DETERMINANTS OF CANCER PREVENTION BEHAVIOURS AMONG FARMERS USING PESTICIDES IN LAIKIPIA COUNTY, KENYA

ANNE W TAIKU

R50/27556/2019

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (ONCOLOGY NURSING) IN THE DEPARTMENT OF COMMUNITY HEALTH AND REPRODUCTIVE HEALTH NURSING IN THE SCHOOL OF HEALTH SCIENCES OF KENYATTA UNIVERSITY

MAY, 2023

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature _____ Date: _____

Anne W. Taiku

R50/27556/2019

This thesis has been submitted for examination with our approval as the university supervisors.

Signature _____. Date _____

Lister Onsongo PhD, RN

Lecturer

Community Health & Reproductive Health Nursing Department

School of Health Sciences

Kenyatta University

Signature _____. Date _____

Elizabeth Ambani MPH-EPI, RN

Lecturer

Senior Lecturer

School of Health Sciences, Department of Nursing Sciences

ABBREVIATIONS AND ACRONYMS

CDC	Centers for Disease Control and Prevention
NCI	National Cancer Institute
NTRH	Nanyuki Teaching and Referral Hospital
PMT	Protection Motivation Theory
PPE	Personal Protective Equipment
SPSS	Statistical Package for the Social Sciences
UICC	Union for International Cancer Control
WHO	World Health Organization

DEFINITION OF TERMS

Attitude	Perception and value attached to personal protection among farmers using pesticide
Demographic characteristics	Description of farmers using pesticide by gender, age, level of education and economic status.
Famers	Refers to persons carrying out agriculture using pesticides.
Knowledge	Level of awareness of the importance of personal protection among farmers using pesticide
Pesticide	Chemical substance use for preventing, destroying, repelling, or mitigating any pest.

DEDICATION

I dedicate this thesis to my Husband, and my two sons Collins, and Jason. To all my family & friends with a special mention of my Sister Elizabeth and Bernard, for the symbol of love and giving, as well as the encouragement & support offered to me. I also would like to dedicate this project to Dr & Mrs. Peterson Warutere of Kenyatta University, both of whom has been wonderful supporters of my master's degree up until my research was completed.

ACKNOWLEDGEMENTS

I am extremely privileged and appreciative to my supervisors, Dr. Lister Onsongo and Elizabeth Ambani, for their invaluable leadership and contributions to this thesis. I will be eternally grateful to you for your assistance and insightful suggestions. To Dr. Lister Onsongo, I do not know where I would be right now if it were not for your tremendous assistance and guidance throughout this voyage. You are a genuinely remarkable individual, and I thank you from the depths of my heart.

To Cyrus, I do not know where I would be without your tremendous assistance in correcting my numerous errors. You are a patient individual and an effective educator. Thank you.

Not least of all, I owe so much to my entire family for their unwavering support and belief in my ability to accomplish so much.

Thank you to everyone.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Cancer is the second leading cause of death worldwide with an average of nine million deaths per year. Available studies have shown a rise in cancer cases from exposure to environmental agents such as pesticides and fertilizers. Despite multiple studies on cancer, empirical evidence on the role of personal protection against exposure to pesticides is lacking especially in the local context. To provide local evidence of personal protection among famers this study sought to establish determinants of cancer preventative behaviors among rural farmers in Laikipia County, Kenya. The objectives of the study were to assess the personal protection practices among farmers, establish demographic characteristics associated with and personal protection practices, determine the association between knowledge and personal protection practices and establish the association between attitude and personal protection practices. A descriptive analytical cross-sectional survey was used in this study. The study targeted small-scale farmers. A sample of 196 farmers was selected using Slovins' formula. The study employed simple random sampling to choose participants. The data was collected using a structured questionnaire that was administered by the researcher. The study instruments were pretested in Isiolo County, Kenya, for a preliminary evaluation. Data was analyzed using descriptive statistics such as frequencies and percentages. Chi-square tests were also carried out to determine the association between the variables. Logistic regression was also carried out to establish determinants of cancer preventative behaviors. Statistical Package for the Social Sciences version 28 was used for analysis. The results showed that majority of the respondents 88.3% (n=173) had poor personal protection practices. Slightly above half 67.3% (n=132) of the respondents were knowledgeable on personal protection. In addition, majority of the respondents 75% (n=147) had a negative attitude towards personal protection. Chi-square analysis showed that age (p<0.01), level of education (p<0.01), land size (p<0.01) and crops grown (p<0.01) were statistically significant. Age (p < 0.001), level of education (p < 0.001), land size (p < 0.001) and attitude (p < 0.001) were predictors in the regression analysis. The study concluded that personal protection practices among farmers using pesticide are poor. Personal protection practices associated with demographic characteristics, knowledge and attitude. The researcher recommended that the county government of Laikipia ought to provide farmers with access to personal protective equipment. In addition, there is a need for targeted education and awareness campaigns to improve knowledge of personal protection practices among farmers.

CHAPTER ONE

INTRODUCTION

1.1 Background

Cancer is the second greatest cause of death in the world after cardiovascular disease, and the third most common cause of mortality worldwide. (Wild, 2019). According to the World Health Organization (WHO) cancer leads as the second top cause of death worldwide with an average of 9 million deaths per year. In 2020, 10 million cancer deaths occurred globally, 550,000 in sub-Saharan Africa and 22,000 in Kenya (WHO, 2021). After infectious and cardiovascular diseases, cancer ranks third in causes of mortality in Kenya. The annual incidence and mortality is 47,000 and 33,000 respectively (Union for International Cancer Control (UICC), 2019).

Risk factors of cancer are broadly classified into lifestyle factors, family history, genetic disorders, viruses, and environmental exposures (Holick, 2020). Lifestyle factors such as poor diet, smoking, lack of using PPE during pesticide application and alcohol use as well as lack of exercises are known modifiable risk factors which have attributed to the prevalence of cancer today (Sabarwal et al. 2018). Available studies also show a rise in cancer cases from exposure to environmental agents such as pesticides and fertilizers. Concerns about pesticides being a carcinogen have been widespread among researchers and this hypothesis has been confirmed in animal studies. The mechanism by which pesticides cause cancer are unclear but researchers suspect that elements in pesticides are involved in DNA mutations which lead to cancerous cells (Melanda et al., 2022).

Due to the economic and social costs associated with cancer, institutions and authors have called for more research into prevention of cancer (Tazval et al., 2016). Bases for

recommendations from global health bodies such as WHO and CDC, pesticides have warnings of the risk of the chemicals to human health. The labels recommend wearing of personal protective equipment (PPE) during application of pesticides in agricultural settings (Holick et al., 2020). Preventing exposure to pesticides is considered as a priority in cancer prevention among those working in the agricultural sector, uptake of PPE should be one of the focuses for cancer prevention (Babazadeh et al., 2017). However, despite multiple studies on cancer, empirical evidence on the role of personal protection against exposure to pesticides is lacking especially in the local context.

A study on determinants of personal protection during pesticide application among patients diagnosed with cancer is important for oncology nurses. An oncology nurse cares for and educates patients who have cancer including prevention and early detection (Von Ah, 2019). One of the responsibilities of an oncology nurse is to provide patient education and using results and recommendations made by the current study, the oncology nurse will be in a better position to provide relevant and up to date health education regarding cancer and the role of personal protection. A lot of studies have been conducted on personal protection among farmers. However, majority of these studies have been conducted in developed countries (Damalas et al., 2019; Mubushar et al., 2019; Yuantari et al., 2015), studies conducted in Sub-Saharan Africa, Kenya – Laikipia County in particular are scarce. Therefore, the purpose of this study was to explore the factors associated with cancer preventative behaviors among farmers in Laikipia County, Kenya.

1.2 Problem Statement

Anecdotal evidence from Nanyuki Teaching and Referral Hospital (NTRH) in Laikipia County indicates that there is an increased projection in cancer related cases among patients with the year 2017 reporting 155 cases, 2018 reporting 276 cases, and 308 cases reported in

2019 (NTRH, 2023). The reasons for this rise are unclear. However, Epidemiological studies such as Melanda et al. (2022) and VoPham et al. (2017) have found link between cancer and exposure to pesticides. This could be either by long exposure periods, lack of awareness, and improper or lack of use of protective wear while handling the chemicals. Because majority of the patients are employees or owners of commercial farms in the county where pesticides are largely used, there is a possibility that the rise in cancer cases is due to the use of the pesticides and lack of personal protection.

Various studies have been conducted on personal protection among farmers and found poor personal protection. However, these studies such as Damalas et al. (2019) and Sapbamrer and Thammachai (2020) were conducted outside Kenya and the results may not be wholly applicable to the Kenyan populace due to environment, cultural and genetic differences. Therefore, to provide local evidence of personal protection among famers this study sought to establish determinants of cancer preventative behaviors among rural farmers in Laikipia County, Kenya.

1.3 Research Questions

i.) What are the personal protection practices of farmers in Laikipia County, Kenya?

ii.) What demographic characteristics are associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya?

iii.) What is the association between knowledge and personal protection practices among farmers using pesticide in Laikipia County, Kenya?

iv.) What is the association between attitude and personal protection practices among farmers using pesticide in Laikipia County, Kenya?

1.4 Research Objectives

The study was guided by the following objectives:

1.4.1 Broad Objective

To establish determinants of cancer preventative behaviors among farmers using pesticide in Laikipia County, Kenya.

1.4.2 Specific Objectives

i.) To assess the personal protection practices among farmers using pesticide in Laikipia County, Kenya.

ii.) To establish demographic characteristics associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya.

iii.) To evaluate the association between knowledge and personal protection practices among farmers using pesticide in Laikipia County, Kenya.

iv.) To establish the association between attitude and personal protection practices among farmers using pesticide in Laikipia County, Kenya.

1.5 Significance of the Study

The findings of this study have important implications for cancer research as the findings will add to the otherwise limited literature on use of personal protection in preventing cancer. The findings of the study will be beneficial to the general public in Laikipia especially those concerned with farming and use pesticides in learning how they can control exposure to themselves. Persons involved in agriculture will benefit by realizing the rise in cancer cases and the role of personal protection in preventing it. Policy makers in cancer control may use the findings to develop new policies that would minimize or entirely eliminate pesticide

exposure to the affected population. Authorities may therefore compel agricultural firms to provide personal protective equipment to all farm workers to prevent cancer. The Ministry of health may also use the findings of this study to initiate a health education campaign on the need of personal protection among famers across the country. In addition, the study findings will form a base for future studies and may be used as reference material by researchers seeking to advance knowledge on cancer and more so personal protection.

1.6 Conceptual Framework

Demographic characteristics, knowledge, attitude are the independent variables while personal protection practices is the dependent variable. The researcher hypothesizes that personal protection practices are associated with lack of personal protection during pesticide application. Poor use of PPE maybe associated with demographic characteristics, low knowledge, negative attitudes or poor practice. Demographic characteristics in this study include gender of the respondents, their age as well as the highest academic achievement. It also involves the socio-economic status of respondents.

To measure knowledge on personal protection, the researcher asked respondents questions to evaluate their knowledge on meaning of personal protection, importance of personal protection, personal protection methods and importance of personal protection in preventing cancer. Higher scores indicated higher knowledge. Similarly, to establish attitudes, the researcher will evaluate respondents' beliefs about personal protection, perceived importance of personal protection, perceived susceptibility towards cancer from pesticides and self-efficacy regarding personal protection. Higher scores indicated negative attitude. To determine, cancer preventative behaviors, the researcher evaluated the use personal protection among respondents, type of personal protection used, adherence to pesticide guidelines

regarding personal Protection and adherence to practices on personal protection. Higher scores indicated good cancer preventative behaviors.

