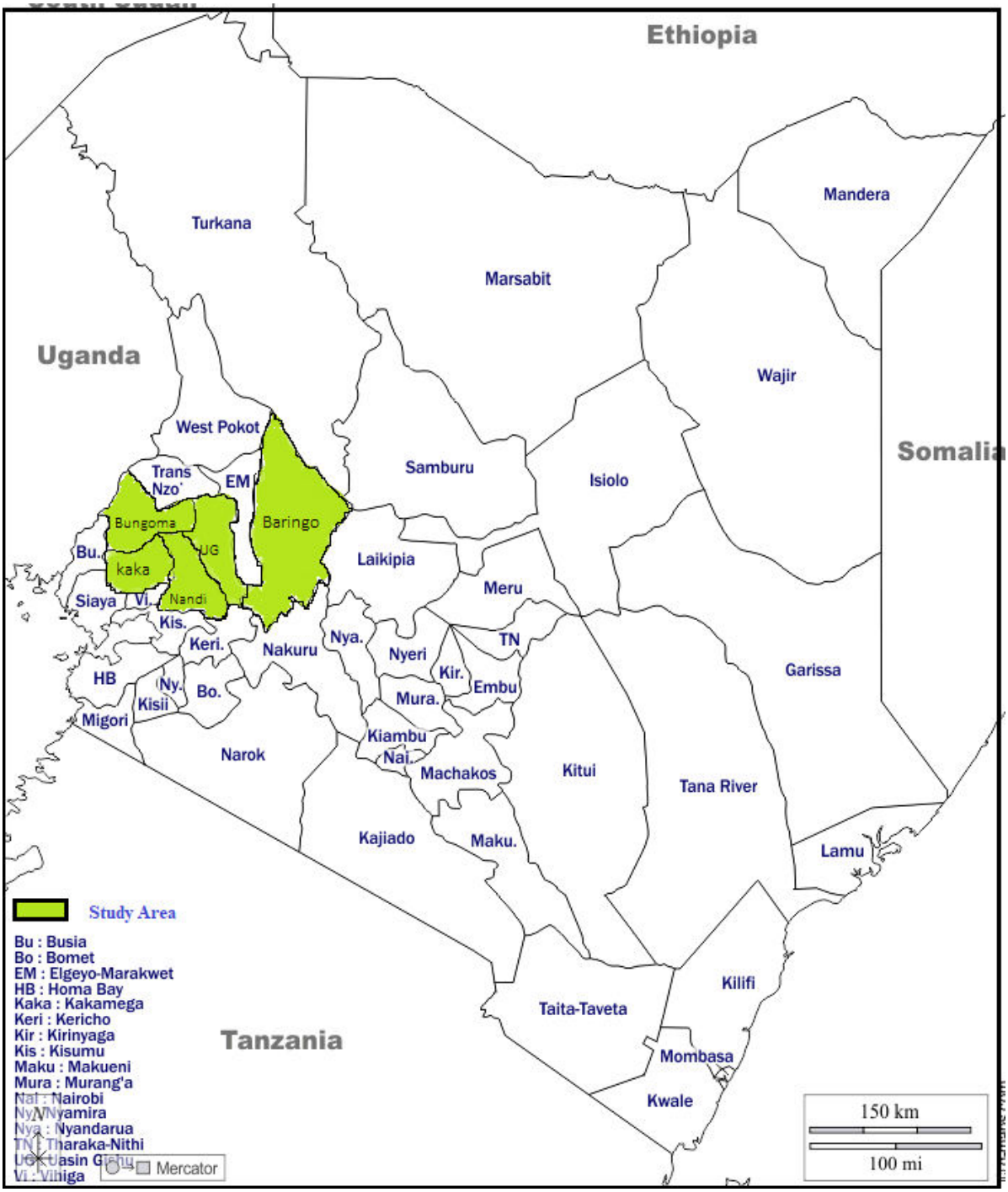
Wambugu, P. W., et al. (2021). Safety and regulatory challenges of traditional herbal medicine in Kenya. Regulatory Toxicology and Pharmacology, 123, 104935.

WHO. (2020). Cancer tomorrow. *International Agency For research on cancer.* Retrieved from https://gco.iarc.fr/tomorrow/en/dataviz/isotype?types=0&sexes=0&mode=population&group_populations=1&multiple_populations=1&multiple_cancers=0&cancers=39&populations=903_904_905_908_909_935

WHO. (2023). Cancer Key facts. *Fact sheets.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/cancer

APPENDICES

APPENDIX I: Map of Kenya showing the selected 5 counties for study.



APPENDIX II: Consent Form.

Title: ETHNOBOTANICAL ASESSMENT OF HERBAL MEDICINE PRACTICES FOR CANCER TREATMENT AMONG TRADITIONAL MEDICINE PRACTITIONERS IN KENYA.

My name is Mr. Janes Otieno, a postgraduate at Masinde Muliro University of Science and Technology. I am the Researcher of this study "Ethnobotanical assessment of herbal medicine Practices for cancer treatment among Traditional Medicine Practitioners in Kenya"

Description

This study is designed to survey the knowledge and practice of TMPs on herbal medicinal plants that are used to treat cancers in Kenya. The study seeks to document the knowledge and practice of the TMPs in use of Traditional medicines for cancer treatment and the knowledge accumulated by local communities of Western, and Rift valley regions. This is important because if any cultural changes take place in this community and the vegetation is degraded due to various factors, the knowledge of the people on the plant resource will be lost. Moreover, some of the medicinal plant species may become extinct from the regions before being documented and the people may lose their uses and their indigenous knowledge on them forever.

If you agree to participate in this study you will be requested to respond to a questionnaire to provide the researcher with some information on the herbal medicines you use for treatment of cancer and also show us some of the herbs used.

Risks: no risk will occur during your participation in responding to the questionnaires.

Confidentiality: All information obtained from you will be treated as confidential, and will be used for the intended purposes of this research.

A certificate of confidentiality will be offered to show my commitment to protect your privacy and confidentiality based on the plants and information you will give. This is to protect sensitivity information, encourage your participation and support your integrity.

Voluntary Participation and Withdrawal: You have the right to participate or not in the study without giving any reason for your decision, and you are free to terminate your participation at any time in the course of the study.

Contacts: If you have any question about this study you are free to contact the principal Researcher: Mr. Janes Otieno (0798322280) or otienojanes2017@gmail.com.

Documentation

If you agree to participate, please sign this informed consent form. I…….... have read and understood the contents of the informed consent form and questions have been answered adequately.

I therefore consent for participation in this study.

Signature of the interviewee……Date……

Signature of the interviewer…….Date…….

APPENDIX III: Interview tool (questionnaire).

Interview schedule

I am Janes Otieno, a student pursuing masters degree in public health from Masinde Muliro University of science and Technology and as part of learning am required to carry out a research, you have been selected to participate in this study that seeks to conduct a study on medicinal plants used to treat cancer in selected regions in western Kenya Rift Valley regions. The study has been funded by the MMUST university research fund. The interview will take about 20 minutes. The information you provide will be used for the purpose of this study, please put a tick or provide an explanation where appropriate.

SECTION A: PRACTITIONERS CHARACTERISTICS

1. What is your age (Years)? _____

2. What is your gender? Male ☐ Female ☐

3. What is your highest level of education?

Primary ☐ Secondary ☐ Tertiary ☐ Other _____

4. What is your current marital status?

Married ☐ Single ☐ Separated/divorced/widowed ☐

5. In which county do you practice?

Kakamega ☐ Bungoma ☐ Nandi ☐ Uasin Gishu ☐ Baringo ☐

6. What's the highest level of formal education you completed?

None ☐ Primary ☐ Secondary ☐ Tertiary ☐

7. What is your primary source of income? Traditional medicine ☐ Farming ☐

Specify _____

8. What is your average monthly income from TM practice? _____

SECTION B: TMP KNOWLEDGE ON PRACTICE

1. How long have you been practicing Traditional medicine?

1-3 years ☐ 4-6 years ☐ 7-9 years ☐ 10years and above

2. How did you acquire your knowledge of traditional medicine?

Hereditary (Family) ☐ Apprenticeship ☐ other ☐ specify _____

3. How long did it take you to complete your training and start practicing on your own?

_____ Months _____ Years

4. Are there any restrictions in your community on who should learn/practice traditional medicine?

Age ☐ Ethnicity ☐ Gender ☐

5. What conditions do you treat?

i. .

ii. .

iii. .

iv. .

v. .

vi. .

vii. .

6. Are you aware of the disease called cancer?

Yes ☐ No ☐

If No, End the Survey here, and find a replacement respondent.