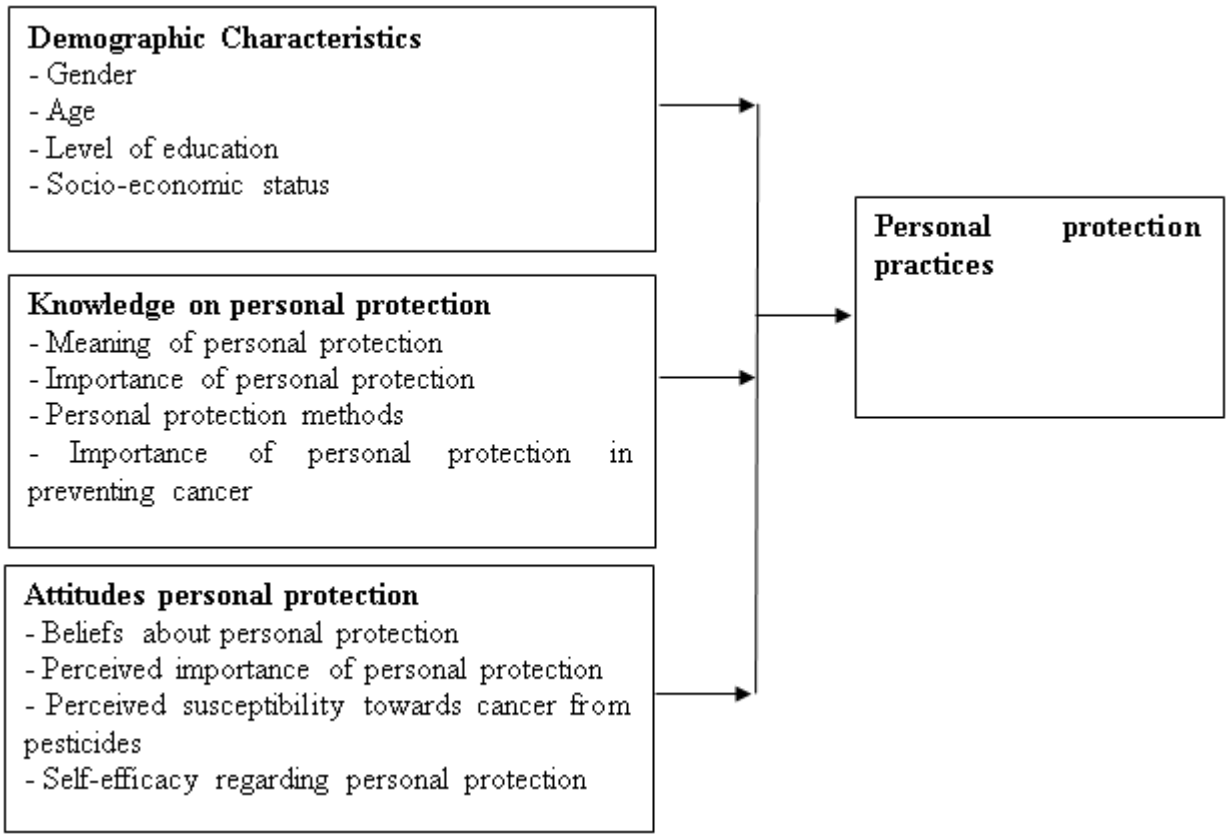


Figure 0.1 Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature related to determinants of cancer preventative behaviours among rural farmers. Literature review involved a synthesis of available studies on level of knowledge on personal protection among rural farmers, attitude towards personal protection among rural farmers and personal protection practices among rural farmers. The summary of reviewed literature and emerging research gaps is also provided.

2.2 Level of Knowledge on Personal Protection among Rural Farmers

Farmers' awareness of pesticide safety and biosafety was assessed by Mubushar et al. (2019) in a in Pakistan in order to keep farmers healthy through targeted extension programmes. Findings indicated that farmers in the study relied on advice from their neighbors, who lack a basic understanding of biosafety because of the low level of literacy in the study area. Various factors, such as level of education, ownership of land and total land area, have a major impact on farmers' awareness of safe pesticide use. The point of departure is that this study was carried out in Pakistan where the types of crops and pesticides used differ greatly to Kenya.

Farmers in Kuwait were tested for their knowledge, attitudes, and behaviours regarding pesticide safety by Jallow et al. (2017). Farmer's health and the environment were seen to be at risk by a large majority of those polled. Pesticide safety information is lacking among farmers, though. However, this study relied solely on self-report data. The current study used both self-report and observational data to generate more robust findings. Vegetable producers

in Nepal were surveyed by Rijal et al. (2018) to determine their awareness of pesticide safety and pest management strategies. Most producers were well-informed of pesticides' harmful impact on human and environmental health. For pesticide-related technical advice, most producers turn to the small, locally owned pesticide dealers. The gap here is that only vegetable farmers were included. The current study included famers of various crops.

Negatu et al. (2016) surveyed Ethiopian farmers and farm labourers on their pesticide knowledge, attitudes, and practices. Except for a few farm employees who were applicators and largely hired by the LSGH, virtually few farmers and farm labourers questioned had received pesticide-related training. Non-chemical pest management strategies were only known by a tiny percentage of farmers and agricultural employees that participated in the research. However, this study relied solely on self-report data. The current study used both self-report and observational data to generate more robust findings. Pesticide use methods, knowledge, and the health impacts of pesticides were studied in randomly chosen horticultural farmers in Meru by Marete et al. (2021). The majority of farmers were familiar with proper pesticide handling techniques, such as reading package instructions and donning protective gear. However, personal protection practices were not assessed in this study necessitating the need for the current study.

2.3 Attitude towards Personal Protection among Rural Farmers

In a study carried out among farmers in Iran, Damalas et al. (2019) evaluated variables that influence farmers' perceptions of personal safety and safe conduct when using PPE for pesticide spraying. More over half of the farmers polled said pesticide spraying posed no risk to workers' health and safety. Increased personal safety concerns were found among young farmers with high educational levels and extensive farmland areas who had access to the internet, a seminar on pesticide usage and PPE, and an awareness of pesticide toxicity. The

point of departure is that this study was carried out in Iran where the types of crops and pesticides used differ greatly to Kenya.

Melon growers in Central Java were studied by Yuantari et al. (2015) for their pesticide awareness and perceptions of. No correlation was discovered between the necessary practices', awareness and perceptions and the actual usage of PPE. Farmers' attitudes regarding pesticide usage in the fields were studied by Moradhaseli et al. (2017), who discovered that 26% of maize farmers had a negative attitude toward pesticide use, while 64.6 percent had an average attitude, and 8.7 percent had a favorable attitude toward pesticide use in the fields. The gap here is that the association between attitude and practice was not tested.

Iranian farmers' attitudes, knowledge, and practices about pesticide usage were examined in a research undertaken by Rostami et al. (2019). Personal protection equipment (PPE) was widely seen as a need by farmers. 37.5 percent of those surveyed said they had difficulty using personal protection equipment. The farmers' usage of personal protection equipment was connected with their knowledge and attitude about the equipment. The point of departure is that this study was carried out in Iran where the types of crops and pesticides used differ greatly to Kenya.

2.4 Personal Protection Practices among Rural Farmers

Regarding pesticide safety measures, the usage of PPE in agricultural pesticide handlers throughout the world has been studied by Sapbamrerand Thammachai (2020). Many studies have shown that pesticide handlers across the world often wear a shirt, pants and caps as their primary PPE. An apron, goggles, gloves, boots, and a mask were the most basic PPE. Farmers wore far more PPE than agricultural laborer. This was a systematic review of many studies from many countries. The current study presented empirical evidence for Kenya.

Using a questionnaire, Damalas et al. (2019) investigated the factors that influence farmers' perceptions of the significance of personal safety and safe behaviour when using PPE in pesticide spraying. Using long-sleeved shirts, long pants, chemical-resistant gloves, socks, and shoes as PPE is risky for most farmers. However, this study relied solely on self-report data. The current study used both self-report and observational data to generate more robust findings. Researchers Moradhaseli et al. (2017) in Iran found that when spraying pesticides, the vast majority of people failed to properly wear their protective gear. Pesticide safety behaviour, employment experience, income level, and attitudes toward correct pesticide application all had a favourable link. The point of departure is that this study was carried out in Iran where the types of crops and pesticides used differ greatly to Kenya.

Melon growers in Central Java were studied in Indonesia by Yuantari et al. (2015), who surveyed their knowledge and attitudes towards pesticide use. On the ground, just 3.8 percent of the people were wearing glasses, and just 1.9 percent were wearing boots. It was merely a piece of their shirt knotted over their lips that served as the masks. Wearing long pants or shirts with sleeves was not a necessity for farmers; they also didn't wash their clothes after wearing them for more than one day at a time. Almost no farmers utilized conventional, comprehensive, and in good condition personal safety equipment. However, the association of knowledge and practice was not tested in this study.

Farmers in Kuwait were tested for their knowledge, attitudes, and behaviors regarding pesticide safety by Jallow et al. (2017). Pesticide label instructions were not read or followed by more than 70% of farmers, and 58 percent of those who handled pesticides did not wear any PPE. Twenty percent of farmers reported storing insecticides in their homes. Respondents buried, incinerated, or abandoned empty pesticide containers on the farm, or reused them, as risky disposal strategies for pesticide waste. Another common method of

disposing of pesticide residue is by dumping it into a farm's drainage system or sewer, according to farmers. More over eight out of ten farmers (82 percent) reported experiencing some form of acute pesticide poisoning. Similarly, the association between knowledge and practice was not tested in this study.

According to Bagheri et al. (2018), a survey of Iranian apple growers found that most of their pesticide treatments were safe. Aside from goggles and coveralls, most farmers wore pants and long-sleeve blouses/shirts when spraying crops. PPE use and safety behaviour were significantly impacted by age and agricultural experience, with older and more experienced farmers not adhering to safety guidelines. Education, information about pesticides, and farming as a primary occupation, on the other hand, encouraged safe conduct. The point of departure is that this study was carried out in Iran where the types of crops and pesticides used differ greatly to Kenya.

In a study by Adesuyi et al. (2018), Nigerian vegetable farmers' knowledge, techniques, and exposure to pesticides were analyzed. More than 67% of farmers said they use PPE when handling, preparing, and spraying pesticides. A mere 11% of those who said they used PPE really did so in accordance with the manufacturer's recommendations. Quite a few people who took the survey said they didn't use respirators, nasal masks, coveralls, or even glasses or goggles when they were working. Protective gloves, helmets, and booths were the most often worn PPE. However, only vegetable famers were included in this study. To fill this gap, the current study included farmers of various crops.

Awareness of pesticides among farmers as well as their perceptions on safety in Ethiopia was the subject of Negatu et al. (2016) study. Pesticide applicators and re-entry employees were the only ones who reported using all of their PPE. SSIF applicators wore just headgear and handkerchiefs, leaving their face, hands, palms, and fingers exposed to the hazardous

chemicals. Eye goggles and respirators aren't commonly worn by pesticide applicators who wear PPE. In a research by Marete et al. (2021), horticultural farmers in Meru, Kenya, were randomly chosen and exposed to pesticides through occupational exposure. When spraying pesticides, many farmers did so without wearing the necessary safety clothes. However, factors associated with practices were not tested in this study creating a knowledge gap.

A research conducted by Soko (2020) aimed to identify the principal crops farmed in Kenya, the pests that damage them, and the agricultural chemicals that are used to manage them. Insecticides and rodenticides were the most commonly utilized agricultural pesticides among responders. Artificial pesticides were found to be both more effective and more popular than pesticides manufactured at home, according to the findings of this study. However, the personal protection practices of the famers in this study were not studied. To fill this gap, the study sought to establish determinants of cancer preventative behaviors among farmers using pesticide in Laikipia County, Kenya.

2.5 Summary and Research Gaps

A lot of studies evaluating knowledge of personal protection among rural framers suggest that farmers have low knowledge. Studies showed that farmers are not trained on personal protection or reducing exposure to pesticides. In addition, majority of farmers not know that exposure to pesticides can result to among others, cancer. Studies also showed that famers do not read the instructions on the labels of pesticides. Majority of reviewed studies such also showed a negative attitude towards the use of personal protection. Pesticide acceptability and usage trends in developing nations are influenced by perceptions of pesticide benefits and drawbacks. Overall, majority of studies showed a low utilization of personal protection when applying pesticides. Many studies such also showed that even among farmers who had good

knowledge and the right attitude towards personal protection, personal protection was carried out wrongly.

In conducting the literature review, the researcher noted that majority of studies conducted on use of personal protection among farmers were conducted by agricultural researchers, and studies focusing on personal protection among farmers from a public health perspective are scarce. The researcher noted with concern the lack of local studies on personal protection among farmers despite agriculture being the main economic activity in Kenya. The researcher came across very few studies conducted in Kenya. It was therefore important to carry out a study on determinants of cancer preventative behavior among rural farmers in Kenya to fill these gaps.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter contains the methodology that was used in the study. It includes the design, population, sampling, data collection and analysis methods and techniques. In addition, ethical considerations and limitations affecting the study are highlighted.

3.2 Study Design

This study employed an analytical cross-sectional design to establish determinants of cancer preventative behaviors among farmers in Laikipia County, Kenya. An analytical cross-sectional study is “a type of quantitative, non-experimental research design”. These studies seek to "gather data from a group of subjects at only one point in time" (Schmidt & Brown, 2019, p. 206). For comparison, these studies collect data on the prevalence of both an exposure and a health result. The health-related event in this study is the personal protection practices. This design was preferred because it is simple and inexpensive and multiple variables and outcomes can be researched and compared at once.

3.3 Study Setting

This study was carried out in Laikipia County which is located in the central part of Kenya. Laikipia County is selected for the study because of the presence of both large and small-scale farming of both subsistence and horticultural farming. Proximity of the county to the researcher was also a preference factor because of cost implication. The farmers in this county pesticides to guard against various pests and diseases as well as for weeding in order to maximize their output. This makes Laikipia County an ideal study site to cancer

preventative behaviors among farmers. There are 386 small-scale farms covering 27.21% of the total land area. Horticultural crops that are grown in the include a wide variety of fruits and vegetables such as: tomatoes, potatoes, cabbages, watermelons, kales, spinach, courgetti, butter nuts, capers, onions, carrots, chilis, and snow peas, among other things (County government of Laikipia, 2021).

3.4 Study Population and Sample

The study population comprised small-scale farmers in Laikipia county. This included famers doing farming in at least five acres of land. The estimated number of small-scale farmers in the county was estimated at 386 (County government of Laikipia, 2021).

3.5 Sampling Procedures

3.5.1 Sample Size Determination

Slovin's formula was used to calculate the sample size

$n = N / (1 + N e^2)$

where "n" represents the sample size, "N" represents the population while e is the margin of error

Therefore, in a population of 386 famers,

$n=386/(1+386*0.05^2) =196.43$

The study therefore used a sample of 196 small-scale farmers in Laikipia county.

3.5.2 Sampling Procedures

Simple random sampling was used to recruit respondents in the study. A list of all small-scale farms was obtained from the county government of Laikipia. Using the random function of Microsoft Excel, 196 numbers from the list of 386 was randomly drawn.

3.5.3 Inclusion and Exclusion Criteria

Farmers aged 18 years and above willing to take part in the study were included in the study. A small-scale farmer was categorized as farming done on less than 5 acres. These farmers grow a wide range of crops including food crops such as tomatoes, maize, potatoes and wheat. Casual laborers and farm managers were not included in the study. These persons were excluded because they were not in charge of the choice of pesticides and personal protection.

3.6 Study Variables

Independent variables in this study included demographic characteristics, knowledge of personal protection and attitude towards personal protection**.** The dependent variable was personal protection practices.

3.7 Data Collection Method

The study used a structured researcher administered questionnaire and an observation checklist to collect data. The questionnaire was used to collect data on demographic characteristics, knowledge and attitude towards personal protection. Using an observation checklist, the researcher observed personal protection practices.

3.7.1 Instruments (Reliability and Validity)

To establish the reliability of the instruments in this study, data collected in the pre-test phase was analyzed using Cronbach alpha was employed to check internal consistency. The study used a coefficient of 0.7 whereby items coring 0.7 and above was accepted while those scoring 0.69 and below were rephrased or removed. A coefficient of 0.75 was obtained in the pre-test indicating the instruments were reliable. To establish validity, the instruments were developed in accordance with the indicators identified in the conceptual framework. In addition, the instruments were reviewed by the researcher's supervisors who provided expert judgment as to whether the instruments would yield valid results.

3.7.2 Pre-Testing

A pre-test was conducted prior to the collection of data. The purpose of the pre-test was to ascertain the feasibility of the study instruments. The pre-test was carried out in Isiolo County which borders Laikipia County to the north. A total of 20 small-scale farmers in Isiolo county which is 10% of the main sample was used.

3.7.3 Data Collection Process

On getting approvals to collect data, the researcher proceeded to the sampled farms to interview the farmers. The researcher hired and trained 5 research assistants to assist her in data collection. The research assistants aided the researcher in seeking consent, administering the questionnaire and data entry. The researcher liaised with agricultural extension officers from the county government of Laikipia who helped her identifying small scale farms. Data collection took one month.

3.7.4 Data Management

Data collected was cleaned, sorted, coded and entered into a computer using SPSS version 25 for windows. The data was only accessible to the researcher and her supervisor.

3.7.5 Data Analysis

Descriptive and chi-square analysis were used to analyze quantitative data. Descriptive analysis included frequencies, percentages, mean and standard deviation. Chi-square analysis was used to test the association between variables such as the association between demographic characteristics and personal protection practices, knowledge and personal protection practices as well as attitude and personal protection practices. All tests were conducted using Statistical Package for the Social Sciences (SPSS) version 28 for Windows at 95% confidence interval.

3.8 Ethical Considerations

The researcher obtained Permission from KU graduate school. Ethical approval was obtained from Kenyatta University Ethics Review (PKU/2590/11716). National Commission of Science, Technology, and Innovation (NACOSTI) issued a research permit. The County government of Laikipia granted permission for data collection. The study was conducted on a voluntary basis, with only consenting participants recruited. In addition, respondents were required to sign informed consent prior to taking part in the study. Anonymity of parctipants was ensured whereby special codes not linked to the respondents were used. The results of the study are meant for academic purposes.

3.9 Limitations

The study was limited to farmers using pesticide in Laikipia County, Kenya. Agricultural officers and health officers were not included in the study. Small scale farmers will acreage less than 5 acres were also not included.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the results on determinants of cancer preventative behaviours among farmers using pesticide in Laikipia County, Kenya. Included are the results on personal protection practices, socio-demographic characteristics and personal protection practices, association of knowledge and personal protection practices and attitude towards personal protection. Results are in the form of descriptive, chi-square and regression statistics presented in tables. A total of 196 parctipants took part in the study representing a maximum (100%) response rate.

4.2 Participants' Personal Protection Practices

The study sought to assess the personal protection practices among farmers using pesticide in Laikipia County, Kenya. Respondents were asked to indicate their frequency of using nose and mouth masks, face masks, goggles, aprons, gloves, long-sleeved shirts, long pants, and helmets. The results show that 37.8% (*n*= 74) frequently used nose and mouth masks while 28.1% (*n*=55) and an equal number 28.1% (*n*=55) used them sometimes and rarely respectively. For face masks, 30.6% (*n*=60) of the respondents indicated that they used them frequently, while 35.7% (*n*=70) used them sometimes. With regards to goggles, 19.4% (*n*=38) of the respondents always used them while applying pesticides, while 29.1% (*n*=57) rarely used them. The results show that 41.8% (*n*=82) of the respondents used aprons frequently while 20.4% (*n*=40) always used them while applying pesticides. For gloves, 42.9% (*n*=84) of the respondents used them frequently and 4.6% (*n*=9) always. Slightly 50.5% *(n*=99) frequently used long sleeved shirts while for long pants, 36.2% (*n*=71) used

them frequently and 23.5% (*n*=46) always used them always. Finally, for helmets, 65.8% (*n*=129) of the respondents never used them.

Table 0.1 Personal Protection Practices

	Always	Frequently	Sometimes	Rarely	Never
Nose and mouth mask	6.1%	37.8%	28.1%	28.1%	0.0%
Face mask	0.0%	30.6%	35.7%	27%	6.6%
Goggles	19.4%	13.8%	20.9%	29.1%	16.8%
Apron	20.4%	41.8%	26.5%	0.0%	11.2%
Gloves	4.6%	42.9%	31.6%	4.6%	16.3%
Long-sleeved shirts	13.8%	50.5%	16.8%	6.1%	12.8%
Long pants	23.5%	36.2%	23%	4.6%	12.8%
Helmet	0.0%	0.0%	10.7%	23.5%	65.8%

Respondents were observed whether they were wearing several personal protection equipment. Results in table 4.3 show that 49.5% (*n*=97) wore a nose and mouth mask, 36.2% (*n*=71) wore a face mask, 53.1% (*n*=104) wore goggles, 65.8% (n=129) wore an apron, 63.8% (*n*=125) wore gloves, 67.3% (*n*=132) wore long-sleeved shirts, and 82.7% (*n*=162) wore long pants. However, none of the respondents wore a helmet.

Table 0.2 Observation Results

	Yes	No
Nose and mouth mask	49.5%	50.5%
Face mask	36.2%	63.8%
Goggles	53.1%	46.9%
Apron	65.8%	34.2%
Gloves	63.8%	36.2%
Long-sleeved shirts	67.3%	32.7%
Long pants	82.7%	17.3%

Helmet	0.0%	100.0%

Respondents who were observed using 5 of the 8 items were deemed to have good practice. As shown in figure 4.1, majority of the respondents 88.3% (*n*=173) had poor personal protection practices.

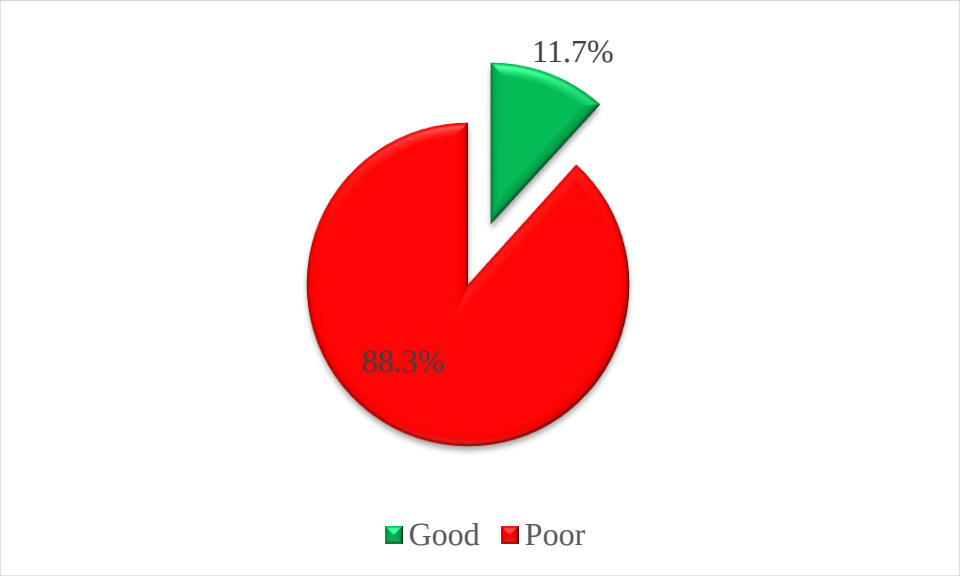


Figure 0.1 Personal Protection Practices

4.2.1 Barriers to Using Protective Wear

Respondents were also asked to indicate the reasons why they did not use the protective wear listed. For nose and mouth masks, 83.7% (*n*=164) of the respondents indicated that they found them uncomfortable, while 10.7% *(n*=21) indicated no reason for not using them. For face masks, 60.2% (*n*=118) of the respondents indicated heat stress for not using them, while 32.7% (*n*=64) found them uncomfortable. For goggles, the biggest reason for not using them was that they were costly, with 43.9% (*n*=86) of the respondents indicating so. For aprons, 41.3% (*n*=81) of the respondents had no reason for not using them. For gloves, the biggest reason for not using them was that they caused heat stress, with 40.3% (*n*=79) of the respondents indicating so. For long-sleeved shirts, the biggest reason for not using them was

that they were uncomfortable, with 34.2% (*n*=67) of the respondents indicating so. For long pants, the biggest reason for not using them was that they were uncomfortable, with 57.1% (*n*=112) of the respondents indicating so. Finally, for helmets, the biggest reason for not using them was that they were costly, with 39.8% (*n*=78) of the respondents indicating so.

Table 0.3 Barriers to Using Protective Wear

	Costly	Uncomfortable	Heat stress	No reason
Nose and mouth mask	0.0%	83.7%	5.6%	10.7%
Face mask	0.0%	32.7%	60.2%	7.1%
Goggles	43.9%	28.1%	9.2%	18.9%
Apron	0.0%	27.0%	31.6%	41.3%
Gloves	5.6%	23.0%	40.3%	31.1%
Long-sleeved shirts	13.3%	34.2%	25.5%	27.0%
Long pants	0.0%	57.1%	23.0%	19.9%
Helmet	39.8%	21.4%	14.3%	24.5%

4.2.2 Mixing and Spraying During Windy Conditions

Regarding avoiding mixing and spraying during windy conditions, the majority of respondents reported that they rarely avoid it 58.7% (*n*=115), while 28.6% (*n*=56) indicated that they always avoid it. About 12.8% (*n*=25) of respondents reported that they never avoid mixing and spraying during windy conditions.

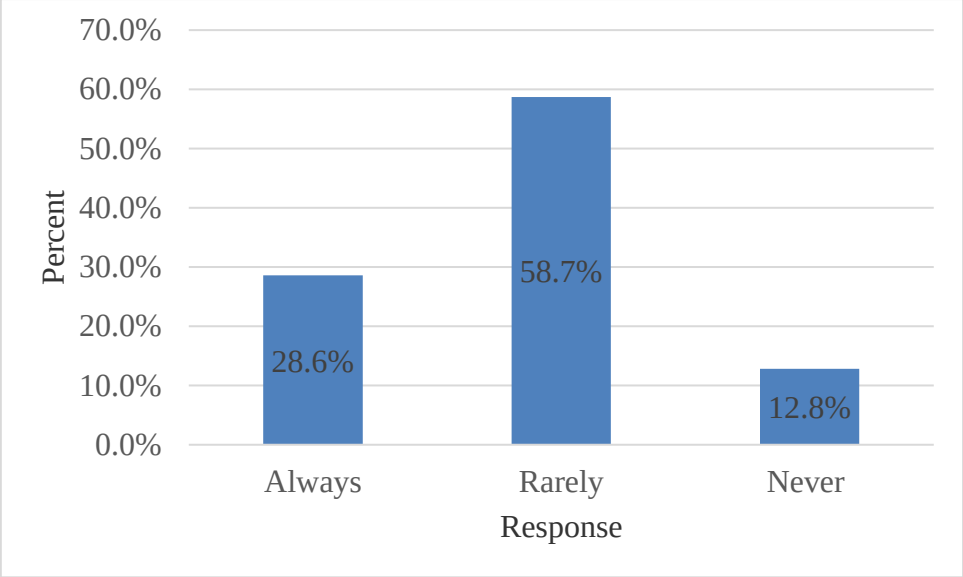


Figure 0.2 Mixing and Spraying During Windy Conditions

Regarding reasons for spraying during windy conditions, the highest proportion of respondents 40.6% (*n*=76) indicated that they had no reason for spraying when it is windy. 36.9% (*n*=69) reported that it is always windy in their area, while 22.5% (*n*=42) indicated that they find it uncomfortable working under the sun when it's calm. Nine respondents did not provide a valid response.

Table 0.4 Reasons for Spraying on Windy Seasons

	Frequency	Percent	Valid Percent
It is always windy in the area	69	35.2	36.9
It is uncomfortable working under the sun when it's calm	42	21.4	22.5
I have no reason for spraying when it is windy	76	38.8	40.6
Total	187	95.4	100.0

4.2.3 Washing Hands After Mixing

According to the survey results, 89.3% (*n*=175) of respondents reported that they always wash their hands after mixing, while 4.6% (*n*=9) reported that they rarely do, and 6.1% (*n*=12) reported that they never do.

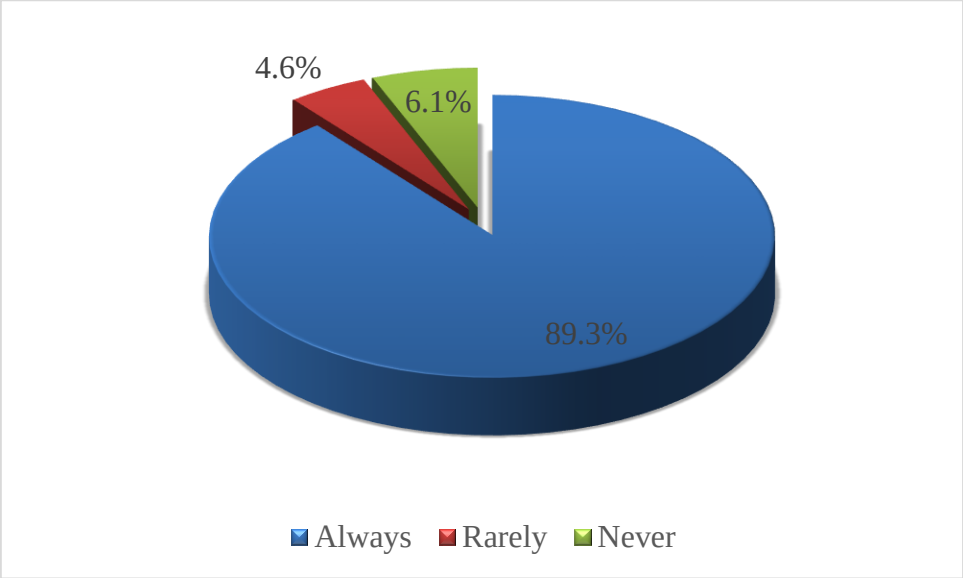


Figure 0.3 Frequency of Washing Hands After Mixing

Among the respondents who indicated reasons for not washing their hands after mixing, 10.7% (*n*=21) said there was not enough water, while 48% (*n*=94) had no reason for not washing their hands.

Table 0.5 Reasons for Not Washing Hands

		Frequency	Percent	Valid Percent
	There is not enough water	21	10.7	18.3
	No reason	94	48.0	81.7
	Total	115	58.7	100.0
Missing	System	81	41.3	
Total		196	100.0	

4.2.4 Smoking Cigarettes While Applying Pesticides

According to the survey results, 73.8% (*n*=138) of respondents never smoke cigarettes while applying pesticides to their crops. 13.9% (*n*=26) of respondents rarely smoke cigarettes while applying pesticides, and 12.3% (*n*=23) of respondents always smoke cigarettes while applying pesticides.

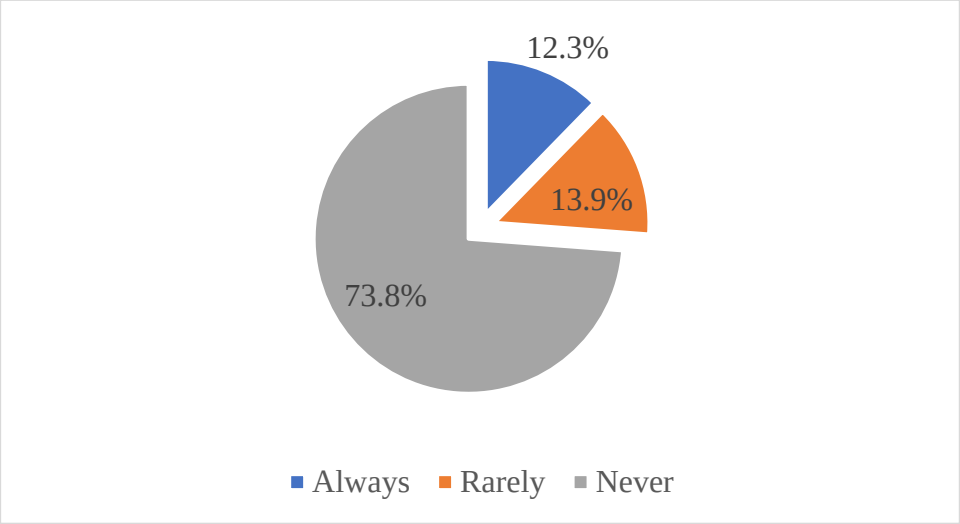


Figure 0.4 Frequency of Smoking Cigarettes While Applying Pesticides

Among the respondents indicated that they smoke cigarettes while spraying pesticides, with 59.7% (*n*=117) stating that there is no reason for doing so and 7.1% (*n*=14) indicating that they get an urge to smoke while spraying.

Table 0.6 Reasons for Smoking Cigarettes While Applying Pesticides

		Frequency	Percent	Valid Percent
Valid	Gets urge to smoke while spraying	14	7.1	10.7
	No reason	117	59.7	89.3
	Total	131	66.8	100.0
Missing	System	65	33.2	
Total		196	100.0	

4.2.5 Eating or Drinking While Applying Pesticides

Slightly above half 55.1% (*n*=108) of respondents reported eating or drinking rarely while applying pesticides to their crops, while 44.9% (*n*=88) reported never doing so.

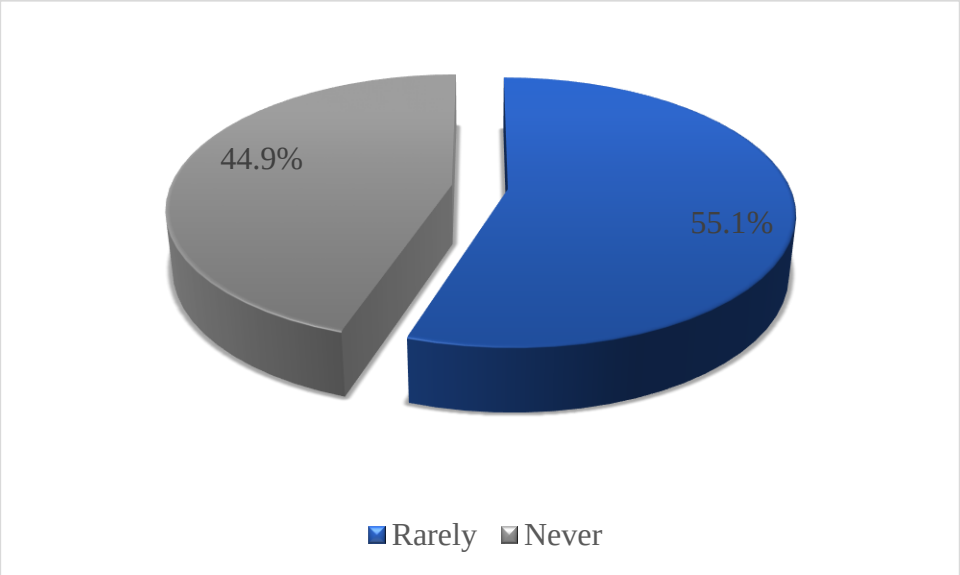


Figure 0.5 Frequency of Eating or Drinking While Applying Pesticides

Of those who did eat or drink, the most common reason was getting the urge to feed while spraying 19.3% *(n*=32) as shown in table 4.7.

Table 0.7 Reasons for Eating or Drinking While Applying Pesticides

		Frequency	Percent	Valid Percent
Valid	Gets urge to feed while spraying	32	16.3	19.3
	No reason	134	68.4	80.7
	Total	166	84.7	100.0
Missing	System	30	15.3	
Total		196	100.0	

4.2 Socio-Demographic Characteristics and Personal Protection Practices

The study sought to establish demographic characteristics associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya. Table 4.8

shows the socio-demographic characteristics of respondents. A total of 196 small-scale farmers participated in the study, comprising an equal number of males 50% (*n*=98) and females 50% (*n*=98). The majority of respondents were aged between 21 and 30 years 55.6% (*n*=109), followed by those aged 31-40 years 21.9% (*n*=43). The most common level of education completed was secondary education 43.9% (*n*=86) followed by college 39.8% (*n*=78). Most of respondents were married 54.1% (*n*=106), with the rest being either single 41.3% (*n*=81) or divorced/separated 4.6% (*n*=9). Christianity was the dominant religion 83.7% (*n*=164), with the rest being either Muslim 11.7% (*n*=23) or from other religions 4.6% (*n*=9).

In terms of land size, the most common size used for farming was 11-20 acres 55.1%, (*n*=108), followed by 5-10 acres 28.1% (*n*=55). Regarding the main crops produced, tomatoes were the most common 27.6% (*n*=54), followed by onions (26.5%, *n*=52) and potatoes 21.4% (*n*=42). Overall, the study found that the participants were equally divided between male and female, with the majority being between 21 and 40 years old and having completed college or secondary education. The majority of respondents were married and identified as Christians. In terms of farming practices, the most common land size used was 11-20 acres, and the most common crops produced were tomatoes, onions, and potatoes.

Table 0.8 Socio-Demographic Characteristics of Respondents

Characteristic		N	%
Gender	Male	98	50.0%
	Female	98	50.0%
Age	<20	21	10.7%
	21-30	109	55.6%
	31-40	43	21.9%
	41-50	13	6.6%
	>51	10	5.1%
Education	Primary	32	16.3%
	Secondary	86	43.9%
	College	78	39.8%
Marital status?	Single	81	41.3%
	Married	106	54.1%
	Divorced/separated	9	4.6%
Religion	Christian	164	83.7%
	Muslim	23	11.7%
	Others	9	4.6%
Land size	5-10	55	28.1%
	11-20	108	55.1%
	21-30	33	16.8%
Crops produced	Potatoes	42	21.4%
	Wheat	22	11.2%
	Tomatoes	54	27.6%
	Onions	52	26.5%
	Carrots	26	13.3%

To establish demographic characteristics associated with personal protection practices among farmers using pesticide in Laikipia County, Kenya, chi-square tests were conducted. Gender was not statistically significant ($\chi2 = 0.443$, df=1, p=0.506). Age was statistically significant ($\chi2 = 196.0$, df=4, p=0.000). The age group <20 had the highest proportion of farmers who reported good personal protection practices, while the age group 41-50 had the highest proportion of farmers who reported poor personal protection practices.

Education was also statistically significant ($\chi2 = 133.5$, df=2, p=0.000). Farmers with primary education had the highest proportion of poor personal protection practices, while farmers with college education had the highest proportion of good personal protection practices. However, religion was not statistically significant ($\chi2 = 5.084$, df=2, p=0.079).

Land size was statistically significant ($\chi 2$ = 32.865, df=2, p=0.000). Farmers with land size between 5-10 acres had the highest proportion of poor personal protection practices, while farmers with land size between 11-20 acres had the highest proportion of good personal protection practices. Crops grown were statistically significant ($\chi 2$ = 48.043, df=4, *p*=0.000). Farmers who grew wheat or tomatoes had the highest proportion of poor personal protection practices, while farmers who grew potatoes or onions had the highest proportion of good personal protection practices

Table 0.9 Demographic Characteristics Associated with Personal Protection Practices

Demographic	Categories	Practice		Chi-square
		Good	Poor	
Gender	Male	88	10	$\chi 2$ =0.443, df=1, p=0.506
	Female	85	13	
Age	<20	21	0	$\chi 2$ =196.0, df=4, p=0.000
	21-30	109	0	
	31-40	43	0	
	41-50	0	13	
	>51	0	10	
Education	Primary	9	23	$\chi 2$ =133.5, df=2, p=0.000
	Secondary	86	0	
	College	78	0	
Religion	Christian	141	23	$\chi 2$ =5.084, df=2, p=0.079
	Muslim	23	0	
	Others	9	0	
Land size	5-10	42	13	$\chi 2$ =32.865, df=2, p=0.000
	11-20	108	0	
	21-30	23	10	
Crops grown	Potatoes	42	0	$\chi 2$ =48.043, df=4, p=0.000
	Wheat	12	10	
	Tomatoes	41	13	
	Onions	52	0	
	Carrots	26	0	

4.3 Knowledge and Personal Protection Practices

The sources of information on personal protective wear for applying pesticides include government agricultural extension workers 31.6% (*n*=62)), radio/TV stations 35.7% (*n*=70), internet 9.2% (*n*=18), and pamphlets attached to the pesticide containers (23.5% (*n*=46).

Table 0.10 Sources of Information on Personal Protective Wear

		Frequency	Percent
Valid	Government Agricultural extension workers	62	31.6
	Radio/TV stations	70	35.7
	Internet	18	9.2
	Pamphlets attached to the pesticides containers	46	23.5
	Total	196	100.0

The results show that the largest proportion of respondents 60.2% (*n*=118) agreed that pesticides cause cancer. Similarly, 45.9% (*n*=90) agreed that working in the farm exposes one to cancer, while 36.2% (*n*=71) did not know. In terms of protective clothing, a large majority 84.2% (*n*=165) agreed that wearing protective clothing while applying pesticides helps prevent cancer. Regarding the importance of reading first aid instructions on the pesticide label before use, 76% (*n*=149) of the respondents agreed that it is important. Finally, 60.7% (*n*=11) of the participants agreed that it is important to use personal protection during mixing and application of pesticides.

Table 0.11 Knowledge on Personal Protection Practices

	Strongly agree	Agree	Disagree	I don't know
Pesticides cause cancer	11.7%	60.2%	0.0%	28.1%
Working in the farm exposes one to cancer.	6.1%	45.9%	11.7%	36.2%
Wearing protective clothing while applying Pesticides help from causing cancer	0.0%	84.2%	4.6%	11.2%
It is important to read the first aid instructions on the label before using the pesticide	0.0%	76.0%	19.4%	4.6%
It is important to use personal protection during mixing and application of pesticides?	10.2%	60.7%	7.1%	21.9%

Items in table 4.11 were summed up. Respondents who scored 60% and above were deemed to knowledgeable. Slightly above half 67.3% (*n*=132) of the respondents were knowledgeable on personal protection as shown in figure 4.6.

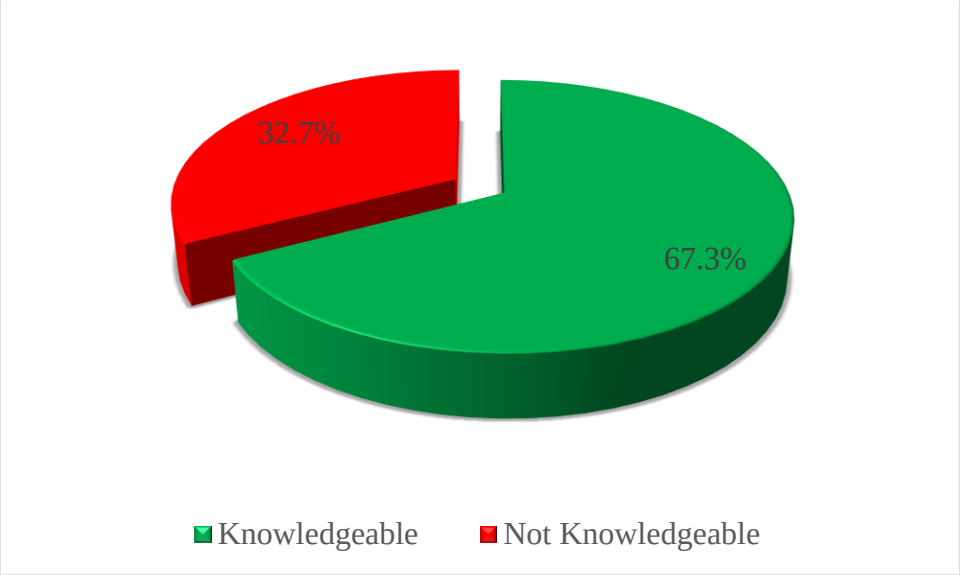


Figure 0.6 Knowledge on Personal Protection Practices

To determine the association between knowledge and personal protection practices, a chi-square test was conducted. Knowledge was statistically significant ($\chi 2$=6.751, df=1, *p*=0.009). The odds ratio for knowledge was 3.110, indicating that farmers with high knowledge were 3.1 times more likely to have good personal protection practices than those with low knowledge.

Table 0.12 Association Between Knowledge and Personal Protection Practices

		Practice		Chi-square
		Good	Poor	
Knowledge	Knowledgeable	122	10	$\chi 2$ =6.751, df=1, p=0.009
	Not knowledgeable	51	13	

4.4 Attitude towards Personal Protection

The largest percentage of respondents 87.2% (*n*=171) agreed that wearing gloves can reduce exposure to pesticides, with indicating agreement. Similarly, the majority agreed that wearing face masks 75.5% (*n*=148), glasses/goggles 61.2% (*n*=120), and overalls 65.3% (*n*=128) can

reduce exposure to pesticides. Slightly above half 52% (*n*=102) of the respondents agreed that pesticides can affect the environment.

Table 0.13 Attitude towards Personal Protection

	Disagree	Uncertain	Agree	Strongly agree
Wearing gloves can reduce exposure to pesticides	6.1%	6.6%	87.2%	0.0%
Wearing face masks can reduce exposure to pesticides	6.1%	18.4%	75.5%	0.0%
Wearing glasses/goggles can reduce exposure to pesticides	12.2%	26.5%	61.2%	0.0%
Wearing overall can reduce exposure to pesticides	6.1%	28.6%	65.3%	0.0%
Pesticides can affect the environment	12.2%	31.1%	52.0%	4.6%

Items in table 4.13 were summed up. Respondents who scored 60% and above of the final score were deemed to have a positive attitude while the rest were classified as having a negative attitude. As shown in figure 4.7, majority of the respondents 75% (*n*=147) had a negative attitude towards personal protection

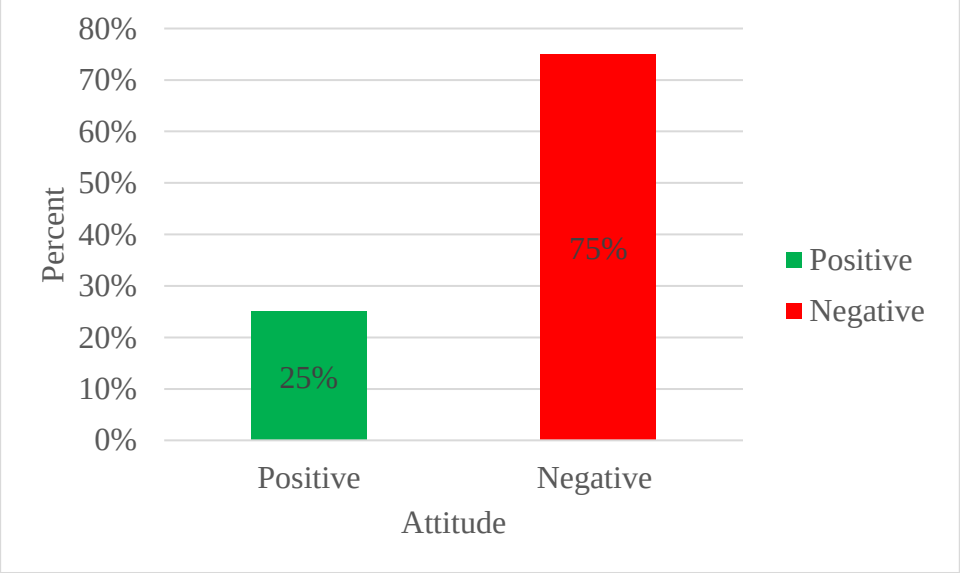


Figure 0.7 Attitude towards Personal Protection

A chi-square test was carried out between attitude and personal protection practices among farmers using pesticide. Attitude was statistically significant ($\chi 2 = 13.809$, df=1, $p < .001$). The risk estimate analysis showed that the odds of having poor personal protection practices were 3.9 times higher (95% CI = 1.827 to 8.326) among farmers with a negative attitude compared to those with a positive attitude, among those with poor personal protection practices.

Table 0.14 Association of attitude and personal protection practices

		Practice		Chi-square
		Good	Poor	
Attitude	Positive	36	13	$\chi 2$ =13.809, df=1, p=0.000
	Negative	137	10	

4.5 Regression Analysis

To establish determinants of cancer preventative behaviors among farmers using pesticide in Laikipia County, Kenya, regression analysis was carried out. Variables which were significant in the chi-square analysis were used. The results are presented in this section. Table 4.15 shows the model summary. The R value in the table represents the correlation coefficient, which shows the strength and direction of the relationship between the independent variables and the dependent variable. In this case, the R value of .883 indicates a strong positive relationship between the independent variables and the personal protection practices. The R Square value (.780) indicates that 78% of the variation in the personal protection practices can be explained by the independent variables in the model. The Adjusted R Square (.773) adjusts the R Square value for the number of predictors in the model. The difference between R Square and Adjusted R Square is small, indicating that the model is not overfitting the data.

Table 0.15 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.883[a]	.780	.773	.154

The ANOVA table 4.16 shows that the regression model is statistically significant (F=111.944, p<0.001), meaning that the independent variables in the model are significantly associated with the dependent variable. The regression model accounts for a significant proportion of the variance in personal protection practices, as indicated by the R square value of 0.780, which suggests that approximately 78% of the variability in personal protection practices can be explained by the independent variables in the model.

Table 0.16 Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.843	6	2.640	111.944	.000[b]
	Residual	4.458	189	.024		
	Total	20.301	195			

Table 4.17 show the coefficients of each variable. The results demonstrate that age (p < 0.001), level of education (p < 0.001), land size (p < 0.001) and attitude (p < 0.001) were statistically significant. The beta values of the significant variables in the regression model were as follows: Age (B = 0.222, p < 0.001), Level of education (B = -0.130, p < 0.001),

Land size (B = 0.125, $p < 0.001$), and Attitude (B = -0.278, $p < 0.001$). The positive beta value for age indicates that older farmers were more likely to engage in cancer preventative behaviors using personal protective equipment. The negative beta value for level of education suggests that farmers with higher levels of education were less likely to engage in personal protection practices. The positive beta value for land size indicates that farmers with larger land sizes were more likely to use personal protective equipment. Lastly, the negative beta value for attitude suggests that farmers with a negative attitude towards personal protection practices were less likely to engage in cancer preventative behaviours.

Table 0.17 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.014	.084		12.065	.000
	Age	.222	.016	.651	13.770	.000
	Level of education	-.130	.025	-.288	-5.305	.000
	Land size	.125	.023	.257	5.436	.000
	Crops Produced	.020	.012	.082	1.599	.111
	Knowledge	.021	.023	.033	.909	.364
	Attitude	-.278	.038	-.374	-7.288	.000

4.6 Summary and Conclusion

The study sought to assess the personal protection practices among farmers using pesticide in Laikipia County, Kenya. Majority of the respondents 88.3% (n=173) had poor personal protection practices. The study sought to establish demographic characteristics associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya. Education level, land size and crops grown were statistically significant. The study sought to determine the association between knowledge and personal protection practices among farmers using pesticide in Laikipia County, Kenya. Slightly above half of the respondents were knowledgeable on personal protection. Chi-square test showed a that knowledge was statistically significant. The study also sought to establish the association between attitude and personal protection practices among farmers using pesticide in Laikipia County, Kenya. Majority of the respondents had a negative attitude towards personal protection. Attitude was statistically significant.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Personal Protection Practices

The study sought to assess the personal protection practices among farmers using pesticide in Laikipia County, Kenya. Majority of the respondents 88.3% (*n*=173) had poor personal protection practices. This finding demonstrates that few farmers who used pesticides also took the precaution of employing personal protective equipment. Similar findings were discovered in an Iranian research by Moradhaseli et al. (2017), who also showed that the vast majority of persons were unable to effectively employ protective gear while spraying pesticides. It is consistent with the findings of the Indonesian research conducted by Yuantari et al. (2015), who discovered that farmers in that country did not wear long trousers and shirts with long sleeves and reused their clothing for more than a single day before cleaning it. Few farmers were using comprehensive, standard, and well-functioning PPE. Damalas et al. (2019) conducted a similar research in Greece and found that the vast majority of farmers did not follow PPE guidelines when it came to wearing protective clothing. A large proportion of respondents in a different research by Adesuyi et al. (2018) said they never used protective gear such respirators/nose masks, coveralls, or eyewear. Researchers speculate that a combination of variables, including a lack of information and a negative attitude towards the necessity of personal protection, contribute to farmers' inadequate personal protection practises in this and comparable research.

5.1.2 Demographic Characteristics Associated with and Personal Protection Practices

The study sought to establish demographic characteristics associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya. The study found that the participants were equally divided between male and female, with the majority being between 21 and 40 years old and having completed college or secondary education. The majority of respondents were married and identified as Christians. In terms of farming practices, the most common land size used was 11-20 acres, and the most common crops produced were tomatoes, onions, and potatoes. There was a significant association between age and personal protection practices. Age was inversely associated with personal protection practices with younger farmers having better practices than the older farmers.

This result is similar to results of Damalas et al. (2019) and Negatu et al. (2016) who in similar studies found to be significant. However, it differs to results of Jallow et al. (2017) who found that age did not predict use of PPE. One possible reason for this finding is that younger farmers may have more education and awareness about the harmful effects of pesticides and the importance of using personal protective equipment PPE than older farmers. Another possible reason is that younger farmers may be more willing to adopt new practices and technologies than older farmers who may be more resistant to change.

Education level was statistically significant. Farmers with primary education had the highest proportion of poor personal protection practices, while farmers with college education had the highest proportion of good personal protection practices. This result is agreement with findings of Bagheri et al. (2018), Jallow et al. (2017) and Soko (2020) who found that educated farmers were significantly more likely to use PPE compared with famers with limited formal education. Farmers with higher education levels may have more knowledge and awareness of the safe use of pesticides and the risks of exposure than farmers with lower

education levels. They may also be more likely to follow safety instructions than farmers with lower education levels

Land size was statistically significant. Farmers with land size between 5-10 acres had the highest proportion of poor personal protection practices, while farmers with land size between 11-20 acres had the highest proportion of good personal protection practices. Jallow et al. (2017) and Moradhaseli et al. (2017) also found that farmers with large tracts of land were more likely to use PPE than farmers with smaller pieces of land. Farmers with larger land size may have more income and resources to afford PPE than farmers with smaller land size. They are also more likely to grow more diverse crops that require different types of pesticides and application methods, which may increase their awareness and knowledge of PPE use than farmers with smaller land size who may grow fewer crops.

Crops grown were statistically significant. Farmers who grew wheat or tomatoes had the highest proportion of poor personal protection practices, while farmers who grew potatoes or onions had the highest proportion of good personal protection practices. However, this finding differs with multiple other studies such as Damalas et al. (2019), Jallow et al. (2017), Moradhaseli et al. (2017) and Sapbamrerand Thammachai (2020) who found no such association. Farmers who grow wheat or tomatoes may use more pesticides or more toxic pesticides than farmers who grew potatoes or onions. They may also have more exposure to pesticides through inhalation or skin contact than farmers who grew potatoes or onions.

5.1.3 Association Between Knowledge and Personal Protection Practices

Slightly above half of the respondents were knowledgeable on personal protection. Knowledge was shown to be statistically significant in a chi-square test. Farmers with higher levels of education were 3.1% more likely to engage in safe work practices. The majority of

farmers in this survey agreed that pesticides were bad for their health and the environment, which is in line with the results of Jallow et al. (2017). This agrees with the results of Rijal et al. (2018), who found that 90% of producers knew that pesticides were bad for people and the planet. This squares with the findings of Marete et al. (2021), who found that the vast majority of farmers (65%) knew how to safely handle pesticides by following the instructions on the packaging and donning protective gear. It agrees with the research of Negatu et al. (2016) and Mubushar et al. (2019), who discovered a connection between education and PPE use.

A significant correlation between knowledge and the mandatory use of personal protective equipment was not found, in contrast to the results of Yuantari et al. (2015). Farmers with a higher level of education may be more likely to take precautions against pesticide poisoning and see the value of employing protective gear. They may also be more likely to employ PPE due to higher drive and assurance than less-informed farmers.

5.1.4 Association Between Attitude and Personal Protection Practices

Majority of the respondents had a negative attitude towards personal protection. Attitude was statistically significant. The odds of having poor personal protection practices were 3.9 times higher among farmers with a negative attitude compared to those with a positive attitude. Similarly, over half of the farmers (55.8%), consistent with the results of Damalas et al. (2019), rated their own safety when spraying pesticides as unimportant. This lines up with the findings of Rostami et al. (2019), who found that farmers' actual usage of PPE mirrored their stated preferences. However, it contradicts the findings of Yuantari et al. (2015), who found no correlation between attitude and the actual use of PPE. The use of personal protective equipment (PPE) may be seen as unneeded, cumbersome, or ineffectual by farmers with a negative attitude, however this may not be the case.

5.2 Conclusion

Personal protection practices among farmers using pesticide in Laikipia County, Kenya are poor. There was a low utilization of nose and mouth mask, face mask and helmets. Discomfort was the main reason given for not using many of the Personal protection equipment. In addition, slightly above half of respondents reported eating or drinking rarely while applying pesticides to their crops.

Demographic characteristics are associated with and personal protection practices among farmers using pesticide in Laikipia County, Kenya. Specifically, age, level of education, land size and crops grown were statistically significant. Older farmers (above 40 years), those with below secondary education, those with small pieces of land (<10 acres) and those who grew wheat or tomatoes were more likely to have poor personal protection practices.

Knowledge was statistically significant. Farmers who are knowledgeable about personal protection practices are more likely to use PPE than those who are not knowledgeable. Attitude was also statistically significant. Farmers with a positive attitude regarding personal protection practices may be more likely to use PPE than those with a negative attitude.

5.3 Recommendations

There was a poor utilization of personal protection practices among farmers using pesticides. It is recommended that the county government of Laikipia ought to provide farmers with access personal protective equipment, as well as training and education on how to use them correctly.

Given the association between level of education and personal protection practices, there is a need for targeted education and awareness campaigns to improve knowledge of personal

protection practices among farmers. This can be achieved through workshops, training programs, and the dissemination of educational materials on the safe handling and use of pesticides.

The study shows that a positive attitude towards personal protection practices can improve the utilization of PPE among farmers. Therefore, it is important to promote a positive attitude towards personal protection practices among farmers through community-based campaigns and sensitization programs.

REFERENCES

Abdollahzadeh, G., Sharifzadeh, M. S., & Damalas, C. A. (2015). Perceptions of the beneficial and harmful effects of pesticides among Iranian rice farmers influence the adoption of biological control. *Crop Protection*, *75*, 124-131.

Adesuyi, A. A., Longinus, N. K., Olatunde, A. M., & Chinedu, N. V. (2018). Pesticides related knowledge, attitude and safety practices among small-scale vegetable farmers in lagoon wetlands, Lagos, Nigeria. *Journal of Agriculture and Environment for International Development (JAEID)*, *112*(1), 81-99.

Apalla, Z., Nashan, D., Weller, R. B., & Castellsagué, X. (2017). Skin cancer: epidemiology, disease burden, pathophysiology, diagnosis, and therapeutic approaches. *Dermatology and therapy*, *7*(1), 5-19.

Babazadeh, T., Nadrian, H., Banayejeddi, M., & Rezapour, B. (2017). Determinants of skin cancer preventive behaviors among rural farmers in Iran: an application of protection motivation theory. *Journal of Cancer Education*, *32*(3), 604-612.

Bagheri, A., Emami, N., Allahyari, M. S., & Damalas, C. A. (2018). Pesticide handling practices, health risks, and determinants of safety behavior among Iranian apple farmers. *Human and ecological risk assessment: an international journal*, *24*(8), 2209-2223.

Bashirian, S., Jenabi, E., Khazaei, S., Barati, M., Karimi-Shahanjarini, A., Zareian, S., ... & Moeini, B. (2020). Factors associated with preventive behaviours of COVID-19 among hospital staff in Iran in 2020: an application of the Protection Motivation Theory. *Journal of Hospital Infection*, *105*(3), 430-433.

Chambers, R. S., Rosenstock, S., Lee, A., Goklish, N., Larzelere, F., & Tingey, L. (2018). Exploring the role of sex and sexual experience in predicting American Indian adolescent condom use intention using protection motivation theory. *Frontiers in public health*, *6*, 318.

Cheng, Y., Chang, Y., Feng, Y., Liu, N., Sun, X., Feng, Y., ... & Zhang, H. (2017). Simulated Sunlight-Mediated Photodynamic Therapy for Melanoma Skin Cancer by Titanium-Dioxide-Nanoparticle–Gold-Nanocluster–Graphene Heterogeneous Nanocomposites. *Small*, *13*(20), 1603935.

Damalas, C. A., Koutroubas, S. D., & Abdollahzadeh, G. (2019). Drivers of personal safety in agriculture: a case study with pesticide operators. *Agriculture*, *9*(2), 34.

Holick, M. F. (2020). Sunlight, UV radiation, vitamin d, and skin cancer: how much sunlight do we need?. In *Sunlight, Vitamin D and Skin Cancer* (pp. 19-36). Springer, Cham.

Jallow, M. F., Awadh, D. G., Albaho, M. S., Devi, V. Y., & Thomas, B. M. (2017). Pesticide knowledge and safety practices among farm workers in Kuwait: Results of a survey. *International journal of environmental research and public health*, *14*(4), 340.

Jeihooni, A. K., Esmaeilifar, Z., Badehian, Z., Khaleghi, A. A., & Yari, A. (2021). COVID-19 Preventive Behaviors in Pre-hospital Emergency Personnel: Application of Protection Motivation Theory.

Khorsandi, M. (2016). The assessment of the protection motivation theory construct of skin cancer preventive behaviors in rural women. *Avicenna Journal of Nursing and Midwifery Care*, *24*(4), 229-237.

Leiter, U., Keim, U., & Garbe, C. (2020). Epidemiology of skin cancer: update 2019. In *Sunlight, Vitamin D and Skin Cancer* (pp. 123-139). Springer, Cham.

Ling, M., Kothe, E. J., & Mullan, B. A. (2019). Predicting intention to receive a seasonal influenza vaccination using Protection Motivation Theory. *Social Science & Medicine*, *233*, 87-92.

LoBiondo-Wood, G., & Haber, J. (2021). *Nursing Research E-Book: Methods and Critical Appraisal for Evidence-Based Practice*. Elsevier Health Sciences.

Melanda, V. S., Galiciolli, M. E. A., Lima, L. S., Figueiredo, B. C., & Oliveira, C. S. (2022). Impact of Pesticides on Cancer and Congenital Malformation: A Systematic Review. *Toxics*, *10*(11), 676.

Moradhaseli, S., Sadighim, H., & Ataei, P. (2017). Investigation of the farmers' Safety and Protective Behavior to Use Pesticides in the Farms. *Health Education and Health Promotion*, *5*(2), 53-65.

Mortada, E., Abdel-Azeem, A., Al Showair, A., & Zalat, M. M. (2021). Preventive Behaviors Towards Covid-19 Pandemic Among Healthcare Providers in Saudi Arabia Using the Protection Motivation Theory. *Risk Management and Healthcare Policy*, *14*, 685.

Moule, P., Aveyard, H., & Goodman, M. (2016). *Nursing research: An introduction*. Sage.

Mubushar, M., Aldosari, F. O., Baig, M. B., Alotaibi, B. M., & Khan, A. Q. (2019). Assessment of farmers on their knowledge regarding pesticide usage and biosafety. *Saudi journal of biological sciences*, *26*(7), 1903-1910.

Negatu, B., Kromhout, H., Mekonnen, Y., & Vermeulen, R. (2016). Use of chemical pesticides in Ethiopia: a cross-sectional comparative study on knowledge, attitude and practice of farmers and farm workers in three farming systems. *The Annals of occupational hygiene*, *60*(5), 551-566.

Nieswiadomy, R. M., & Bailey, C. (2018). Foundations of nursing research.

Norman, P., Boer, H., Seydel, E. R., & Mullan, B. (2015). Protection motivation theory. *Predicting and changing health behavior*, 70-106.

Qadir, M. I. (2016). Skin cancer: Etiology and management. *Pakistan journal of pharmaceutical sciences*, *29*(3).

Rijal, J. P., Regmi, R., Ghimire, R., Puri, K. D., Gyawaly, S., & Poudel, S. (2018). Farmers' knowledge on pesticide safety and pest management practices: A case study of vegetable growers in Chitwan, Nepal. *Agriculture*, *8*(1), 16.

Rostami, F., Afshari, M., Rostami-Moez, M., Assari, M. J., & Soltanian, A. R. (2019). Knowledge, Attitude, and Practice of Pesticides Use Among Agricultural Workers. *Indian journal of occupational and environmental medicine*, *23*(1), 42–47. https://doi.org/10.4103/ijoem.IJOEM_153_18

Sabarwal, A., Kumar, K., & Singh, R. P. (2018). Hazardous effects of chemical pesticides on human health–Cancer and other associated disorders. *Environmental toxicology and pharmacology*, *63*, 103-114.

Sapbamrer, R., & Thammachai, A. (2020). Factors affecting use of personal protective equipment and pesticide safety practices: A systematic review. *Environmental research*, *185*, 109444.

Schmidt, N. A., & Brown, J. M. (2019). Evidenced-based practice for nurses: Appraisal and application of research (4th ed.). Burlington, MA: Jones and Bartlett.

Schneider, Z., Whitehead, D., LoBiondo-Wood, G., Faan, P. R., Haber, J., & Faan, P. R. (2016). *Nursing and midwifery research: Methods and appraisal for evidence based practice*. Elsevier.

Shillair, R. (2020). Protection Motivation Theory. *The International Encyclopedia of Media Psychology*, 1-3.

Soko, J. J. (2020). Agricultural Pesticides used by small-scale farmers in Kenya: What are the experiences of the farmers?.

Sung, H., Siegel, R. L., Torre, L. A., Pearson-Stuttard, J., Islami, F., Fedewa, S. A., ... & Jemal, A. (2019). Global patterns in excess body weight and the associated cancer burden. *CA: A Cancer Journal For Clinicians*, *69*(2), 88-112.

Tazval, J., Ghafari, M., Mohtashami Yeganeh, F., Babazadeh, T., & Rabati, R. (2016). Efficiency of protection motivation theory on prediction of skin cancer and sunlight preventive behaviors in farmers in Ilam county. *J Health*, *7*(7), 656-67.

Union for International Cancer Control (2019). *Addressing Kenya's growing cancer burden.* https://www.uicc.org/news/addressing-kenya%E2%80%99s-growing-cancer-burden

Vishlaghi, N., & Lisse, T. S. (2020). Exploring vitamin D signalling within skin cancer. Clinical endocrinology, 92(4), 273-281.

Von Ah, D. (2019). Research agenda of the oncology nursing society: 2019–2022. *Number 6/November 2019*, *46*(6), 654-669.

VoPham, T., Bertrand, K. A., Hart, J. E., Laden, F., Brooks, M. M., Yuan, J. M., ... & Weissfeld, J. L. (2017). Pesticide exposure and liver cancer: a review. *Cancer Causes & Control*, *28*(3), 177-190.

Westcott, R., Ronan, K., Bambrick, H., & Taylor, M. (2017). Expanding protection motivation theory: investigating an application to animal owners and emergency responders in bushfire emergencies. *BMC psychology*, *5*(1), 1-14.

WHO (2017). Radiation: Ultraviolet (UV) radiation and skin cancer.https://www.who.int/news-room/q-a-detail/radiation-ultraviolet-(uv)-radiation-and-skin-cancer

WHO (2021). cancer. https://www.who.int/news-room/fact-sheets/detail/cancer

Wild, C. P. (2019). The global cancer burden: necessity is the mother of prevention. *Nature Reviews Cancer*, *19*(3), 123-124.

Yuantari, M. G., Van Gestel, C. A., Van Straalen, N. M., Widianarko, B., Sunoko, H. R., & Shobib, M. N. (2015). Knowledge, attitude, and practice of Indonesian farmers regarding the use of personal protective equipment against pesticide exposure. *Environmental monitoring and assessment*, *187*(3), 1-7.

Zare Sakhvidi, M. J., Zare, M., Mostaghaci, M., Mehrparvar, A. H., Morowatisharifabad, M. A., & Naghshineh, E. (2015). Psychosocial predictors for cancer prevention behaviors in workplace using protection motivation theory. *Advances in preventive medicine*, *2015*.

APPENDICES

APPENDIX I: INFORMED CONSENT

My name is Anne Taiku. I am a postgraduate student at Kenyatta University pursuing a masters' degree in nursing. I am conducting a research to establish determinants of cancer preventative behaviors among farmers in Laikipia County, Kenya. You have been selected by random sampling to take part in this study. I therefore invite you to take part in the study.

Procedures to be followed

Your participation in this study is voluntary. If you do choose to participate, you will be asked questions about demographic characteristics, knowledge and attitude towards personal protection. The revelations of this study have important implications for cancer research as the findings will add to the otherwise limited literature on use of personal protection in preventing cancer.

Discomforts and risks

There are no risks associated with your participation in this study. There will also be no rewards or payment for your participation. However, any questions that you have will be answered or you will be referred appropriately. Administration of the questionnaire will take about 15 minutes.

Confidentiality

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

Contact information

If you have any questions you may contact Dr. Lister Onsongo. On 0700004288 or Dr. Elizabeth Ambani. On 0729496970 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke ,

Participant's statement

Code of participant…….

…… ……

Signature or thumb print Date

Investigator`s statement

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

Name of interviewer……..

……. …….

Interviewer signature Date

APPENDIX II: QUESTIONNAIRE

Questionnaire on Determinants of Cancer Preventative Behaviors Among Farmers

Title: Determinants of cancer preventative behaviors among farmers using pesticide in Laikipia County, Kenya.

Serial No……

The purpose of this questionnaire is to collect data to establish determinants of cancer preventative behaviours among farmers in Laikipia County, Kenya. Please answer all the questions as honestly as possible. The questionnaire will only take 15 minutes.

A: Sociodemographic characteristics

1. What is your gender?	Male [ ] Female [ ]
2. How old are you?	Below 20 Years [ ] 21-30 Years [ ] 31-40 Years [ ] 41-50 Years [ ] Over 51 years [ ]
3. What is your highest level of education that you have completed?	Primary [ ] Secondary [ ] College (certificate/diploma) [ ]
4. What is your marital status?	Single [ ] Married [ ] Divorced/separated [ ]
5. What is your religion?	Christian [ ] Muslim [ ] Others [ ]
6. What is the size of your land that is used for farming?	5- 10 acres [ ] 11-20 acres [ ] 21-30 acres [ ] 41-50 acres [ ] Over 50 acres [ ]
7. What is the main crop that you produce?	Maize [ ] Potatoes [ ] Wheat [ ] Tomatoes [ ] Onions [ ] Carrots [ ] Others [ ]

B: Personal Protection Practices

8. How often do you wear the following personal protective equipment while applying pesticide to your crops? Put a mark accordingly on a scale of 1 to 5 (5 being "Always" and 1 being "Never"

	Always [5]	Frequently [4]	Sometimes [3]	Rarely [2]	Never [1]
Nose and mouth mask	o	o	o	o	o
Face mask	o	o	o	o	o
Goggles	o	o	o	o	o
Apron	o	o	o	o	o
Gloves	o	o	o	o	o
Long-sleeved shirts	o	o	o	o	o
Long pants	o	o	o	o	o
Helmet	o	o	o	o	o

C: Barriers to using protective wear

9. What is the reason (s) why you don't use the protective wear listed in the table below . Please tick appropriately'

	Costly	Uncomfortable	Heat Stress	No Reason
Nose and mouth mask	o	o	o	o
Face mask	o	o	o	o
Goggles	o	o	o	o
Apron	o	o	o	o
Gloves	o	o	o	o
Long-sleeved shirts	o	o	o	o
Long pants	o	o	o	o
Helmet	o	o	o	o

10. a.) How often do you avoid mixing and spraying during windy conditions?

Always [ ] Rarely [ ] Never[ ]

b.) Please indicate below reasons for spraying on windy seasons.

It is always windy in the area [ ] It is uncomfortable working under the sun when it's calm [ ] I have no reason for spraying when it is windy [ ]

11. a.) How often do you wash hands after mixing?

Always [ ] Rarely [ ] Never [ ]

b.) Please indicate below reasons for not washing hands after mixing pesticide

Washing hands or not does not make any difference [ ]
There is not enough water [ ] No reason [ ]

12. a.) How often do you smoke cigarettes while applying pesticides to your crops

Always [ ] Rarely [ ] Never [ ]

b.) Please tick below reasons for smoking cigarettes while spraying.

Gets urge to smoke while spraying [ ] Smoking while spraying has no effect on health[ ]
No reason [ ]

13. a.) How often do you eat or drink while applying pesticides to your crops?

Always [ ] Rarely [ ] Never [ ]

b.) Please indicate below reasons for drinking / eating while spraying.

Gets urge to feed while spraying [ ] Drinking/Eating while spraying has no effect on health [ ] No reason [ ]

C: Knowledge on Personal Protection

14. What are your sources of information on personal protective wear?

Government Agricultural extension workers [ ] Radio/TV stations [ ]

Internet [ ] Pamphlets attached to the pesticides containers. [ ]

For questions 15-19, indicate your agreement or disagreement by ticking in the appropriate box

		Strongly agree	Agree	Disagree	I don't know
15.	Pesticides cause cancer	O	O	O	O
16.	Working in the farm exposes one to cancer.	O	O	O	O
17.	Wearing protective clothing while applying Pesticides help from causing cancer	O	O	O	O
18.	It is important to use personal protection during mixing and application of pesticides	O	O	O	O
19.	It is important to use personal protection during mixing and application of pesticides	O	O	O	O

D: Attitude towards Personal Protection

For questions 21-25, indicate your agreement or disagreement by ticking in the appropriate box

		Strongly agree **4**	**Agree** **3**	**Uncertain** **2**	**Disagree** **1**
21	Wearing gloves can reduce exposure to pesticides	O	O	O	O
22	Wearing face masks can reduce exposure to pesticides	O	O	O	O
23	Wearing glasses/goggles can reduce exposure to pesticides	O	O	O	O
24	Wearing overall can reduce exposure to pesticides	O	O	O	O
25	Pesticides can affect the environment	O	O	O	O

THANKYOU.

OBSEVATION CHECKLIST

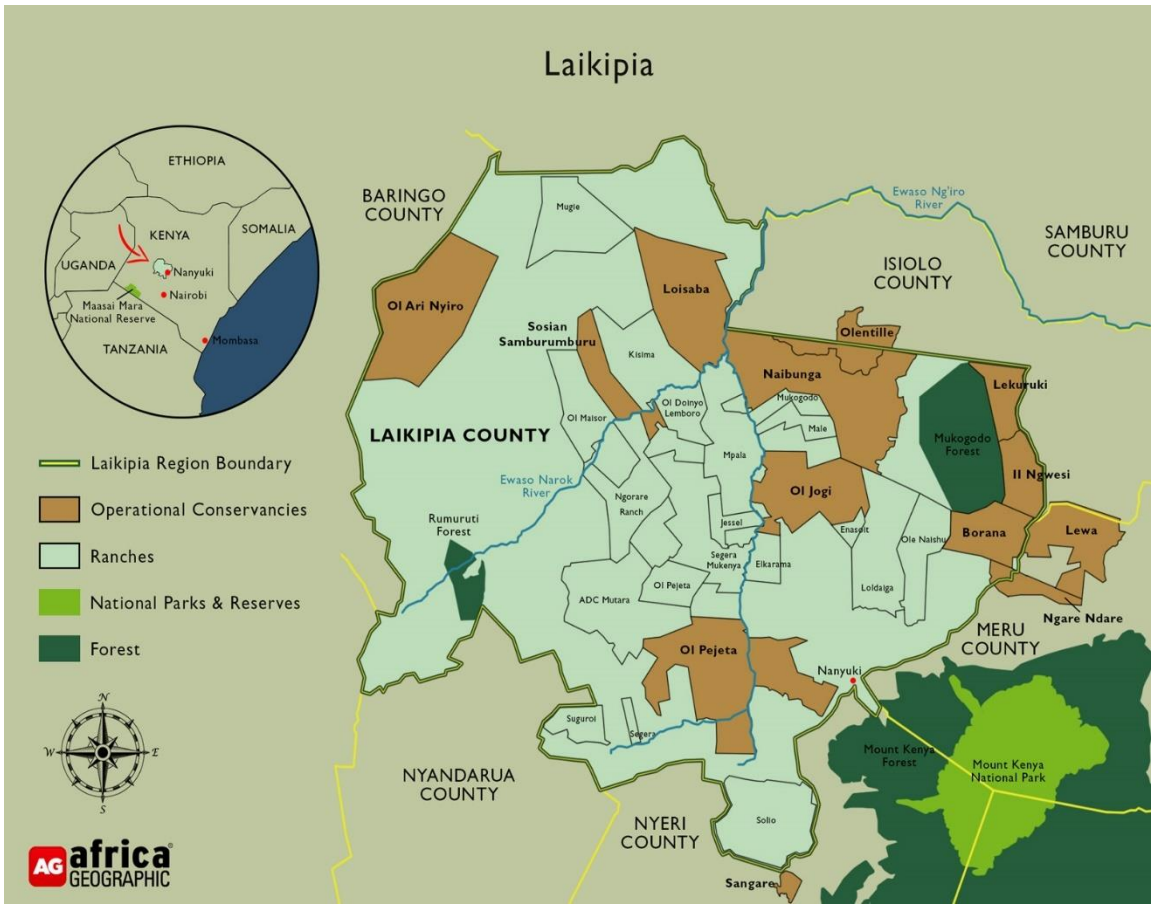
1. Wears protective equipment's before starting pesticide application**. (**Tick according to observation made.)

	Yes	No
Nose and mouth mask		
Face mask		
Goggles		
Apron		
Gloves		
Long-sleeved shirts		
Long pants		
Helmet		

APPENDIX III: OBSERVATION CHECKLIST

	Yes	No	Remarks
Reads the instructions written on the container			
Powder mixer stick used during pesticide mixing			
Wears gloves to protect hands			
Wear mask to protect face			
Wear long dress before starting a spray			
Wears boots during spraying			
Wears glasses during spraying			
Eats/drinks/smokes in-between spraying			

APPENDIX IV: MAP OF STUDY AREA



APPENDIX V: LETTERS OF APPROVAL

KENYATTA UNIVERSITY
CENTRE FOR RESEARCH ETHICS AND SAFETY

Fax: 8711242/8711575 **P. O. Box 43844,**
Email: chairman.kuerc@ku.ac.ke
Nairobi, 00100

Tel: 8710901/12

Website: www.ku.ac.ke
Our Ref: **KU/ERC/APPROVAL/VOL.1** Date: 11th /10/2022

Anne W. Taiku
P.O Box 43844, 00100
Nairobi.

Dear Ms.Taiku,

APPLICATION NUMBER: PKU/2590/I1716- ASSESSMENT OF CANCER PREVENTION BEHAVIORS AMONG FARMERS USING PESTICIDE IN LAIKIPIA COUNTY, KENYA

This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/2590/I1716.** The approval period is from **11th /10/2022 to 11th /10/2023.**

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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***
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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** 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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.

COUNTY GOVERNMENT OF LAIKIPIA
RECEIVED
25 OCT 2022
OFFICE OF THE CHIEF OFFICER
LAIKIPIA HEALTH SERVICE

Anne W Taiku
R50/27556/2019
P.O. BOX 10105-8,
NAROMORU
0721 490 546

24TH October 2022

LAIKIPIA HEALTH SERVICE
CHIEF OFFICER
25 OCT 2022
Approved
SIGN
COUNTY GOVERNMENT OF LAIKIPIA
Dr Panga

Dr Timothy Panga
Chief Officer
County Department of Health
LAIKIPIA

Dear Sir;

REF: REQUEST FOR AUTHORIZATION TO CONDUCT STUDY FOR RESEARCH IN LAIKIPIA COUNTY

In reference to the subject above.

I am Postgraduate student of Masters Oncology at Kenyatta University. As part of fulfilment of postgraduate education, a student is expected to conduct research.

I have been cleared by Kenyatta University Ethical Review Committee and National Commission for Science, Technology and Innovation (NACOSTI) to conduct a study under the title; *"ASSESSMENT OF CANCER PREVENTIVE BEHAVIORS AMONG FARMERS USING PESTICIDES IN LAIKIPIA COUNTY , KENYA.*
Attached are copies of the Authorities from both institutions.

The study aims to establish determinants of cancer preventative behaviors among rural farmers in Laikipia County. Further, the study findings will guide the county during policy development, planning and decision-making as it continues strategizing fight against cancer in the county.

The full study will be undertaken in Laikipia County across the three sub counties. The data will be collected through structured questionnaires.

This is to therefore request access to collect data from the farmers.

Yours Sincerely,

Anne W Taiku.
Candidate

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **927392**

Date of Issue: **19/October/2022**

RESEARCH LICENSE

This is to Certify that Ms.. ANNE WANGECHI TAIKU of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Laikipia on the topic: ASSESSMENT OF CANCER PREVENTIVE BEHAVIOURS AMONG FARMERS USING PESTICIDES IN LAIKIPIA COUNTY, KENYA. for the period ending : 19/October/2023.

License No: **NACOSTI/P/22/21091**

927392

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