7. If yes, what types of cancers do you know?

i. .

ii. .

iii. .

iv. .

v. .

vi. .

8. What symptoms do you look for in patients with cancer?

i. .

ii. .

iii. .

iv. .

v. .

vi. .

8. How do you diagnose the types of cancer in 7 above? (For each of the above, give diagnosis method)

i. .

ii. .

iii. .

iv. .

v. .

vi. .

10. Have you ever treated a patient with cancer?

Yes ☐ No ☐

If yes, did the patient make a full recovery?

Yes ☐ No ☐

11. Rate the severity of the majority of cancer patients you have treated on a scale of 1-5, where 5 is very severe _____

12. Which herbs do you use to treat the types of cancer (As listed above?)

i. .

ii. .

iii. .

iv. .

v. .

vi. .

12. What part of the herbs above do you use to treat cancer?

Bark ☐ Fruit ☐ Root ☐ Leaves ☐ Flower ☐ Other ☐

13. How do you prepare the plant part for administration?

Infusion ☐ Decoction ☐ Poultice ☐ Other _____

14. How do you administer the prepared medicine? Orally ☐ Rub on skin ☐

☐ Injection ☐ Other. Specify _____

15. Which factors do you consider to decide the quantity and rate of dosage for your medicine?

☐ Age ☐ Weight ☐ Weight ☐Severity ☐No standard

☐Others. Specify _____

16. Are you aware of any side effects associated with any of the herbs you use for cancer treatment?

Yes ☐ No ☐

If yes, which ones? (probe for which herb has which known side effects)

i. .

ii. .

iii. .

iv. .

v. .

SECTION C: INTERGRATION OF TRADITIONAL MEDICINE WITH CONVENTIONAL MEDICINE

1. Have you ever used medical records/reports to diagnose cancer?

Yes ☐ No ☐

2. Do you know how to read medical diagnosis reports and images?

Yes ☐ No ☐

If yes, which ones?

☐ X-rays ☐ MRIs ☐ Lab reports ☐ Prescriptions. Other _____

3. Have you ever referred a patient to the hospital?

Yes ☐ No ☐

If yes, what was the reason? _____

4. Have you ever had a patient lose their lives when undergoing treatment?

Yes ☐ No ☐

5. Who do you report fatalities to? _____

6. Which anthropometric measures do you measure as part of your practice?

None ☐ Height ☐ Weight ☐ Waist circumference ☐

7. Are you aware of the government's requirement to register you practice with the county?

Yes ☐ No ☐

8. Are you registered as a TMP with the county health office?

Yes ☐ No ☐

If no, what are the reasons? _____

SECTION D: FACTORS ASSOCIATED WITH TRADITIONAL MEDICINE USE FOR CANCER TREATMENT.

1. Do you advertise your Services?

Yes ☐ No ☐

If yes, how do you advertise?

Mass media ☐ Social media ☐ Banners and posters ☐

2. How do you access your clients?

Local Community ☐ Peer referrals ☐ Self-referrals ☐

3. Amongst your clients, which gender seeks your services more?

Male ☐ Female ☐

4. What is your average charge for cancer treatment?

☐ 0 – 5k ☐ 5k – 10k ☐ 10k – 15k ☐ 15k – 20k. Over 20k, specify _____

5. Do you believe traditional medicine is better than conventional medicine for cancer management? Yes ☐ No ☐

6. How much risk do you believe the use of traditional medicine poses to cancer patients compared to conventional medicine?

Low ☐ Moderate ☐ High ☐

7. How severe do you believe the side effects of traditional medicines used to treat cancer are?

Low ☐ Moderate ☐ High ☐

8. How effective do you believe traditional medicines to be against Cancer?

Low ☐ Moderate ☐ High ☐

9. Are you aware of any cultural beliefs or norms related to cancer that influence your clients' decision to use traditional medicine for cancer? Yes ☐ No ☐

Explain _____

Thank you for your time and Feedback

APPENDIX IV: WHO COMPLIANCE CHECKLIST

S.N	Guideline	✓ for Yes x for No
1	Treated water used for manufacturing the medicines	
2	Waste water from production unit regularly disposed of	
3	Clearly marked waste-bins available at the production unit	
4	Drug production processes are defined	
5	Records are maintained such as the date, name and description of the product, receipts, storage, and expiry dates	
6	Product defects or deterioration recorded in detail and the causes thoroughly investigated.	
7	Reports of any adverse reaction/event should be entered in a separate register	
8	The dispensing of herbal medicines is authorized by persons trained in the processing and quality control of herbal materials	
9	Records of training are maintained, with periodic assessments of the effectiveness of training programs	
10	Personnel are protected from contact with toxic irritants and potentially allergenic plant materials using PPEs when manufacturing.	
11	Written procedures listing the basic hygiene requirements are made available.	
12	Practitioners observe hand washing before handling the formulations and contact with the patients.	
13	The equipment used is thoroughly cleaned after use	
14	Storage areas are well organized and tidy	
15	Storage areas are well labelled and materials stored in a such a way as to avoid cross –contamination	
16	A standard is set for the maximum amount of foreign matter, e. g insects, soil, animal excreta, allowable in the collected herbs	

APPENDIX V: CERTIFICATE OF CONFIDENTIALITY.

Confidentiality Statement for Traditional Medicine practitioners

The Kenya Data Protection Act 2019, National Commission for Science and Technology (NACOSTI), the various county research permits, the MMUST ISREC, and their respective regulations protect the confidentiality of personal information of research participants. Such information may not be disclosed except as authorized by law or as authorized by the research participant. These privacy laws and regulations apply to all persons, including all persons conducting research in educational settings. All observers are required to agree to and sign this confidentiality statement.

I understand that, as a researcher, I may see, hear, or be exposed to confidential information about Traditional medicine practitioners and their patients, such as medical information, information about herbal medicine sourcing and preparation, type of illness other educationally related information.

I acknowledge that it is my responsibility to respect the privacy and confidentiality of this information. I will not access, use, or disclose any confidential information outside of my capacity as a researcher. I understand that if I breach any provision of this Agreement, I may be subject to civil or criminal liability.

_____

Observer's Name (Print)

_____

Observer's Signature

_____

Date

APPENDIX VI: ETHICAL CLEARENCE

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

Tel: 056-31375
Fax: 056-30153
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke

P. O. Box 190,
50100.
Kakamega,
KENYA

Institutional Scientific and Ethics Review Committee (ISERC)

REF: MMU/COR: 40312 Vol 6(01) Date: March 1 I th, 2024

To: Mr. Janes Otieno Ouko

Dear Mr.

RE: ETHNOBOTANICAL SURVEY ON KNOWLEDGE AND PRACTICE OF HERBAL MEDICINE USED TO TREAT CANCER BY TRADITIONAL MEDICINE PRACTITIONERS IN KENYA

This is to inform you that the Masinde Muliro University ofScience and Technology Institutional Scientific and Ethics Review Committee (MMUST-ISERC) has reviewed and approved your above research proposal. Your application approval number is MMUST/ ISERC/026/2024. The approval covers for the period March 11th, 2024 to March 11th, 2025.

This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by MMUST-ISERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to MMUST-ISERC within 72 hours of notification iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to MMUST-ISERC within
72 hours

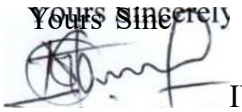
v. Clearance for export of biological specimens must be obtained from relevant institutions.

vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period.
Attach a comprehensive progress report to support the renewal.

vii. Submission of an executive summary report within 90 days upon completion of the study to MMUSTISERC.

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

Yours Sincerely



IW

Prof. Gordon Nguka (PhD)
Chairperson, Institutional Scientific and Ethics Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
Vice Chancellor
DVC (PR&I)

APPENDIX VII: NACOSTI PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **308847**

Date of Issue: **25/April/2024**

RESEARCH LICENSE



This is to Certify that Mr.. JANES OTIENO OUKO of Masinde Muliro University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Baringo, Bungoma, Kakamega, Nandi, Uasin-Gishu on the topic: ETHNOBOTANICAL SURVEY ON KNOWLEDGE AND PRACTICE OF HERBAL MEDICINE USED TO TREAT CANCER BY TRADITIONAL MEDICINE PRACTITIONERS IN KENYA for the period ending : 25/April/2025.

License No:**NACOSTI/P/24/34831**

308847

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

See overleaf for conditions

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way; i. Endanger national security

ii. Adversely affect the lives of Kenyans

iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).

iv. Result in exploitation of intellectual property rights of communities in Kenya

v. Adversely affect the environment

vi. Adversely affect the rights of communities

vii. Endanger public safety and national cohesion

viii. Plagiarize someone else's work

3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.

15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke