THE RELATIONSHIPS BETWEEN SELECTED FACTORS AND FARMERS' DEMAND FOR SERVICES FROM PLANT CLINICS IN NAKURU-NORTH SUB-COUNTY, KENYA

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this is my original work and it has not been presented for the award of a degree in this or any other University.

Signature…… Date……

Daniel Njuguna Muchiri

EM12/3338/12

Recommendation

This Thesis has been submitted to the Graduate School with our approval as University supervisors

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DEDICATION

I dedicate this work to my beloved wife Rahab, my Children Patience, Eliezer, Ruth and Martin, and also my parents Francis and Dorcus.

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ABSTRACT

Plant clinics were introduced in Nakuru-North Sub-County in 2010 with the objective of improving farmers' access to crop protection extension services, subsequently reducing incidences of crop pests and diseases. The services are provided to the farmers on demand. Since their introduction, farmers' demand for the services has been low. Many farmers are therefore not benefiting from the services as it was intended. In order to understand the scenario and adopt policies that will ensure many farmers benefit from plant clinics services, it is crucial to establish the relationships between selected factors which are likely to determine farmers' demand for services from plant clinics, and farmers' demand for services from the plant clinics. The objective of this study was to establish the relationships between the selected factors; level of awareness of plant clinics, accessibility of plant clinics by farmers, farmers' perceptions of relevance of plant clinics, and farmers' perceptions of quality of services provided at the plant clinics. A Correlation study was conducted involving 152 farmers selected randomly from 6,000 small scale farmers in four out of the 12 locations of the Sub-County. A self-administered questionnaire was used to collect data from the farmers. Data was analyzed using the Statistical Package for Social Sciences (SPSS) for windows. Descriptive statistics was used to summarize and present the findings in frequency distribution, percentages, means and standard deviation. The relationships between independent and dependent variables was analyzed using Chi-square and interpreted at α=0.05 level of significance. The study established that there are statistically significant relationships between the farmers' level of awareness of plant clinics, accessibility to plant clinics by farmers and farmers' perceptions of quality of services provided at the plant clinics, and farmers' demand for services from plant clinics. This implies that the demand for services from plant clinics depends on these factors. The study concludes that the demand for services from plant clinics can be improved by improving the farmers' awareness of plant clinics, accessibility of plant clinics by farmers and farmers' perceptions of the quality of services provided at the plant clinics. The study recommends that financiers of plant clinics should allocate more resources to improve these factors.

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ABBREVIATIONS AND ACRONYMS

CABI	Commonwealth Agriculture Bureaux International
DFID	Department for International Development
GPC	Global plant clinics
ICT	Information Communication Technology
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
MOALF	Ministry of Agriculture, Livestock & Fisheries
NACOSTI	National Council of Science, Technology and Innovation
PPMC	Pearson Product Moment Correlation Coefficient

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

One major contributory factor to low agricultural productivity in the world is crop losses due to pests and diseases problems (Julie, 2010). The global food security is threatened by the vulnerability of our agricultural systems to numerous pests, pathogens, weeds, and environmental stresses (Michelmore, et al., 2017). Apart from to low yields, infected plants negatively affect human and livestock health by contaminating food and feed resulting in diseases and disorders when consumed (Fink-Gremmels, 2008). Enhanced responsiveness to plant health threats also takes an added urgency and importance in a global context of emerging exotic diseases and unpredictable disease patterns induced by climate change and the increased mobility of people and goods (Danielsen & Matsiko, 2016). Any intervention towards improved global food security must therefore endeavor to improve plant health (Julie, 2010).

Timely issue of appropriate plant protection advisories is helpful in appropriate decision-making which may result in saving more crops, the environment and the beneficial organisms (Singh, Tanwar, et al., 2016). Good and timely diagnosis is also essential for management of further spread of pests to new areas and therefore issues that hinder plant doctors' access to quick, accurate diagnostic service must be identified and addressed (Mugambi, Williams, Muthomi, Chege, & Oronje, 2016). This calls for an effective crop protection extension method which ensures early and accurate diagnosis and surveillance of crop pests and diseases in order to predict outbreaks and allow time for development and application of appropriate mitigation measures (Miller, Beed and Harmon, 2009). Innovativeness is required in extension service delivery to make relevant information available to the millions of smallholders around the world who depend on their crops for household food security and income (Danielsen and Kelly, 2010).

Plant clinics are facilities where farmers take samples of their affected plants for problems identification and management recommendations (Koigi, 2013). They have been identified as an innovative agricultural extension service delivery method to help farmers deal with crop pests, diseases and other plant problems (Brubaker, Danielsen, Olupot, Romney and Ochatum, 2013). The plant clinics have been founded in many developing countries as a cost-effective way of providing plant protection advice to small-scale farmers who have limited

access to consulting services (Ghiasi, Allahyari, Damalas, Azizi and Abedi, 2017). They were started by Global Plant Clinics (GPC) in the town of Comarapa, Bolivia, in the year 2000 (Bentley et al., 2011). Then they were spread to Bangladesh, Uganda and Nicaragua (Boa, 2009).Since 2003 the method has been piloted in several other developing countries as a way of providing regular, low cost plant health services to smallholder farmers who have limited access to advisory services (Danielsen and Kelly, 2010). In Kenya plant clinics were introduced in 2010. Nakuru-North is one of the pioneer Sub-Counties. It started with four plant clinics (Ministry of Agriculture Livestock and Fisheries (MOALF, 2012). Currently there are 134 plant clinics in 14 counties of Kenya (Scheidegger and Graf, 2013).

A basic plant clinic consists of a table, chairs, a banner or a prominent sign board for publicity. The plant clinics are held regularly in weekly or biweekly sessions of 2-3 hours in a prominent meeting place like a market center. The farmers are advised to take samples of any noted cases of crop pests or diseases infestation to the clinics for identification and advice (Koigi, 2013). The plant doctors undergo a standardized training programme and are provided with pests and diseases identification kits and reference materials that help them in making accurate diagnoses and giving effective recommendations to farmers (MOALF, 2012). When a farmer takes a sample to the plant clinic, he describes his problem/s to the 'plant doctor'. The 'plant doctor' listens to the farmer and examines the sample to diagnose the problem before suggesting an affordable and available treatment. The 'plant doctor' keeps records of the queries received and advice given to the farmers. Those records act as a source of information about prevalent pests and diseases. They are also used to monitor and improve the quality of diagnoses and recommendations given to farmers (Danielsen et al., 2013). Sometimes plant doctors have to send samples to a laboratory in the same way that a human doctor sends samples to a hospital laboratory. Plant clinics also link with other diagnostic laboratories around the world where need arises (Danielsen et al., 2013).

Plant clinics is a demand led service (Boa, Franco, Chaudhury, Simbalaya and Van Der Linde, 2016). Chipeta, Zellweger, Pesche, and Christoplos (2006) defines demand as what people need, ask for and value so much that they are willing to invest their resources such as time and money, in order to acquire it. According to Ali, Ahmad and Ali (2011), farmers demand and their need for advisory services are decisive factors in determining the effectiveness of extension services. Some factors are known to be related with farmer's reception of agricultural extension services and may therefore be related with farmers'

demand for services from plant clinics as well. According to Danielsen, Frank, Emmanuel and Gabriel (2012), the demand for services or technologies are driven by awareness of the existence of these services or technologies. The Physical distance from the plant clinic may also determine how frequently a farmer attends plant clinics (Brubaker et al., 2013). The Farmers' perceptions as well determine the adoption of an innovation (Llewelly, Pannell, Lindner and Powles, 2005).

Early results of plant clinic implementation showed that plant clinics had the potential to enhance the outreach of agricultural extension, capture demand and improve disease vigilance (Danielsen, Matsiko, Mutebi and Karubanga, 2012). However the current scenario is that the available diagnostic facilities are often under-utilized (Danielsen and Kelly, 2010). The demand for services from the plant clinics is low with most subsistence level farmers often overlooking their plant health problems while commercial farmers make some inquiries and seek information about their problems (Raj-Kumar, 2009). At the same time many farmers identify plant health problems by their symptoms and not by their causes, many of which are not easily visible (Boa, 2008). Consequently they only go for plant diseases control when it is too late or never at all. According to a plant clinics progress report from Nakuru-North Sub-County Agriculture Office, (2013), low farmers turn out during plant clinic sessions have been the major challenge facing their implementation. The average farmers' turnout during plant clinic sessions in the Sub-County stands at three to four farmers per plant clinic session (Nakuru-North Sub-County Agriculture Office, 2013). This is low compared to farmers' turnout during conventional extension methods such as demonstrations and information desks which stands at 15 to 25 farmers per session.

In order to understand the scenario and adopt policies that will ensure many farmers benefit from plant clinics services, knowledge of the relationships between selected factors which are likely to determine farmers' demand for services from plant clinics, and the demand is crucial. The study was conducted in Nakuru-North Sub-County to establish these relationships. The selected factors are farmers' level of awareness of plant clinics, accessibility of plant clinics by farmers, farmers' perceptions of relevance of plant clinics, and farmers' perceptions of quality of services provided at the plant clinics. The Sub-County was selected since it was among the first Sub-Counties to implement plant clinics in the country (MOALF), 2012), and has implemented them for a longer period of time. In addition

the Sub-County has a high agricultural potential with many small scale farmers which make it possible to get a large sample of farmers for the study.

1.2 Statement of the Problem

Plant clinics were introduced in Nakuru-North Sub-County in 2010 by Commonwealth Agriculture Bureaux International (CABI) and the Ministry of Agriculture as an appropriate extension method that would improve farmers' access to crop protection extension services, subsequently reducing incidences of crop pests and diseases. Their services are provided to farmers on demand. Since their introduction, farmers' demand for the services has been low. Many farmers are therefore not benefiting from these services as it was intended despite of crop pests and diseases incidences being still high in the Sub-County. In order to understand the scenario and adopt policies that will ensure many farmers benefit from plant clinics services, it is crucial to establish relationships between selected factors which are likely to determine the farmers' demand for services from plant clinics, and the demand. It was therefore necessary to carry out this study to establish these relationships.

The study sought to establish relationships between selected factors and farmers' demand for services from plant clinics in Nakuru-North Sub-County. The information can help agriculture extension policy makers and institutions running plant clinics to adopt strategies that will ensure more farmers demand and access services from plant clinics. This would improve farmers' capacity to deal with their crop health problems and thereby improving their farm yields and incomes.

1.3 Purpose of the Study

The purpose of the study was to establish the relationships between selected factors and farmers' demand for services from plant clinics in Nakuru-North Sub-county.

1.4 The Objectives of the Study

The objectives of the study were:

i. To establish the relationship between farmer's level of awareness of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.
ii. To establish the relationship between accessibility of plant clinics by farmers and demand for services from plant clinics in Nakuru-North Sub-County.
iii. To establish the relationship between farmers' perception of relevance of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.

iv. To establish the relationship between farmers' perception of quality of services provided at the plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.

1.4 Hypotheses

The following Null Hypotheses were used in the study:

H_{O1}: There is no statistically significant relationship between farmers' level of awareness of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.

H_{O2}: There is no statistically significant relationship between accessibility of plant clinics by farmers and demand for services from plant clinics in Nakuru-North Sub-County.

H_{O3}: There is no statistically significant relationship between farmers' perception of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.

H_{O4}: There is no statistically significant relationship between farmers' perception of quality of services provided at the plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.

1.6 Significance of the Study

The findings of the study may help extension policy makers in developing more informed strategies related to agriculture extension and especially in relation to crop protection extension. Knowledge of the relationships between the selected factors and farmers' demand for services from the plant clinics can help the implementers of plant clinics to know the areas which need to be focused in order to attract a higher farmers' demand for plant clinic services. This would result in more farmers accessing crop protection information and the consequent reduction of crop pests and diseases incidences. With more farmers advised on crop protection there would be higher crop yields and therefore improved food security as well as increased farm incomes. The study data generated by the study may provide evidence for determining the efficacy of plant clinics extension method in addressing plant health problems.

1.7 Scope of the Study

The study sought to establish the relationships between selected factors and farmers' demand for services from plant clinics in Nakuru-North Sub-County. Focus was on those factors related to the farmers and those related to plant clinics. It was carried out in Nakuru-North Sub-County but specifically confined to Bahati, Kabatini, Dundori and Githioro Locations of

the Sub-County. It involved small scale farmers from the study area who are the target clients of plant clinics extension method.

1.8 Assumptions of the Study

The study made the following assumptions

i) All respondents gave truthful information.

ii) The small scale farmers' farm situations and agricultural practices in all the study area are generally the same.

iii) The farmers' characteristics in all the study area are the same as those in other parts of the Sub-Country.

1.9 Limitations of the Study

i) The study did not cover all the locations of Nakuru-North Sub-County that are operating plant clinics due to financial and time implications.

ii) The study did not cover all the possible factors as this would have made the questionnaire to long and thereby compromising the quality of the study.

1.10 Definitions of Terms

Accessibility: People's ability to employ available facilities at the time of need (Mohammed and Shamima, 2011). In this study accessibility of plant clinics services refers to the distance from the farmer's residence to the nearest plant clinic. The shorter the distance, the more accessible the plant clinic is to the farmer.

Crop Protection Extension Services: The entire set of services that support and facilitate people engaged in agricultural production to solve plant health problems and to obtain information, skills, and knowledge (Davis, 2008). In this study crop protection extension services refer to services which include analysis of farmers' description or plant samples to determine the cause of a disease or syndrome in a plant or plant population, and giving recommendations on control measures.

Farmers' Demand for Services: Demand is the amount of any given commodity or service that people are willing and able to acquire at a given time and at a given price (The American Heritage New Dictionary of Cultural Literacy, 2005). In this study farmers' demand for services from plant clinics refers to the number of visits a farmer made to the plant clinic and number of samples presented to a plant clinic for diagnosis and advice in the past one year.

Farmers' Level of Awareness: Awareness is knowing something; knowing something exists and is important (Hornby, 2010). In this study farmers level of awareness on plant clinics is measured using '1 for Yes and 0 for No' whether the farmer knows of plant clinics.

Perception of Quality of Service: Perception is an idea, a belief, judgement or an image one have as a result of what he sees or understands (Hornby, 2010). Quality is the standard, superiority, grade or degree of excellence (Collins, 2009). In this study perception of quality of service was measured using Likert scale with items related to Reliability, Responsiveness, Competence, Courtesy, Credibility, and Appropriate equipments at the plant clinics. An index was then computed as a simple sum of all the response scores.

Perception of Relevance: Relevance is having direct bearing on; being pertinent to the matter at hand; (Collins, 2010). In this study Perception of relevance of plant clinics was measured using Likert scale with items related to pertinence, provision of information required by farmers, services appropriate to local farmers, applicable recommendations, timeliness, current and updated information. An index was then computed as a simple sum of all the response scores.

Plant Clinics: A facility where farmers take samples of their affected plants for problems identification and management recommendations (Koigi, 2013). For the purpose of this study plant clinic refer to the facility where farmers take samples of their affected plants for problems identification and management recommendations.

Plant Doctor: Staff who undergoes a standardized training programme and are provided with identification tools and reference materials that help them in making accurate diagnoses and giving effective recommendations to the farmers (MOALF, 2012).

Small Scale Farmer: In this study, this is a crop or mixed farmer who is operating on land size not exceeding 10 acres.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature related to plant clinics and the relationships between selected factors and farmers' demand for services from plant clinics extension method in Nakuru-North Sub-County. It is has five sections that include: - The Crop Protection Extension Services, Plant clinics extension method, farmers demand for services from plant clinics, and the relationship between selected factors and farmers demand for services from plant clinics. The chapter concludes by presenting the Theoretical Frame work and the Conceptual Frame work of the relationships between selected factors and farmers' demand for services from plant clinics.

2.2 The Crop Protection Extension Services

It is anticipated that in the next decade mankind will demand more food from less land and water resources (Schneider et al., 2011). The growth in agriculture production needs to be sustained to meet the food demand by the increasing population. The Millennium Declaration had set 2015 as the target date for halving the number of people living in extreme poverty (Cervantes-Godoy and Dewbre, 2010). At the same time food security, being one of the Millennium Development Goals (MDGs), requires a nutritionally adequate and safe food supply at household levels, (Musotsi, Sigot and Onyango, 2008). Yet, with the rapid global human population increase, achieving efficient and productive agricultural land use is a global challenge. Besides, agricultural growth has long been recognized as an important instrument for poverty reduction (De Janvry and Sadoulet, 2010). This implies more efficient agricultural production systems are required to compensate for the increasing demand for food and income. However, farmers especially in the tropics are facing crop production challenges and risks. These challenges include food insecurity, lower income, adverse effects of pesticide use on human health and on the environment, and export restrictions on limits of pesticide residues (Ratnadass, Fernandes, Avelino and Habib, 2012). (Tschamtke et al., 2012). In Kenya, crop losses due to pests and diseases is among the key challenges to food security achievement (Ministry of Agriculture- Kenya, 2009). Insect pests for example in harvested fresh commodities can lead to huge losses due to rejections of shipments, restrictions on shipments, reduction of market quality, and reduction of market price (Arthur, Johnson, Neven, Hallman and Follett, 2009).

One way to increase the production and productivity is to minimize losses due to pests and diseases (Singh and Gupta, 2016). There is need to keep crop pests and diseases damage under control in order to provide more and better food to populations (Ratnadass, 2012), and to ensure poverty reduction in the world. Ensuring health of food plants is critical in maintaining the quality and productivity of crops and for sustenance of the rapidly growing human population (Michelmore, et al., 2017). With the wide variety of factors responsible for onset and spread of the pest, it becomes essential to monitor pests continuously not to allow recurrences of outbreaks. Such a preventive action required a strong pest monitoring and advisory mechanism to be put in place (Vennila, Lokare, Singh, Ghadge and Chattopadhyay, 2016). Timely diagnosis using new technologies has a positive impact on small holder farmers by reducing input costs per acre and increasing production and net income (Rajkumar and Anabel, 2018). It is estimated that growers spend approximately 18% of days performing tasks associated with applying crop protection and management (Jordan, et al., 2018).

Although a lot is known about the technical aspects of plant diseases and how to grow healthy crops, the majority of small-scale farmers in developing countries do not have access to adequate and timely advice on how to handle existing or emerging plant health problems (Bently, 2009). Most of the services have been focused on agriculture technology transfer but less has been emphasized on risk management (Ali and Man, 2017). The capacity to identify pests and diseases is scarce and limited in scope and quality (Smith et al, 2008; Miller, Beed and Harmon, 2009). Since agricultural extension services are perceived by many as the key driver behind innovation processes in agriculture (Faure, Desjeux & Gasselin, 2012). They can be looked upon to enhance the farmers' capacity to identify and control crop health problems. For example in Kenya the government is supporting efforts to increase agricultural productivity by among other things reviving extension services (Ministry of Agriculture (MOA, 2009). Hence clear agriculture policies and strategies are very crucial for influencing the performance of agriculture extension and advisory services (Masangano, Kambewa, Bosscher and Fatch, 2017). Policies embracing innovative crop protection extension methods are necessary if farmers are to adopt more innovative ways of identifying plant health problems early enough before they cause significant damage on their crops.

2.3 The Plant Clinics Crop Protection Extension Method

So as to take timely and correct decision for selection of appropriate pests and diseases control option that is readily available, economical and applicable at the field level, farmers

need expert advice (Singh and Gupta, 2016). Nevertheless, according to Department for International Development **(**DFID) (2010), majority of small scale farmers cannot afford to hire specialists when unknown plant health problems affect their crops. They rely on their own knowledge, their neighbours' advice, chemical dealers who often have vested interests or inefficient government extension services. The answer is sometimes costly, harmful, and ineffective pesticide use.

Plant clinic is a facility modeled on the human health concept, where farmers take samples of their affected plants to agronomists and extension agents who identify the problems and recommend pest management methods (Koigi, 2013). They act as satellite crop protection extension dissemination centers and are ran by the local extension staff (MOALF, 2012). The idea is that with access to crop protection extension services farmers can tackle pests and diseases and produce healthy crops and productive yields and thus improving their income and food security (CABI, 2012). Currently plant clinics offer significant services to small-scale farmers in terms of crop protection advice in many developing countries (Azimi, Allahyari, Damalas and Kavoosi-Kalashami, 2017). An ideal plant clinic should have a fully operational laboratory with scientific equipment (Ranjinder, 2013). The plant clinics are operated by trained staff referred to as 'plant doctors'. When the "plant doctors" serve the farmers, they fill registers of questions received from farmers and advice given as a source of information about pests and diseases prevalence, and farmers' demand for the services (Danielsen et al., 2013). This information can help extension service providers, researchers, plant health authorities in their decision-making in regard to crop health and production.

2.4 Farmers' Demand for Services from Plant Clinics.

The current trend in agriculture extension services is to make them demand-driven. This is because the demand-driven approach is considered an important aspect of improving agricultural extension provision (Glendenning, Babu and Asenso-Okyere, 2010). Understanding farmers' demand for crop protection services is important in improving the efficiency of the Plant Clinics. According to Ali, Ahmad, and Ali (2011), lack of demand for extension services in an area paves the way for inefficient extension services. A significant change in farmer's demand for crop protection extension services can also have cost implications. Furthermore, the unit cost of providing these services depends on the number of clients served. This is because a large component of expenditure for providing crop

protection extension services arises from the fixed costs of developing materials and the committed costs of employing staff.

One approach of looking at the farmers' demand for plant clinic services is by categorizing those farmers who are participating in plant clinics as users, while the non-participating group is referred to as non-users (Brubaker et al., 2013). This results in a binary variable with scores 1 for users and 0 for non-users. Another method would be by looking at the frequency a farmer visits the plant clinics (Danielsen and Kelly, 2010). In this the users can be categorized either as first time users or return clients. Demand can also be assessed by looking at the number of questions or diseased samples presented at the clinic for analysis (Danielsen and Kelly, 2010).

To explain the varying farmers' demand for services from the plant clinics, a study conducted in Vietnam, Sri Lanka, Malawi and Zambia found that the most commonly cited reasons for not attending the plant clinics were that frequency and timing did not work for farmers, the clinics were far away, and information about plant clinics was not known (Mujahid, Ndengu, Kuntashula, Welamedage and Nguyen, 2016). Another study conducted in Iran established that the most important factors explaining the variance of farmers' willingness to use plant Clinics services were service relevance, service usefulness, familiarity with Plant Clinics services, service quality, and education level of the farmers (Ghiasi, Allahyari, Damalas, Azizi and Abedi, 2017).

The demand for services or technologies are driven by awareness of the existence of these services or technologies, that means, good publicity is key to attracting more people to demand for plant clinics extension services (Danielsen, Frank, Emmanuel and Gabriel, 2012). Awareness is defined as knowing something; knowing something exists and is important (Hornby, 2010). According to Faham, Rezvanfar and Samiee (2009), awareness plays a crucial role in adoption of innovations. Awareness is the first stage of demand for a service by the client in a set of stages such as awareness, consideration, intention, and adoption. A potential client must be aware of the service before evaluating and consciously choosing to demand for it (Do & Wong, 2012). Thus plant doctors can't create demand for their services without first creating awareness of their operations (Do and Wong, 2012). Awareness levels can be differentiated as:- i) Just the awareness of the name of the extension method ii) Awareness of the services provided through the method iii) Awareness of key attributes or differentiators of the method. All these are likely to affect demand decisions of the farmers.

Awareness alone however is not enough to change the farmers' demand decisions as it is possible to create awareness only, without changing the farmers' consideration, demand intention or demand decisions (Lenskold, 2011). Success of plant clinics in providing crop protection extension services may also depend on information the farmers have about the benefits of the services (Seyed and Richard, 2011).

Physical proximity of services can play an important role in the use of services (Peters et al., 2008). Geographical accessibility, the distance that must be travelled in order to use a facility, may present an important barrier of access to services (Feikin et al., 2009). It is hypothesized that long distance can be a significant obstacle to reaching services, and a disincentive to trying to seek for services (Mohammed and Shamima, 2011). Physical distance from the plant clinic is expected to influence the farmers' decision on how frequent to attend plant clinics (Brubaker et al., 2013). The variable also determines the travel cost to the plant clinic, a factor also likely to influence the farmers demand for the plant clinic services. Thus physical accessibility is an important measure of accessibility. It is measured using two parameters; first the distance from the facility and time taken to the nearest facility (Mohammed and Shamima, 2011). Compliance with the planned schedules and time management practices at the clinics sites e.g. timely start, short waiting time are important in determining the accessibility of plant clinic services (Danielsen, Frank, *et al*., 2012). These factors either favorably or unfavorably affect the accessibility of the plant clinics extension services by the farmers. Consequently they are likely to affect the demand for plant clinics extension services by the farmers.

As the agriculture scenario has become more complex, farmers' access to sources of reliable and relevant information has become increasingly important. There is an increasing need to provide locally relevant services that meet the information needs of smallholder farmers (Glendenning, Babu and Asenso-Okyere, 2010). Singh, Singh and Riyajuddeen (2008) also notes that the technical information provided to the farmers should be timely and relevant. Even before the farmers decide on whether to attend a plant clinic they already have a prior idea or belief about the relevance of the plant clinic. Several factors including Education and experience play a role in the formation of these perceptions (Seyed and Richard, 2011). The perceptions that farmers have about the relevance of plant clinics extension method may determine their demand for services from the plant clinics. An understanding of farmers' perceptions of a particular type of extension service and their relationship with the demand of

this service is necessary in providing answers to demand of agricultural innovations (Mushunje, Muchaonyerwa, Mandikiana and Taruvinga, 2011). Interventions that facilitate the farmers' perception of relevance of an extension methodology might promote farmer's demand for services provided through the methodology.

Farmers demand quality services which can satisfy their needs (Ali et al., 2011). If they experience high quality plant clinic extension services, then they are more likely to recommend the services to others and less likely to seek for services from competing organizations (Haile and Israel, 2012). If they are convinced that the services are of high quality, then they will demand for them. On the other hand if they are skeptical about the quality of services provided, then they will not go for these services. The quality of crop protection extension services depends on the availability and quality of human capital, infrastructure, and technology (Lemon, Hamburg, Sparling, Choffnes and Mack, 2007). These attributes can be used to develop an index for quality of the services. The available quality criteria for plant clinics include technical quality, timeliness, staff attitude, feasibility of advice, clinic location, materials, organization and outreach (Danielsen and Kelly, 2010). The issues of time keeping, staff attitude, reliability of diagnosis, efficacy and feasibility of the advice given to farmers can potentially affect clients' confidence in the service and may go some way in building the farmers' perception about the quality of the services provided at the plant clinics (Danielsen, Frank et al., 2012).

Since the study is dealing with general farmers, some of which have not attended a plant clinic, it is important to study the relationship between farmers' perception of the quality of plant clinic services and demand for the services since the study may provide an answer on their lack of demand for the plant clinic services.

2.5 Theoretical Framework

This study is in line with Roger's (2003) Diffusion of innovation theory. The theory explains the factors which increase or decrease the likelihood that an innovation will be adopted by members of a given culture. Rogers defines innovation as "an idea, practice, or object that is perceived to be new by an individual or other unit of adoption". Adoption is to start to use a particular method or to show a particular attitude towards something (Hornby, 2010). According to the theory, adoption of an innovation is a five steps process involving the factors Awareness, Persuasion, Decision, Implementation, and Confirmation of the innovation. These factors interact and are judged as a whole. Ability and Motivation, which

vary on situation, have a large impact on a potential adopter's likelihood to adopt an innovation. The rate of adoption is usually measured as the number of members of the system that adopt the innovation in a given time period.

Plant Clinics is an innovative agricultural extension service delivery method (Brubaker, Danielsen, Olupot, Romney and Ochatum, 2013). Farmers demand for services from the plant clinics is an indicator of the adoption of the service delivery method. Demand is defined as the amount of any given commodity or service that people are willing and able to acquire at a given time and at a given price (The American Heritage New Dictionary of Cultural Literacy, 2005). On the basis of the above theory, it was hypothesized that some factors interact to determine the likelihood of farmers' demanding for services from plant clinics. Selected factors were studied to establish the relationships between them and farmers' demand for services from plant clinics in Nakuru-North Sub-County. The selected factors were farmers' level of awareness of plant clinics, the accessibility of plant clinics, farmers' perceptions of the relevance of plant clinics and farmers' perceptions of quality of services provided at the plant clinics.

2.6 Conceptual Framework

In this study, the researcher measured the farmers' demand for services from plant clinics (dependent variable). There exists a relationship between selected factors which forms the independent variables, and the dependent variable 'farmers' demand for services from plant clinics'. Based on the literature review, the factors likely to be related with farmers demand for services from plant clinics include farmers' awareness of plant clinics, the accessibility of plant clinics by farmers, farmers' perception of relevance of plant clinics and farmers' perception of quality of services provided at the plant clinics. The intervening variables, which according to Kothari (2004) are variables that mediate or provide a causal link between the dependent and independent variables, include farmers' personal characteristics, financial endowment, and farming experience.

The dependent variable (farmers' demand for services from plant clinic) and the independent variables (selected factors) were measured using a self-administered questionnaire on small scale farmers, and then analyzed to establish whether they have statistically significant relationships. A statistically significant relationship between the dependent variable and any of the selected factors would mean that the factor is one of the determinants of farmers demand for services from the plant clinic. The effects of the intervening variables were

controlled by using a large sample which was randomly selected for the study. Figure 1 shows the interaction between the independent variables (including intervening variables) and the dependent variable.

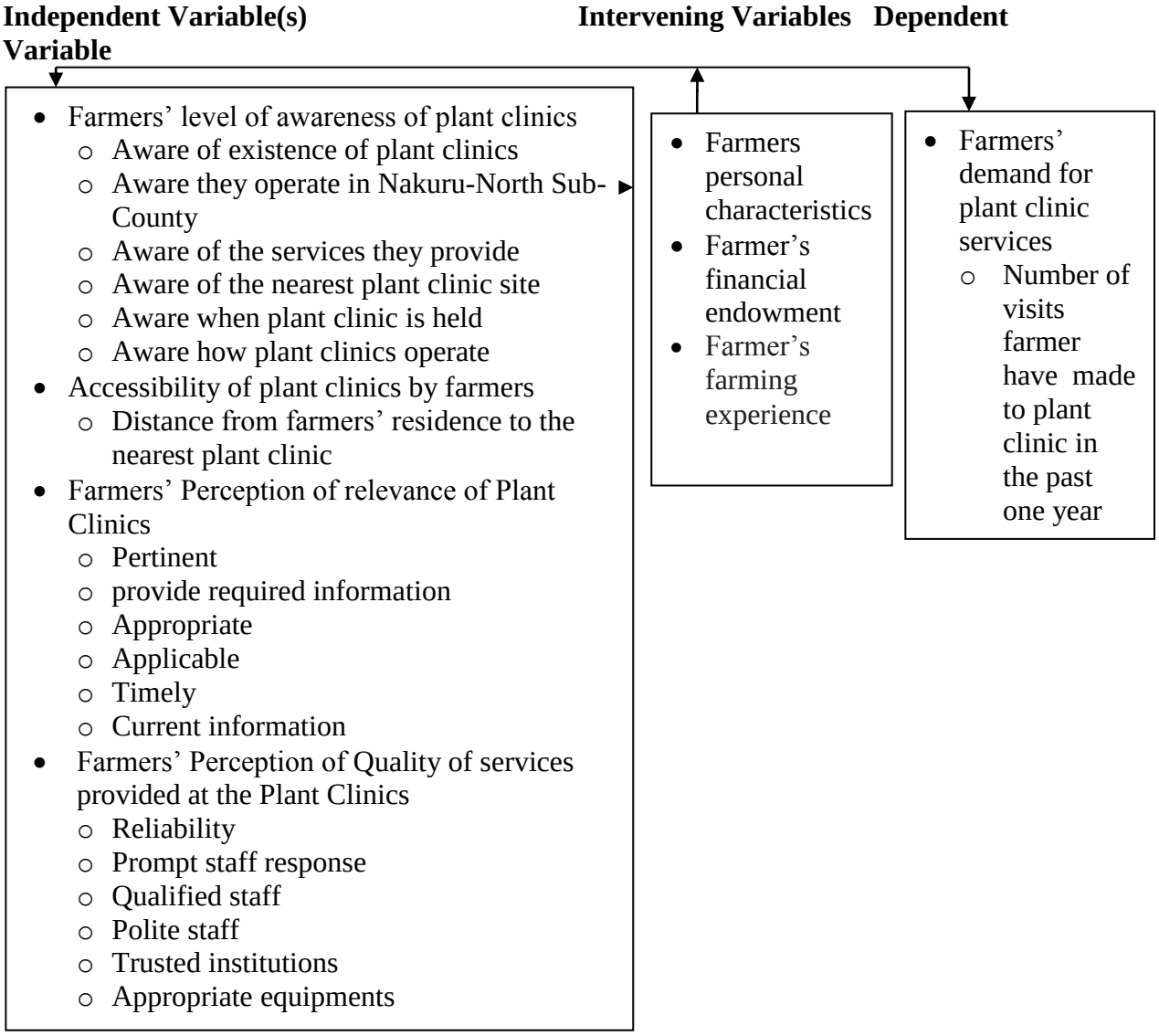

Figure 1: The interaction between the independent variables (selected factors) and dependent variable (farmers demand for services from plant clinics) of the study

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This section describes the method used to carry out the study. It gives details of the research design used, location of the study, the target population, sampling procedures and sample size, tools and procedures used in data collection and analysis. It ends with a table showing a summary of how data was analyzed.

3.2 Research Design

A Correlational Study was used. A Correlational Study determines whether or not two variables are correlated. This means to study whether an increase or decrease in one variable corresponds to an increase or decrease in the other variable. According to Kothari (2004), Correlation study is considered as more important in most social and business researches where the main interest lies in understanding relationships between variables and determining causes. In this study, data was collected from sample farmers in order to establish the relationships between selected factors (independent variables) and farmers' demand for services from plant clinics (dependent variable) after their introduction in Nakuru-North Sub County.

3.3 Location of the study

The study was conducted in Nakuru-North Sub-County and specifically in Bahati, Kabatini, Dundori and Githioro Locations. The Sub-County was chosen because it is one of the ten Sub-Counties in the country where plant clinics were first introduced (MOALF, 2012), similar research has not been done in the area, and the Sub-County has a great potential to improve crop production through successful implementation of plant clinics.

Nakuru-North Sub-County lies in the North Eastern part of Nakuru County. It lies to the south of Subukia Sub-County, East of Rongai Sub-County, North of Gilgil Sub-County and west of Nyandarua County. The eastern border of the Sub-County stretches along the eastern slopes of the Rift valley.

The area receives bimodal rainfall ranging from 1500mm to 2000mm per annum with the wettest season being April and May. Temperatures range from minimum of between 12°C to a maximum of 26°C. The study area lies between 1800 to 2500m above sea level. In terms of Agro-ecological zones it lies within lower highlands to upper midland zones.

The study area has a population density of 357 people per Km^2 and annual population Growth Rate of 3.4 percent (Kenya National Census, 2009). Poverty Level is 41 percent in the urban areas and 45 percent in the rural areas (Kenya National Census, 2009). The Main economic activities in the area are small scale **s**ubsistence and commercial agriculture, energy generation, small-scale trade, dairy farming, flower farming, eco-tourism, commercial businesses.

3.4 Population of the study

The population of the study comprised of the 23,500 small scale farmers in Nakuru-North Sub-County. The accessible population was the 6000 small scale farmers in Bahati, Kabatini, Dundori and Githioro Locations. There are both small scale mixed farmers and large scale farmers in the area. The small scale farmers have an average of 2.5 acres of land and are the majority being about ninety percent, while the large scale farmers forms about ten percent of the farmers. The major enterprises with small scale farmers are maize, wheat, beans, tomatoes, irish potatoes, carrots, kales, cabbages, coffee, cut flowers and dairy. Large scale farmers mainly practice monoculture and their main enterprises are coffee, tea and wheat. The farmers are distributed among the four Locations as shown in Table 1 and this formed the sampling frame.

Table 1: Summary of the accessible population in the study area (N = 6,000).

Location	Number of farmers
Bahati	1960
Kabatini	1560
Dundori	770
Githioro	1710
Total	6000

Source: Sub-County Agriculture Office-Nakuru North.

3.5 Sampling procedures and sample size

Purposive sampling was usedto select the four locations of the study from the 12 locations in the Sub-county. The four locations were chosen because at the time the plant clinics were introduced in the Sub-County, a plant clinic was started in each of them. The Locations are also well distributed across the Sub-county and therefore giving a good representation of the whole Sub-County. Proportionate random sampling was used to select the farmers to be studied from each of the study Locations. This allowed every farmer to have an equal independent chance of being included in the sample. Proportionate random sampling also

ensured no sub-population is omitted from the sample, and avoids overloading in certain sub-populations (Borg and Gall, 2003).

On determining the sample size, Nassiuma (2001) says that in most surveys or experiments, coefficient of variation of at most 30% is usually acceptable. The study took a coefficient of variation of 25% and a standard error of 0.02. Sample size generation formula given by Nassiuma is as follows.

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where n = Sample size

N = Population

C = Coefficient of variation

e = Standard error

In this case, $n = \frac{6000(25\%)^2}{(25\%)^2 + (6000-1)(0.02)^2} = 152$

This sample size is above the minimum recommended sample size of 100 for survey studies. It has also been considered appropriate in consideration of the level of accuracy required and the accessible population (Kathuri and Pals, 1993). Table 2 gives the names of the study locations and the corresponding number of respondents that were selected.

Table 2: Sample size per study location

Location	Number of small scale farmers	Proportion of the population	Number of farmers selected
Bahati	1960	0.33	49
Kabatini	1560	0.26	40
Dundori	770	0.13	20
Githioro	1710	0.28	43
Total	6000	1.00	152

A list of land registration numbers for farmers in each study Location was obtained from the lands registrar office in Nakuru through the help of Sub-County Agriculture Office of Nakuru- North Sub-County. The list constituted the sampling frame from which the land registration numbers of the selected farmers were picked using a table of random numbers. The village elders and the Field Agriculture Extension Officers from the areas helped to identify and contact the selected farmers.

3.6 Instrumentation

A self-administered questionnaire was the main instrument of collecting data in the study. The items in the questionnaire were developed based on the objectives of the study. The questionnaire had six sections. Section A captured the farmer's personal data, Section B captured data on farmer's level of awareness of plant clinics, Section C on farmers' demand for services from plant clinics, Section D on accessibility of plant clinics services by farmers, Section E on farmers' Perception of relevance of plant clinics and Section F on farmers' perception of quality of services provided at the plant clinics.

3.6.1 Validity of the instrument

Validity is an important criterion used to evaluate the degree to which an instrument measures what it is supposed to measure in terms of accuracy, soundness and effectiveness (Kothari, 2004; Wiersma, 1995). To ensure that the instrument is valid, the researcher ensured that its layout is good, instructions are clear and adequate and that it had clear guidance on the mode of response. The items in the schedule represented the content area that they were intended to measure. The research instrument was availed to lectures in the Department of Agriculture Education and Extension to establish its content and construct validity and ensure that the items adequately represented the subject area to be studied. Their comments were used to make the necessary corrections.

3.6.2 Reliability of the instrument

To ensure the instrument is reliable it was piloted in Bahati Ward of Nakuru-North Sub-County on a sample of 30 respondents with similar social economic characteristics and farming systems as the population being studied (Mugenda and Mugenda, 2003). Cronbanch's alpha procedure was used to establish the instrument's reliability and the instrument found to have a reliability coefficient of 0.799 at α=0.05 level of significance. A reliability coefficient of at least α=0.70, at α=0.05 level of significance is considered acceptable (Mugenda and Mugenda, 1999; Frankel and Wallen, 2000).

3.7 Data collection procedures

Upon approval of the research proposal by the Graduate School, a letter of authorization to conduct research was obtained. This was used to facilitate acquisition of research permit from the National Council of Science, Technology and Innovation (NACOSTI). Once the permit was obtained, the intent to carry out research in the selected area was communicated to the Sub-County Agriculture Office and the village elders.

To collect data, a self-administered questionnaire was used. The researcher took the questionnaire to each of the sample farmers at their homes and explained the purpose of the study before the farmers filled the questionnaires. The researcher was present throughout the exercise to clarify any issues that arose and then left with the filled questionnaires. Assistance of the area agriculture extension staff was sought where necessary to assist in tracing the study farmers, and in clarifying and verifying some of the issues encountered during the study. Most of the farmers in the area understand English and thus did not need of a translator. The agriculture extension staff assisted in interpreting for those who did not understand English.

3.8 Data analysis

The process of data analysis started by checking the accuracy of the response data. The data was then coded, entered into the computer and analyzed using the Statistical Package for Social Sciences (SPSS).

The dependent variable Farmer's Demand for Services from Plant Clinics was measured as the number of visits a farmer made to a plant clinic, and the number of plant samples taken to the plant clinic in the past one year. The past one year was used for the measurement because it would be easier for the respondents to remember the events of one year than for a longer period of time. One year is also the maximum time taken by crops to complete a whole production season along which crop pests and diseases problems occur. Farmers' Level of Awareness of Plant Clinics was calculated as a simple sum of scores from responses to questions in which farmers respond 'Yes' or 'No' whether they are aware of each of some six attributes of plant clinics (their existence, their operation in the Sub- County, site where located, their work, when they are held, how they operate). The response scores were recorded as 1 for 'Yes' and 0 for 'No'. A level of 0 indicates no awareness, 1 to 3 indicates low level of awareness of plant clinics while 4 to 6 indicates high level of awareness of plant clinics. Accessibility of plant clinics services was measured using the physical distance from the farmer's residence to the nearest plant clinic venue.

The independent variable farmer's perception of relevance of plant clinics was measured by asking respondents to respond to a set of questions on their perception of some attributes of plant clinics and recording their responses on a five point Likert scale with 1= Strongly disagree, 2 = Disagree, 3 = No opinion, 4 = Agree, 5=Strongly agree. An index score was computed as a simple sum of all the response scores. Six questions were asked giving a

maximum score of 30 and a minimum score of 6. The midpoint was 18. An index score below 18 indicates that the farmer perceives plant clinics as not relevant while an index score above 18 indicates that the farmer perceives plant clinics to be relevant. The higher the score the more relevant the farmer perceives plant clinics to be and the lower the score the less relevant the farmer perceives plant clinics to be.

The independent variable farmers' perception of quality of services provided at the plant clinics was measured by asking respondents to respond to a set of questions on their perception of some attributes of quality of plant clinics and recording their responses on a five point Likert scale with 1= Strongly disagree, 2 = Disagree, 3 = No opinion, 4 = Agree, 5=Strongly agree. An index score was computed as a simple sum of all the response scores. Six questions were asked giving a maximum score of 30 and a minimum score of 6. The midpoint is 18. Scores below the midpoint indicates that the farmer perceives the quality of services to be poor while scores above the midpoint indicates the farmer perceives the quality of services to be good. The higher the score the better the quality of services is perceived to be.

Descriptive statistics were used to describe the sample of the study in the form of frequency distribution, percentages, means and standard deviation. The relationships between independent and dependent variables was calculated using Chi–square statistics and interpreted at α=0.05 level of significance (Kalyanarama, 2009).

Table 3: Summary of statistical tests used in data analysis.

Hypothesis	Independent Variables	Dependent Variable	Statistical Test
H_{01}: There is no statistically significant relationship between Farmers' level of awareness of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.	Farmers' level of awareness of plant clinics o Awareness of existence of plant clinics o Awareness they operate in Nakuru-North Sub-County o Awareness of the services they provide o Awareness of the nearest plant clinic site o Awareness when plant clinic is held o Awareness how plant clinics operate	Farmers demand for services from plant clinics.	Chi – Square
H_{02}: There is no statistically significant relationship between Accessibility of plant clinics by farmers and demand for services from plant clinics in Nakuru-North Sub-County.	Accessibility of plant clinics by farmers o Distance from farmers' residence to the nearest plant clinic	Farmers demand for services from plant clinics.	Chi – Square
H_{O3}: There is no statistically significant relationship between farmers' perception of plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.	Farmers' Perception of relevance of Plant Clinics o Pertinent o Provide required information o Appropriate o Applicable o Timely o Current information	Farmers demand for services from plant clinics.	Chi – Square
H_{O4}: There is no statistically significant relationship between farmers' perception of quality of services provided at the plant clinics and demand for services from plant clinics in Nakuru-North Sub-County.	Farmers' Perception of Quality of services provided at the Plant Clinics o Reliability o Prompt staff response o Qualified staff o Polite staff o Trusted institutions o Appropriate equipments	Farmers demand for services from plant clinics.	Chi – Square

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion of the study. Section 4.2 presents the profiles and discussion of the respondents. Section 4.3 presents the findings and discussion of analysis of the independent variable 'farmers' level of awareness of plant clinics,' and of the dependent variable 'farmers' demand for services from plant clinics. It also gives the results of the analysis of the relationship between the independent and the dependent variables. Section 4.4 is the findings and discussion of the measurement of the independent variable 'accessibility of plant clinics services' and of the analysis of the relationship between the variable and the dependent variable. Section 4.5 gives the results and discussion of measurement of the independent variable 'farmers' perceptions of relevance of plant clinics' and of the analysis of the relationship between the variable and the dependent variable. Section 4.6 presents the results and discussion of measurement of the independent variable 'farmers' perceptions of quality of services provided at the plant clinics' and of the analysis of the relationship between the variable and the dependent variable.

4.2 Profiles of the respondents

In order to understand the characteristics of the study population, the respondents were asked to indicate the details of their date of birth (used to work out their age), gender, level of education, farm sizes, and monthly incomes. All the 152 respondents responded to this question. The responses were analyzed using descriptive statistics and summarized in frequency distribution, percentages, and means. The results are shown in Table 4.

Table 4: Profiles of the respondents

Variable	Parameter	Frequency	Percentage (%)	Mean
Age	Youths (18-35 years)	40	26.3	45
	Middle aged (36-60 years)	94	61.8	
	Elderly (>60 years)	18	11.9	
	Total	152	100.0	
Gender	Male	78	51.3	
	Female	74	48.7	
	Total	152	100.0	
Level of education	No Formal Education	18	11.8	
	Primary School Education	57	37.5	
	Secondary School Education	54	35.5	
	Post-Secondary School Education	23	15.1	
	Total	152	100.0	
Farm sizes (hactares)	0.1 - 0.5	78	51.3	0.62
	0.6 - 1.0	57	37.5	
	1.1 - 1.5	8	5.3	
	- 2.0	6	3.9	
	>2	3	2.0	
	Total	152	100.0	
Monthly income (KES)	1-10,000	105	69.1	10,981
	10,001-20,000	28	18.4	
	20,001-30,000	11	7.2	
	> 30,000	4	2.6	
	No Response	4	2.6	
	Total	152	100.0	

n=152

The results indicate that 26.4% of the respondents were youths (18 - 35 years), 61.8% were middle aged (36 - 60 years) while 11.8% were elderly farmers (>60 years). This implies that most of the small scale farmers in Nakuru-North Sub-County are middle aged, followed by youths and only few (11.8%) of the farmers are elderly farmers. The results also indicate that 51.3% of the respondents were men while 48.7% were women. This implies that in the Sub-County, farming is an activity of both the male and the female. Plant clinics should therefore be planned so as to favour the demand of their services by both male and female. For example, while choosing plant clinics sites and determining the time of the day when the plant clinics are held, factors such as gender daily calendars needs to be understood. e.g. If the plant clinic is scheduled around midday, women are more likely not to attend as this is the time they prepare lunch at their homes.

The results show that 11.8% of the respondents had no Formal Education, 37.5% had Primary School Education, 35.5% had Secondary School Education, and 15.1% had Post-Secondary Education. Hence most of the respondents (88.1%) have at least primary level education and only 11.8% of the respondents had no formal education. This implies that majority of farmers in Nakuru-North Sub-County are literate and can therefore read and understand publicity materials for plant clinics, and information brochures. Communication barrier is therefore unlikely to be an impediment to these farmers demanding services from plant clinics. They would also be able to get and understand the information from the media. This would be an advantage while creating awareness of plant clinics and implementing the recommendations given by plant doctors. Farmers who are well aware of plant clinics would most probably be compelled to demand for their services. Since literate farmers are more likely to understand the recommendations given to them by plant doctors, they would be expected to make more demand for the services after realizing their benefits.

The results indicate that 51.3% of the respondents had farms which were 0.1 – 0.5 hectare, 37.5% had farms which were 0.6 – 1.0 hectare, 5.3% had farm which were 1.1 – 1.5 hectares, 3.9% had farms which were 1.6 - 2.0 hectares while 2% had farms which were >2.0 hectares. The mean land size of the respondents was 0.67 hectares. This implies that most respondents (88.8%) had farms of less than or equal to 1.0 hectare. The small farm sizes can either work for or against the farmers' demand for services from the plant clinics. Either the farmer can opt to apply best practices and optimize production from the small farm size. In this case he would be motivated to demand for plant clinics services to minimize his crop losses from pests and diseases. Most likely these farmers practiced continuous cropping due to inadequate land for crop rotation. This would result in crop pests and diseases build up making plant clinics services crucial to them. On the hand the farmer could view the total value of the crops at risk as small and not worth the bother of visiting a plant clinic. This would likely deter the farmer from demanding for plant clinics services.

The results show that the monthly incomes of 69.1% of the respondents were between KES.1 and KES. 10,000. 18.4% had monthly incomes of between KES. 10,001 to 20,000, 7.2% had monthly incomes of between KES.20,001 to 30,000 and 2.6% had incomes of over KES.30,000 per month. The mean monthly income of the respondents was KES.10,981. This implies that most of the small scale farmers in the study area are in the lowest income category of KES. 1 - KES.10,000 per month. Low incomes may affect the farmers demand for plant clinics either positively or negatively. First the level of income indicates that their

farm production is low. It is possible that they are not keen to follow good farming practices that would guarantee them high agricultural production that would lead to high incomes. Such farmers may lack persuasion to demand for plant clinics services. They may also have a low demand for plant clinics services due to the feeling that their incomes are low and therefore they may not be able to buy the recommended pests and diseases control products. On the other hand, their low income status may encourage them to take advantage of the free plant clinics services to reduce their crops losses in an attempt to raise their income levels. Collaboration between plant clinics implementers with pesticide companies or dealers to avail recommended chemicals at subsidized prices during plant clinics is likely to encourage such farmers to demand for plant clinics services.

4.3 Farmers' Level of Awareness of Plant Clinics

Section 4.3.1 presents the results of measurements of the independent variable 'farmers' level of awareness of plant clinics' and that of the dependent variable 'farmers demand for services from the plant clinics' while section 4.3.2 closes by presenting the result and discussion of the Chi-square Test of the Relationship between the two variables.

4.3.1 Respondents' Awareness of Plant Clinics

The respondents were asked to indicate whether they agree with six statements on their awareness of plant clinics by ticking 'Yes' or 'No' against each one of them. All the 152 respondents responded to this question. Their responses are summarized in Table 5.

Table 5: Respondents' Awareness of Attributes of Plant Clinics

Statement	Response			
	Yes		No	
	Frequency	%	Frequency	%
I am aware of the existence of plant clinics	99	65.1	53	34.9
I am aware that plant clinics operate in this Sub-County	90	59.2	62	40.8
I am aware of the services plant clinics provide	88	57.9	64	42.1
I am aware of the site of my nearest plant clinic	80	52.6	72	47.4
I am aware of when the nearest plant clinic to my residence is held	71	46.7	81	53.3
I am aware of how plant clinics operate	77	50.7	75	49.3

n=152

The results indicate that 65.1% of the respondents were aware that plant clinics exist, 59.2% were aware that plant clinics operate in Nakuru-North Sub-County, 57.9% were aware of services provided by the plant clinics, 52.6% were aware of the site of the nearest plant clinic

to their residence, 46.7% were aware of when the nearest plant clinic to their residence is held, and 50.7% were aware of how plant clinics operate.

From the analysis, majority of the respondents were aware that plant clinics exist. The analyses also show that the respondents had different levels of awareness of plant clinics. For example only 46.7% of the respondents were aware when the nearest plant clinics to their residence are held implying that 18.4% of the respondents were aware of the existence of plant clinics but not aware of when the nearest plant clinics to their residence are held.

A score of 1 was given for a 'Yes' and 0 for a 'No' response to each of the statements. The sum of scores which represented the number of attributes of plant clinics that the respondent was aware of was then computed. Based on the number of attributes of plant clinics that the respondent was aware of, the respondents were categorized into 3 levels of awareness of plant clinics; Those who were not aware of any of the six attributes of plant clinics were categorized as having No awareness, those who were aware of 1 to 3 attributes of plant clinics were categorized as having low level of awareness of plant clinics since they were only aware of at most half of the six attributes of plant clinics, those who were aware of 4 to 6 attributes of plant clinics were categorized as having high level of awareness of plant clinics since they were aware of more than half of the six attributes of plant clinics. The results are summarized in table 6.

Table 6: Respondents' Level of Awareness of Plant Clinics

Level of Awareness	Frequency	Percent
No Awareness	53	34.9
Low Level of Awareness	15	9.9
High Level of Awareness	84	55.2
Total	152	100

n=152

The results indicated that 34.9% of the respondents were not aware of plant clinics, 9.9% had low level of awareness of plant clinics, while 55.3% had a high level of awareness of plant clinics. Table 7shows the farmers' level of awareness of plant clinics by Locations

Table 7: Respondents level of Awareness of Plant Clinics by Locations

Location	Level of Awareness						Total
	No Awareness		Low		High		
	f	%	f	%	f	%	
Bahati	3	6.1	8	16.3	38	77.6	49
Kabatini	25	62.5	1	2.5	14	35.0	40
Dundori	7	35.0	3	15.0	10	50.0	20
Githioro	18	41.8	3	7.0	22	51.2	43

f – frequency, % - percentage

The results show that the level of awareness of plant clinics varied from one Location to the other. The proportion of respondents who had high level of awareness of plant clinics was highest (77.6%) in Bahati Location. It was lowest in Kabatini Location which had 62.5% of the respondents being not aware of plant clinics. The variation could be as a result of the differences in the sizes of the locations and therefore the distance from the farmer to the nearest plant clinics. It could also be due to the differences in publicity skills of the 'plant doctors' man plant clinics in the different locations. Bahati being the Sub-County headquarters could be having an advantage of more farmers visiting the center while attending to other businesses than the other plant clinics venues.

4.3.2 Respondents' opinion on how to improve Awareness of Plant Clinics

The respondents indicated their opinion on how awareness of plant clinics can be improved. The results are summarized in Table 8.

Table 8: Respondents' opinion on how farmers' awareness of plant clinics can be improved

Response	Frequency	Percent
Holding them more frequently	15	9.9
Conducting them in venues nearer to farmers	17	11.2
Doing more publicity	108	71.1
No response	12	7.8
Total	152	100.0

n=152

The results indicate that majority (71.1%) of the respondents had the opinion that more publicity should be done, 9.9% were of the opinion that the plant clinics should be held more frequently, while 11.2% were of the opinion that the plant clinics should be conducted in venues closer to the farmers. There were 7.8% of the respondents who did not respond to this question may be because they did not have an idea or they were not sure of what to answer.

4.3.3 Farmers' Demand for Services from Plant Clinics

The dependent variable 'farmers' demand for services from plant clinics' was measured by the number of times a farmer attended a plant clinic and the number of samples taken to the plant clinic in the last one year. Since a respondent would not be expected to attend a plant clinic if he was not aware that they exist, the test was run on the 99 respondents who had some awareness of plant clinics.

i) Number of times respondents attended a Plant Clinic in the Last One Year

The respondents were asked to indicate the number of times they attended a plant clinic in the past one year. The responses of the 99 respondents who had some awareness of plant clinics are summarized in Table 9.

Table 9: Number of Times Respondents Attended Plant Clinic in the Past One Year

Number of times	Frequency	Percent
None	41	41.4
Once	17	17.2
Twice	13	13.1
Thrice	9	9.1
More than three times	19	19.2
Total	99	100.0

n=99

The results indicated that 41.4% of those respondents who had some awareness of plant clinics did not attend a plant clinic in the past one year, 17.2% attended once, 13.1% attended twice, 9.1% attended thrice, and 19.2 % attended more than thrice. This implies that majority (58.6%) of those who had some awareness of plant clinics attended a plant clinic at least once during the year. Majority of those who attended did so more than once during the period.

Based on the number of times they attended a plant clinic in the past one year, the respondents were categorized into 3 levels of demand for plant clinics services. Those who did not attend were categorized as Non-users, those who attended once were categorized as One time users, while those who attended more than once were categorized as Return Clients. The results are summarized in table 10.

Table 10: Demand for services from plant clinics

Demand	Frequency	Percent
Non-users	41	41.4
One time users	17	17.2
Return Clients	41	41.4
Total	99	100.0

n=99

The results indicate that out of the respondents who had some awareness of plant clinics 41.4% were Non-users of plant clinics, 17.2% were one time users while 41.4% were return clients. This implies that a significant proportion of those who had some awareness of plant clinics were Non-users of plant clinics. It could be that they did not have sufficient information to enable them demand for plant clinics services or there were other factors that hindered them from demanding for the services. Table 11 shows the Demand for services from plant clinics per study location.

Table 11: Demand for services from plant clinics by Locations

	Demand			
Location	None User	One Time Users	Return Clients	Total
Bahati	21	13	12	46
Kabatini	5	2	8	15
Dundori	4	2	7	13
Githioro	11	0	14	25

n=99

The results indicate that the demand for services from plant clinics varied from one location to the other. The proportion of respondents who had some awareness of plant clinics but were non-users of plant clinics was highest in Bahati as compared to the other Locations of the study. In Bahati Location also, majority of those who attended plant clinics were one time users while in the other three Locations they were return clients. These imply that although the respondents from Bahati Location had the highest level of awareness of plant clinics, they also had the lowest level of demand for services from plant clinics amongst those who were awareness of plant clinics. It means therefore that farmers' demand for services from the plant clinics depend on other factors besides awareness of plant clinics.

ii) Reasons for Non-users not attending Plant Clinics

The respondents who didn't attend a plant clinic in the past one year were asked to state the reasons for not attending. The responses are summarized in table 12.

Table 12: Reasons for non-users not attending plant clinics

Reason for not attending a Plant Clinic	Frequency	%
Inadequate information on the Plant Clinics	10	23.4
Far distance to the nearest Plant Clinic	10	23.4
Lack of time due to other engagements	7	17.1
No serious plant health problem encountered	6	14.7
Previous attendance didn't bear results	1	2.4
Lack of interest in Plant Clinics	3	7.3
Receives the services from elsewhere	1	2.4
No response	3	7.3

n=41

The results indicate that 10 (23.4%) of those who had some awareness about plant clinics, but didn't attend a plant clinic in the past one year cited inadequate information about plant clinics as the reason for not attending plant clinics. They were either not aware that plant clinics operate in Nakuru-North Sub-County, the services provided by the plant clinics, of the site of the nearest plant clinic to their residence, when the nearest plant clinic to their residence is held, or how plant clinics operate. The results also indicated that 23.4% didn't attend because the plant clinics venues are far away from their residence, 17.1% cited lack of time to attend plant clinics due to other engagements, 14.7% because they had not encountered serious plant health problems. There were 2.4% who didn't attend because their previous attendance did not yield results, 7.3% who failed to attend due to lack of interest on plant clinics, 2.4% because they receive similar services from other sources while 7.3% did not respond to the question.

The findings imply that the following steps are necessary to make those who didn't attend plant clinics to attend; First, more publicity needs to be done to ensure that more farmers have adequate information on plant clinics. This can be done by; conducting the plant clinics closer to the farmers possibly in the rural areas and in more sites, holding them more frequently, use of ICT for communication between farmers and staff, use of media. Secondly, the distances that farmers cover to the nearest plant clinics need to be reduced. This can be done by introducing mobile plant clinics or increasing the number of plant clinics. Thirdly farmers' interest on plant clinics should be aroused. This can possibly be done by conducting

more farmers' trainings on appropriate farming methods, providing current and effective recommendations, and providing written materials such as brochures and pamphlets.

iii) Number of samples taken to Plant Clinics in the Past One Year

The respondents were asked to indicate the number of samples they had taken to plant clinics in the last one year. All the respondents responded to this question. The results are summarized in table 13.

Table 13: Number of samples taken to plant clinics in the past one year

Number of samples	Frequency	Percent
0.00	53	53.5
1.00	9	9.1
2.00	9	9.1
3.00	4	4.0
4.00	9	9.1
5.00	6	6.1
6.00	3	3.0
7.00	4	4.0
8.00	1	1.0
10.00	1	1.0

n=99

The results indicate that 53(53.5%) of the 99 respondents who had some awareness about plant clinics did not take any sample to the plant clinic in the past one year. Since the results in table 13 indicated that 41(41.4%) of the respondents did not attend any plant clinic in the past one year, then it implies that 12(12.1%) of the respondents attended plant clinics but did not take any sample to the plant clinic with them. As such the Number of samples taken to plant clinics in the past one year would not be an appropriate measure of farmers' demand for services from the plant clinics. The number of times a farmer had attended plant clinic in the past one year was therefore considered to be a more appropriate measure for the farmers' demand for services from the plant clinics.

The respondents gave their opinion on what can be done to improve farmers' demand for services from the plant clinics. The results of analysis of the responses by those respondents who had some awareness of plant clinics are summarized in Table 14.

Table 14: Respondents' opinion on how to improve farmers' demand for services from plant clinics

Response	f	%
Conducting the in venues which are nearer to farmers	14	14.1
Holding them more frequently	12	12.1
Doing more publicity to increase awareness	28	28.3
Ensuring effective communication with farmers	10	10.1
Availing agrochemicals at fair prices during plant clinics	15	15.2
Teaching farmers on importance of the plant clinics	9	9.1
Plant doctors visiting the farmers	7	7.1
Plant doctors being accessible in the social media	2	2.0
No response	3	3.0

n=99, f – frequency, %- percentage

The results indicate that 28.3% of the respondents were of the opinion that the demand of services from plant clinics can be improved by doing more publicity to increase farmers' awareness of plant clinics and their services. Another 15.2% of the respondents thought that the demand for services from plant clinics can be improved by availing agrochemicals at fair prices during plant clinics. This can serve as one stop shop for both crop protection advice and agrochemicals and thereby saving farmers' time and cautioning them from counterfeit agrochemicals. This can also act as bait for attracting farmers to the plant clinics. The results also show that 14.1% felt that the demand could be improved by conducting the plant clinics in venues which are nearer to the farmers, possibly because this would cut the time taken and cost of visiting the plant clinic. Those who were of the opinion that the demand could be improved by holding the plant clinics more frequently were 12.1%. This would possibly increase the chances of those farmers who have limited time due to other commitments attending plant clinics.

There were 10.1% of the respondents who thought that the demand of services from plant clinics can be improved by ensuring that there is a clear communication between the farmers and the plant doctors so that the farmers understand well the recommendations passed to them by the plant doctors. There were also 9.1% of the respondents who had the opinion that by teaching farmers on importance of the plant clinics, more farmers would demand their services. Training would make the farmers informed of the losses they incur due to pests and disease incidences as well as the savings and gains they would get by seeking the right information on how to control the pests and diseases. The respondents who felt that the

demand can be improved be having the plant doctor visiting the farmers whose crop is affects instead of the farmer carrying the samples to the plant clinic were 7.1%. A further 2.0% felt that the demand for services from plant clinics can be improved by having Plant doctors being accessible in the social media. This would possibly improve the accessibility of the plant doctors to the farmers, some of whom who doesn't get time to attend plant clinics due to other engagements. Only 3.0% of the respondents did not respond to the question.

4.3.3 Relationship between Farmers' Level of Awareness of Plant Clinics and Farmers' Demand for services from the Plant Clinics

Table 15 presents cross tabulation of farmers' level of awareness of plant clinics and farmers' demand for services from the plant clinics.

Table 15: Cross tabulation of farmers' level of awareness of plant clinics and farmers' demand for services from plant clinics

Level of Awareness	Demand for services from plant clinics			Total
	None users	One time users	Return clients	
Low	15	0	0	15
High	26	17	41	84
Total	41	17	41	99

n=152

Table 16 shows the result of Chi-Square test of the relationship between the independent variable 'farmers' level of awareness of plant clinics' and the dependent variable 'farmers' demand for services from plant clinics' at α=0.05 level of significance.

Table 16: Chi-square Test of the Relationship between Farmers' Level of Awareness of Plant Clinics and their demand for services from plant clinics

Test	Value	df
Pearson Chi-square	25.009	2
Pearson's R	.464	
N of valid Cases	99	

The computed value of Chi-square χ^2 for the relationship between the independent variable 'farmers' level of awareness of plant clinics' and the dependent variable 'farmers' demand for services from plant clinics' is 25.009. The table value of χ^2 at 2 degrees of freedom and α=0.05 level of significance is 5.9915. Since the computed χ^2 = 25.009 > Table value of χ^2 =5.9915, then the Null Hypothesis that there is no statistically significant relationship between farmers' level of awareness of plant clinics and their demand for services from plant

clinics in Nakuru-North Sub-County is therefore rejected and a conclusion made that there is a statistically significant relationship between farmers' level of awareness of plant clinics and their demand for services from plant clinics in Nakuru-North Sub-County.

The existence of a statistically significant relationship between the independent variable 'farmer's level of awareness of plant clinics' and the dependent variable 'farmers' demand for services from plant clinics' implies that the two variables are correlated and therefore changing the farmers' level of awareness of plant clinics (independent variable) would consequently lead to a change in the level of farmers demand for services from plant clinics. Since the Pearson's R value for correlation of the two variables is positive, it implies that improving the farmers' level of awareness of plant clinics (independent variable) would consequently improve the level of farmers' demand for services from plant clinics.

The finding agrees with the views of Danielsen, Frank, Emmanuel and Gabriel (2012), that the demand for services or technologies is driven by awareness of the existence of these services or technologies. It also agrees with the opinion of Do and Wong (2012), that plant doctors can't create demand for their services without first creating awareness of their operations since a potential client must be aware of the service before choosing to demand for it. The findings are also consistent with the argument of Faham, Rezvanfar and Samiee (2009), that awareness plays a crucial role in adoption of innovations. They are also in agreement with the findings of Ghiasi et al., 2017 that familiarity with plant clinics has positive impact on farmers demand for Plant Clinics services. The also agree with the findings of Mujahid et al., 2016that lack of information about plant clinics is among the main reasons cited for not attending plant clinics in Vietnam, Sri Lanka, Malawi and Zambia found.

The farmers' level of awareness of plant clinics maybe improved through approaches which include holding the plant clinics in a number of venues such as in every Sub-location, publicity through area leaders and media, holding them in farmers' farms, conducting them in farmers' groups, more farmers' sensitization during Field days, farmers' trainings, public barazas, holding the Plant Clinics more frequently. Since the study established that most of the small scale farmers in Nakuru-North Sub-County are youths and middle aged, Information Communication Technology (ICT) would also be an appropriate method of publicity of plant clinics and for other plant clinics communications as these age groups are increasingly using ICT. The use of Short Message Services (SMS), Social media like

whatsApp and Face book has the potential of reaching more farmers and more easily. This would probably increase farmers' demand for plant clinics services and the consequent benefits of reducing crop losses due to pests and diseases damage resulting into increased crops yield. Since the study shows that most of the farmers in the Sub-County are literate (have at least a primary level of education), it is likely that they can read and understand publicity materials for plant clinics, and information brochures implying that written materials would also be appropriate for publicity of plant clinics.

4.4 Accessibility of Plant Clinics Services by farmers

This section presents the results of measurements of the independent variable 'Accessibility of Plant Clinics Services by the farmers', and the results and discussion of the Chi-square Test of the Relationship between the variable and the dependent variable.

4.4.1 Distance from Farmers' Residences to nearest Plant Clinic

Respondents were asked to indicate the distance from their residence to the nearest plant clinic. Even those respondents who learnt of plant clinics for the first time during the study could estimate the distance from their residence to the nearest plant clinic after learning of where the sites are. Nearly all of them (99.3%) responded to this question as indicated in Table 17.

Table 17: *Distance from farmers' residences to nearest plant clinic*

Distance (km)	Frequency	Percent	Mean
.50	34	22.4	1.92
1.00	31	20.4	
1.50	11	7.2	
2.00	19	12.5	
2.50	11	7.2	
3.00	23	15.1	
3.50	6	3.9	
4.00	11	7.2	
4.50	1	.7	
5.00	3	2.0	
6.00	1	.7	
No Response	1	.7	
Total	152	100.0	

n =152

Based on the distance from their residence to the nearest plant clinic, the respondents were grouped into 3 categories. Those within 0.5 to 2 km were categorized as having high

accessibility of plant clinic; those within 2.5 to 4 km were categorized as having moderate accessibility of plant clinic, while those within 4.5 to 6 km were categorized as having low accessibility of plant clinic. The results are summarized in table 18.

Table 18: Accessibility of plant clinics

Accessibility of plant clinic	Frequency	Percent
Low	5	3.3
Moderate	51	33.6
High	95	62.5
No response	1	.7
Total	152	100.0

The results indicate that 3.3% of the respondents were within 4.5 to 6 km, 33.6% of the respondents were within 2.5 to 4 km while 62.5% were within 0.5 to 2 km from the site of the nearest plant clinic venue. The mean distance from the respondent's residence to the nearest plant clinic was found to be 1.92 km. None of the respondent was more than 6km from the nearest plant clinic venue. This implies that plant clinics are well accessible to majority of the respondents. Since 11.6% of those who failed to attend plant clinics in the past one year cited far distance as their reason for not attending plant clinics, then it means they would prefer the plant clinics to be nearer to their residences.

4.4.2 How Accessibility of Plant Clinics can be improved

The respondents were asked to indicate their opinion on how the accessibility of plant clinics services can be improved. The results are summarized in Table 19.

Table 19: Respondents' opinion on how the accessibility of plant clinics services can be improved

Response	Frequency	Percentage
Holding them more frequently	23	15.1
Holding them in venues which are nearer to farmers	83	54.6
Use of ICT for communication between farmers and plant doctors	10	6.6
Introducing mobile plant clinics	19	12.5
Having permanent stations for plant clinics	3	2
No response	14	9.2
Total	152	100

n =152

The results indicate that majority (54.6%) of the respondents thought that the accessibility of plant clinics can be improved by having them being held in venues which are nearer to the farmers. That means devolving them possibly from being held per location to being held per Sub-location or even per village. This would ensure that every farmer is close to a plant

clinic. Another 15.1% of the respondents felt that the accessibility of plant clinics can be improved by having them being held more frequently. Having the plant clinics being held more frequently would ensure that the nearest plant clinic to the farmer will be held soon after the farmer notices a problem on his crop and therefore the farmer doesn't have to travel to another plant clinic which is distant away but next on schedule. Another 12.5% of the respondents had the opinion that accessibility of plant clinics can be improved by introducing mobile plant clinics. This would enable the plant doctors to mover deeper into the rural areas where more farmers are and also be able to schedule for more plant clinics sessions. A further 6.6% of the respondents thought that accessibility of plant clinics can be improved by incorporating the use of information communication technology (ICT) for communication between farmers and plant doctors. This would enable the farmers to communicate with the plant doctors even when they are far off. A farmer who may not have been able to attend a plant clinic for some reason would conveniently take photos of the diseased samples, send them to the plant doctor for identification and then receive advice through the same channel. Those who felt that accessibility of plant clinics can be improved by having permanent stations for plant clinics where the services or offered continuously 2% of the respondents. This would guarantee that the services of the nearest plant clinic are available at any time that the farmer needs them and would lead to noted outbreaks of pests and diseases being dealt with promptly and therefore minimizing the crop losses they would cause.

4.4.3 Relationship between Accessibility of Plant Clinics and Farmers' Demand for services from Plant Clinics

A cross tabulation of accessibility of plant clinics, and farmers' demand for services from plant clinics was done for the respondents who had some awareness of plant clinics as shown in Table 20.

Table 20: Cross tabulation of the accessibility of plant clinics and farmers' demand for services from plant clinics

Accessibility of plant clinics	Demand for services from plant clinics			Total
	None users	One time users	Return clients	
Low	2	0	0	2
Moderate	16	1	7	24
High	23	15	34	72
Total	41	16	41	98

The results show that none of those who indicated they were aware of plant clinics but had low accessibility of plant clinics attended a plant clinic. The results also show that the majority of those who attended plant clinics either once or more than once were those who had high accessibility of plant clinics services.

Table 21 presents the result of the Chi-square test for the relationship between the independent variable 'accessibility of plant clinics' and the dependent variable 'farmers' demand for services from plant clinics' at α=0.05 level of significance.

Table 21:Chi-square test of the relationship between accessibility of plant clinics and farmers' demand for plant clinics services

Test	Value	df
Pearson Chi-Square	12.491	4
Pearson's R	.293	
N of Valid Cases	98	

The computed value of Chi-square χ^2 for the relationship between accessibility of plant clinics and farmers demand for plant clinics services is 12.491. The table value of Chi-square (χ^2) at 4 degrees of freedom and α=0.05 level of significance is 9.48733. Since the computed χ^2 = 12.491 > Table value of χ^2 =9.48733, then the Null Hypothesis that there is no statistically significant relationship between accessibility of plant clinics by farmers and the farmers' demand for services from plant clinics in Nakuru-North Sub-County is therefore rejected and a conclusion made that there is a statistically significant relationship between accessibility of plant clinics and farmers' demand for services from plant clinics.

The existence of a statistically significant relationship between the independent variable 'accessibility of plant clinics' and the dependent variable 'farmers' demand for plant clinics services' implies that the two variables are correlated and therefore changing the accessibility

of plant clinics by farmers' (independent variable) would consequently would consequently lead to a in change the farmers' demand for services from plant clinics. Since the Pearson's R value for correlation of the two variables is positive, it implies that improving the accessibility of plant clinics (independent variable) would consequently improve the level of farmers' demand for services from plant clinics. This is in agreement with the findings of Adhikari, Regmi, Thapa, Dhoj and Boa (2016) that increase in distance reduce the probability of a farmer's participation in plant clinics and vice versa. It is also in agreement with the views Mohammed and Shamima (2011) that long distance can be a significant obstacle to reaching services, and a disincentive to trying to seek for services. It is also consistent with the views of Brubaker et al., 2013 that physical distance from the plant clinic may determine how frequently a farmer attends plant clinics.

Since the farmers demand for services from plant clinics has been found to be correlated with accessibility of plant clinics, farmers' demand for services from plant clinics can be improved by making the services more accessible to the farmers. According to Karubanga, Matsiko and Danielsen (2017), placing clinics at market places does not automatically ensure equitable access and high farmer attendance to plant clinics. Efforts should therefore be made to ensure that plant clinics services become more accessible to the small scale farmers in Nakuru-North Sub-County. This can possibly be done by holding the plant clinics in more venues and thereby reducing the distances between the farmers and the nearest plant clinic. It can also be achieved through introduction of mobile plant clinics.

4.5 Farmers' Perceptions of the Relevance of Plant Clinics

This section presents the results of measurement of the independent variable 'Farmers' Level of Awareness of Plant Clinics', and the results and discussion of the Chi-square Test of the Relationship between the variable and the dependent variable.

4.5.1 Respondents' Perceptions of the Relevance of Plant Clinics

The respondents were asked to indicate their opinion on relevance of plant clinics by responding to a set of six statements. The responses of the respondents who indicated that they had some awareness of plant clinics were recorded on a five point Likert scale with 1= Strongly disagree, 2 = Disagree, 3 = No opinion, 4 = Agree, 5= Strongly agree. The results are summarized in table 22.

Table 22: Respondents opinion on relevance of plant clinics

Statement	Strongly Agree		Agree		Not Sure		Disagree		Strongly Disagree		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
Plant clinics are pertinent	42	42.4	45	45.5	4	4.0	6	6.1	2	2.0	99	100
Plant clinics provide required information	41	41.4	45	45.5	11	11.1	2	2.0	-	-	99	100
Plant clinics provide appropriate services	31	31.3	53	53.5	11	11.1	4	4.0	-	-	99	100
Recommendations provided at plant clinics are applicable	33	33.3	51	51.5	10	10.1	4	4.0	1	1.0	99	100
Plant clinics services are timely	17	17.2	42	42.4	27	27.3	10	10.1	3	3.0	99	100
Information provided at plant clinics is current	24	24.2	53	53.5	18	18.2	3	3.0	1	1.0	99	100

n=99, f - frequency, % - percentage

An index score was then computed as a simple sum of the response scores from the six statements giving a maximum score of 30 and a minimum score of 6. The midpoint is 18 indicating that the farmer has no opinion or is not sure. An index score below 18 indicates that the farmer perceives plant clinics as not relevant (negative perception) while an index score above 18 indicate that the farmer perceives plant clinics as relevant (positive perception). 152 of the respondents responded to this question giving a response rate of 100%. The results are summarized in table 23.

Table 23: Farmers' perceptions of relevance of plant clinics

Perception	Frequency	Percent
Negative	6	6.1
No Opinion	3	3.0
Positive	90	90.9
Total	99	100.0

The results indicated that 10 % of the respondents perceive plant clinics as not relevant. Some other 86.2% of the respondents perceive plant clinics as relevant, and 3.9% of the respondents had no opinion on the relevance of plant clinics.

4.5.2 Respondents' opinion on how to make Plant Clinics more relevant

The respondents were asked to indicate their opinion on what can be done to make plant clinics more relevant to the current crop protection needs of farmers. The results are summarized in Table 24.

Table 24: Respondents' opinion on how to make plant clinics more relevant

Response	Frequency	%
Conducting them in venues which are nearer to farmers	11	11.1
Ensuring accurate diagnosis and recommendations	9	9.1
Holding them more frequently	9	9.1
Training farmers on good agricultural practices	7	7.1
Availing recommended pests and diseases control products during plant clinics sessions	16	16.2
Incorporate written materials e.g. brochures in plant clinics	6	6.1
Updating information given to farmers regularly	11	11.1
Teaching farmers on importance of the plant clinics	4	4.0
Providing applicable recommendations to farmers	4	4.0
No response	22	22.2
Total	99	100

n=99

The results indicate that 17.8% of the respondents had the opinion that plant clinics can be made more relevant to the farmers' crop protection needs by ensuring that the plant doctors give accurate diagnosis and recommendations to the plant problems. This ensures that the farmers' visit to the plant clinic is never in vain but addresses the farmers' problem. There were 15.5% who felt the plant clinics can be made more relevant by holding them more frequently such that the services are available whenever the farmer needs them. Some 15.1% of the respondents thought that plant clinics can be made more relevant by conducting them in venues which are nearer to farmers so that. The results also indicate that 11.8% of the respondents had the opinion that the services can be made more relevant by availing recommended plant pests and diseases control products during plant clinics sessions. This is to ensure that the products recommended to the farmer are available and on time for the farmer to use the right products. There were 7.1% who thought that the plant clinics can be made more relevant by regularly updating information given to farmers as this would provide them with the improved ways of combating the crop pests and disease problems. A further

5.9% of the respondents were of opinion that plant clinics can be made more relevant by training farmers on good agricultural practices. This would increase farmers' awareness of the risks of pests and diseases on their crops and hence the relevance for a crop protection extension system. Those who felt that plant clinics can be made more relevant by incorporating written materials e.g. brochures in plant clinics as reference materials were 3.9% of the respondents while3.3% of the respondents believed that plant clinics can be made more relevant by teaching farmers on their importance. Some farmers may be ignorant and might not understand the importance of plant clinics unless they are explained.

4.5.3 Relationship between Farmers' Perception of Relevance of Plant Clinics and Farmers' Demand for services from Plant Clinics

Table 25 present the result of the Chi-square test for the relationship between the independent variable 'farmers' perception of relevance of plant clinics' and the dependent variable 'farmers' demand for services from plant clinics' at α=0.05 level of significance.

Table 25: Cross tabulation of farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics

Perception of relevance of plant clinics	Demand for services from plant clinics		
	None users	One time users	Return clients
Negative	4	1	1
No Opinion	3	0	0
Positive	34	16	40
Total	41	17	41

n=99

Table 26 presents the result of the Chi-square test for the relationship between farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics at α=0.05 level of significance.

Table 26: Chi-square test of the relationship between farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics

Test	Value	df
Pearson Chi-Square	6.562	4
Pearson's R	.200	
N of Valid Cases	99	

The computed value of Chi-square χ^2 for the relationship between farmers' perception of relevance of plant clinics and farmers demand for services from plant clinics is 6.562. The Table value of Chi-square (χ^2) at 4 degrees of freedom and α=0.05 level of significance is

9.48733. Since the computed χ^2 = 6.562 < Table value of χ^2 =9.48733, then the Null Hypothesis that there is no statistically significant relationship between farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics is accepted.

The absence of a statistically significant relationship between farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics implies that just improving the farmers' perceptions of relevance of plant clinics would not result in any significant change in farmers' demand for plant clinics services. Efforts to do so should therefore be in addition to improving the factors that have significant relationship with the farmers' demand for plant clinics services. This finding contradicts the findings of Ghiasi et al. (2017) that service relevance have positive impact on farmers demand for Plant Clinics services in Iran. The difference could be due to the different farming environments and agricultural challenges between two areas.

4.6 Farmers' Perception of Quality of Services Provided at the Plant Clinics

This section presents the results of measurement of the independent variable 'Farmers' Perception of Quality of Services Provided at the Plant Clinics', and the results and discussion of the Chi-square Test of the Relationship between the variable and the dependent variable.

4.6.1 Respondents' opinion of Quality of Services Provided at the Plant Clinics

The respondents who had some awareness of plant clinics were asked to indicate their opinion on the quality of services provided at the plant clinics by responding to a set of six statements. The responses were recorded on a five point Likert scale with 1= Strongly disagree, 2 = Disagree, 3 = No opinion, 4 = Agree, 5= Strongly agree. The results are summarized in table 27.

Table 27: Respondents opinion on Quality of Services Provided at Plant Clinics

Statement	Strongly Agree		Agree		Not Sure		Disagree		Strongly Disagree		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
Plant clinics services are reliable	27	27.3	56	56.6	8	8.1	7	7.1	1	1.0	99	100
Staff manning plant clinics responds promptly	24	24.2	40	40.4	21	21.2	11	11.1	3	3.0	99	100
Staff manning plant clinics are well qualified	24	24.2	53	53.5	16	16.2	6	6.1	0	0	99	100
Staff manning plant clinics are polite	38	38.4	45	45.5	14	14.1	1	1.0	1	1.0	99	100
A trusted institution is running the clinics	44	44.4	36	36.4	17	17.2	2	2.0	0	0	99	100
Plant clinics have appropriate tools	10	10.1	35	35.4	36	36.4	16	16.2	2	2.0	99	100

n=99, f - frequency, % - percentage

An index score was then computed as a simple sum of the response scores from the six statements giving a maximum score of 30 and a minimum score of 6. The midpoint is 18 which indicate that the farmer has no opinion or is not sure. An index score below 18 indicates that the farmer perceived the quality of services provided at the plant clinics as poor (negative perception) while an index score above 18 indicate that the farmer perceives the quality of services provided at the plant clinics as good (positive perception). The results are summarized in table 28.

Table 28: Farmers' perceptions of the quality of services provided at the plant clinics

Perception	Frequency	Percent
Negative	6	6.1
No Opinion	3	3.0
Positive	90	90.9
Total	99	100.0

n=99

The results indicated that 90.9 % of the respondents perceived the quality of services provided at the plant clinics as good, 6.1 % of the respondents perceived them as poor, while 3% of them had no opinion on the quality of services provided at the plant clinics.

4.6.2 Respondents' opinion on how the Quality of Services provided at the Plant Clinics can be improved

The respondents were asked to indicate their opinion on what can be done to improve the quality of services provided at the plant clinics. The responses from those who had some awareness of plant clinics are summarized in Table 29.

Table 29: Respondents' opinion on how the quality of services provided at the plant clinics can be improved

Response	Frequency	%
Having competent plant doctors	21	21.2
Using appropriate plant clinics equipments	28	28.3
Providing current recommendations	3	3.0
Holding plant clinics more frequently	11	11.1
Backing oral recommendations with publications e.g. brochures, booklets	6	6.1
Providing applicable and affordable recommendations to farmers	2	2.0
Having well-furnished plant laboratories	4	4.0
Plant doctors responding quickly to farmers problems	4	4.0
Using polite language to customers	4	4.0
No response	16	16.2
Total	99	100

n=99

The results indicate that 28.3% of the respondents were of the opinion that the quality of services provided at the plant clinics can be improved by using appropriate plant clinics equipments. This would ensure accuracy in the pests and diseases identification. The results also indicated that 21.2% of the respondents had the opinion that the quality of services provided at the plant clinics can be improved by having competent plant doctors. This can be achieved by recruitment of well qualified staff and regular retraining of the existing 'plant doctors' to update their knowledge on crop pests and diseases management. Some other 4.0% of the respondents had the opinion that the quality of services provided at the plant clinics can be improved by having well-furnished plant laboratories. This would create conducive environment for the 'plant doctors' as well as the clients. It would also improve the impression the farmer has about plant clinics and motivate them to seek for services from them.

The results also show that 11.1% of the respondents thought that the quality of services provided at the plant clinics can be improved by holding the plant clinics more frequently. This would make the plant clinics more reliable. Another 3.0% of the respondents thought

that the quality of services provided at the plant clinics can be improved by providing current recommendations. Current information is viewed as an improvement of the previous ones and incorporates recent technologies which are adopted for their better performance than their predecessors. There was 6.1% of the respondents who felt that the quality of services provided at the plant clinics can be improved backing oral recommendations with publications e.g. brochures and booklets. This would enable farmers to study about the crop pests and diseases more deeply on their own. It would also help the farmers to validate the information they receive from the plant doctors. Those who believed that the quality of services provided at the plant clinics can be improved by the 'plant doctors' providing applicable and affordable recommendations to farmers were 2.0% of the respondents. Farmers would value applicable and affordable recommendations as it would be useful to them.

The results further indicate that 4.0% of the respondents had the opinion that the quality of services provided at the plant clinics can be improved by having the 'plant doctors' responding quickly to farmers' problems. This would ensure efficiency of the services as less time would be used by the farmers in getting their crop problems identified and being given the right recommendations. There were also 4.0% of the respondents who thought that the quality of services provided at the plant clinics can be improved by the 'plant doctors' using polite language to customers. This would improve the farmers' satisfaction with the services and encourage them to visit the plant clinics next time they note a problem with their crops.

4.6.3 The Relationship between Farmers' Perception of Quality of Services provided at the Plant Clinics and Farmers' Demand for services from the Plant Clinics

Table 30 presents a cross tabulation of farmers' perception of quality of services provided at the plant clinics and farmers' demand for services from plant clinics.

Table 30: Cross tabulation of farmers' perception of quality of services provided at the plant clinics and farmers' demand for services from the plant clinics

Perception	Demand for services from plant clinics			Total
	None users	One time users	Return clients	
Negative	5	0	1	6
No Opinion	3	0	0	3
Positive	33	17	40	90
Total	41	17	41	99

n=99

Table 31 shows the results of Chi-square test of the relationship between farmers' perception of quality of services provided at the plant clinics and farmers' demand for services from the plant clinics.

Table 31: Chi-square test of the relationship between farmers' perception of quality of services provided at the plant clinics and farmers' demand for services from the plant clinics

Test	Value	df
Pearson Chi-Square	9.551	4
Pearson's R	.244	
N of Valid Cases	99	

The computed value of Chi-square (χ^2) for the relationship between farmers' perception of quality of services provided at the plant clinics, and farmers demand for services from the plant clinics is 9.551. The table value of Chi-square (χ^2) at 4 degrees of freedom and α=0.05 level of significance is 9.48733. Since the computed χ^2 = 9.551 >Table value of χ^2 =9.48733, then the Null Hypothesis that there is no statistically significant relationship between farmers' perception of the quality of services provided at the plant clinics and farmers' demand for services from plant clinics in Nakuru-North Sub-County is rejected and a conclusion made that there is a statistically significant relationship between farmers' perception of quality of services provided at the plant clinics and farmers demand for services from plant clinics in Nakuru-North Sub-County.

The existence of a statistically significant relationship between the independent factor 'farmers' perception of quality of services provided at the plant clinics' and the dependent variable 'farmers demand for services from the plant clinics implies that the two variables are correlated and therefore changing the farmers' perception about the quality of services provided at the plant clinics (independent variable) would consequently would consequently

lead to a change in the level farmers' demand for services from plant clinics. Since the Pearson's R value for correlation of the two variables is positive, it implies that improving the farmers' perception about the quality of services provided at the plant clinics (independent variable) would consequently improve the level of farmers demand for services from plant clinics.

The finding agrees with Ali et al. (2011), who noted that farmers demand quality services which can satisfy their needs. It also concurs with Haile and Israel (2012), that if farmers experience high quality plant clinic extension services, then they are less likely to seek for services from competing organizations and are more likely to recommend the services to others. The findings are also in line with the findings of Ghiasi et al., (2017) which found service quality to be among the most important factors explaining the variance of farmers' willingness to use plant clinics services. Improving the quality of services provided at the plant clinics is therefore crucial in attracting more farmers to attend plant clinics and benefit from their services.

The respondents believe that the quality of services provided at the plant clinics can be improved by; making them more reliable e.g. having more sessions during long and short rains when the pests and diseases are more prevalent, ensuring that the plant clinics have the appropriate equipments for the diagnosis of pests and diseases, and having well qualified 'plant doctors' providing the services promptly and politely.

Since the study established that 86.2% of the respondents perceived plant clinics as relevant and that 87.5% of the respondents had positive perception on the quality of services provided at the plant clinics, it implies that the majority of the respondents have positive perceptions of plant clinics. Positive perception would not hinder them from demanding services from the plant clinics. The fact that 41.4% of the respondents who had some awareness of plant clinics were non-users and 17.2% were one time users of plant clinics in the past one year implies that some of those who had positive perceptions of plant clinics were non users or had low level of demand for plant clinics services. This implies that just having positive perception of plant clinics does not make a farmer to demand services from them. There must be other factors apart from perceptions of relevance and of quality of plant clinics services that determines farmers demand for plant clinics services.

CHAPTER FIVE
SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings, the implications, conclusions and recommendations of the study. Section 5.2 presents the summary of the findings. Section 5.3 presents the implications of the findings. Section 5.4 presents the conclusions drawn from the study findings based on the objectives of the study. Section 5.5 gives the recommendations made based on the findings and objectives of the study while section 5.6 gives Suggestions for further research.

5.2 Summary of findings

The study sought to establish the relationships between the independent variables; farmers' level of awareness of plant clinics, accessibility of plant clinics, farmers' perception of relevance of plant clinics, farmers' perception of the quality of services provided at the plant clinics, and the dependent variable; farmers' demand for services from the plant clinics in Nakuru-North Sub-County. It was conducted on a sample of 152 farmers selected from 4 Locations of the Sub-County. Data was collected using questionnaires and analyzed using Statistical Package for Social Sciences (SPSS). All 152 questionnaires were filled and returned with a high response rate to all the questions.

The study found that most of the small scale farmers in Nakuru-North Sub-County are middle aged farmers of between 36 to 60 years and youthful farmers of between 18 to 35 years, and only few were old farmers of above 60 years. In the Sub-County farming is an activity undertaken by both males and females. Most of the farmers in the Sub-County are literate with at least a primary level of education. The average farm size with small scale farmers in the study area was 0.62 hectares and most of the respondents (88.8%) had farms of less than or equal one hectare. The main occupation of most (73.7%) of the small scale farmers in the Sub-County is farming. Most of the small scale farmers in Nakuru-North Sub-County are low income earners with mean monthly incomes of between kshs.1,000 and kshs.10,000 per month. The average monthly income of the respondents was found to be kshs.10981.

The study also found that about thirty five percent (34.9%) of the respondents were not aware of plant clinics, 9.9% had low level of awareness of plant clinics, while 55.3% had a high level of awareness of plant clinics. In regard to farmers' demand for services from plant clinics the study established that the majority of the respondents didn't attended a plant clinic

in the past one year. Several reasons were given for the non-attendance which include inadequate information about plant clinics, plant clinics venues being far away from their residence, being held by other engagements away from the farm, the farmer not having experienced a big plant health problem, lack of interest on plant clinics, feeling that previous visit did not yield results, and the respondent receiving similar services from other sources. The mean distance from the respondent's residence to the nearest plant clinic was found to be 1.9172 km. None of the respondent was more than 6 km from the nearest plant clinic Venue. Majority of the respondents had positive perceptions about the relevance of plant clinics and of the quality of services provided at the plant clinics.

On relationships between the independent and dependent variables, the study found that there are statistically significant relationships between; Farmers' level of awareness of plant clinics and farmers' demand for services from plant clinics, accessibility of plant clinics and farmers' demand for services from plant clinics, Farmers' perceptions of quality of services provided at the plant clinics, and farmers' demand for services from plant clinics. The study found no statistically significant relationship between farmers' perceptions of relevance of plant clinics and the farmers' demand for services from plant clinics.

5.3 Implication of the study findings

The existence of statistically significant relationships between the independent variables 'farmers' level of awareness of plant clinics', 'accessibility of plant clinics', and 'farmers' perception of quality of services provided at the plant clinics', and the dependent variable 'farmers' demand for services from plant clinics' implies that the 'farmers' demand for services from the plant clinics' depends on farmers' level of awareness of plant clinics, accessibility of plant clinics, and farmers' perceptions of quality of services provided at the plant clinics. Interventions that would change the farmers' level of awareness of plant clinics, accessibility of plant clinics, or farmers' perception of quality of services provided at the plant clinics would lead to a change in farmers' demand for services from the plant clinic. Improvement in the farmers' level of awareness of plant clinics, accessibility of plant clinics by farmers, or farmers' perception of quality of services provided at the plant clinics would lead to a subsequent improvement in farmers' demand for services from plant clinics.

5.4 Conclusion

The following conclusions were made from the results of the study:

i). Since there is a statistically significant relationship between farmers' level of awareness of plant clinics and farmers' demand for services from plant clinics, the study concludes that the farmers' demand for plant clinics services depends on the farmers' level of awareness of plant clinics and therefore improving the level of farmers' awareness of plant clinics services would improve farmers demand for services from plant clinics and subsequently reduce crop losses from pests and diseases.

ii). Since the study established that there is a statistically significant relationship between Accessibility of plant clinics and farmers demand for services from plant clinics, the study concludes that the farmers' demand for plant clinics services depends on the accessibility of the plant clinics by the farmers. Therefore improving the accessibility of plant clinics would improve the farmers demand for services from plant clinics.

iii). The study did not find any statistically significant relationship between farmers' perception of relevance of plant clinics and farmers' demand for services from plant clinics and therefore concludes that the farmers demand for services from plant clinics is not dependent on farmers' perceptions of relevance of plant clinics. Improving just the farmers' perceptions of relevance of plant clinics would therefore not result in any significant change in farmers' demand for services from plant clinics services. Efforts to do so should therefore be in addition to improving the factors that have significant relationship with the farmers' demand for plant clinics services.

iv). Since the study established that there is significant relationship between farmers' perception of quality of services provided at the plant clinics and farmers' demand for services from plant clinics, the study concludes that farmers' demand for plant clinics services depends on the farmers' perceptions of the quality of services provided at the plant clinics and therefore improving the quality of services provided at the plant clinics would improve farmers' demand for the services.

5.5 Recommendations of the study

Based on the findings and conclusions presented, the study recommends the following:

i) More awareness creation on plant clinics services needs to be done in Nakuru-North Sub-County. More resources should be allocated and directed towards awareness creation of

plant clinic. The use of more channels including media advertisements and ICT should be explored.

ii) The plant clinics services should be made more accessible to the farmers. More plant clinics sites should be established within easy reach of the farmers. Provision of plant clinic sites on lower administrative units such as a Sub-locations and villages would considerably improve coverage, hence accessibility of the services by farmers. In addition, plant clinics should also be held more frequently. It would also be prudent to introduce mobile plant clinics.

iii) The quality of services provided at the plant clinics should be improved. The plant clinics should be well equipped with the appropriate equipments and the 'plant doctors' should be well trained and regularly updated to improve their capacity to identify plant health problems and advice farmers appropriately.

5.6 Suggestions for Further Research

The study analyzed four factors for their relationship with farmer's demand for services from plant clinics; further research should be done to study other factors which could be related with farmers demand for services from plant clinics.

The study was conducted in Nakuru-North Sub-County, it would be necessary to carry out similar research in other areas with different social economic environments to find out if similar results would be obtained.

Since more than one factor was found to have a statistically significant relationship with farmer's demand for services from plant clinics in Nakuru-North Sub-County, there is need to study and understand the contribution of each of these factors towards farmer's demand for plant clinics services.

From the study, majority of farmers in the Sub-County had a positive perception of the relevance of plant clinics, yet the perception of the relevance of plant clinics had no statistically significant relationship with farmer's demand for plant clinics services. It would be necessary to carry out a research to establish why the scenario.

It is also important to study the impact of implementation of plant clinics in the Sub-County to find out their worth and justification.

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APPENDIX A: FARMERS' QUESTIONNAIRE FOR DETERMINING THE RELATIONSHIPS BETWEEN SELECTED FACTORS AND FARMERS' DEMAND FOR SERVICES FROM PLANT CLINICS IN NAKURU-NORTH SUB-COUNTY

Introduction

Dear respondent, my name is Daniel Njuguna Muchiri, a Master of Science (Msc) student at Egerton University's Department of Agricultural Education and Extension. I am conducting a research to determine the relationship between selected factors and farmer's demand for services from plant clinics in Nakuru-North Sub-County. The purpose of this questionnaire is to collect the information required for the study, whose findings will inform policy makers and other stakeholders on how plant clinics can be improved and made to benefit more farmers. You have been selected to assist in providing this information. All the information you give will be treated with confidentiality and will be used only for purposes of this study.

Instruction

Please respond to each item in this questionnaire as accurately and truthfully as possible. Fill or tick your response to the space provided.

SECTION A.

Personal Data

1. Location of residence……
2. Respondents' date of birth……
3. Gender *(Tick one)*

   Male ( ) Female ( )
4. Education level *(Tick one)*

   No formal education ( ) Secondary school education ( )

   Primary school education ( ) Post-secondary school education ( )
5. Farm size……acres
6. Main occupation of respondent *(Tick one)*

   Farming ( ) Labourer ( ) Employee ( )

   Trader ( ) Other ( ) Please specify……
7. Average monthly income Ksh……..

SECTION B

Farmer's awareness of plant clinics

8. a) Please indicate whether you agree with the following statements by ticking 'Yes' or 'No' against each one of them.

Statement	Response	
	Yes	No
I am aware of the existence of plant clinics		
I am aware that plant clinics operate in this Sub-County		
I am aware of the services plant clinics provide?		
I am aware of the site of your nearest plant clinic?		
I am aware of when your nearest plant clinic is held?		
I am aware of how plant clinics operate?		

b) Farmers' awareness of plant clinics can be improved by:

……

……

SECTION C

Farmers' demand for services from plant clinics

9. a) I have attended a plant clinic in the last one year*(Tick one)*

Yes ( ) No ( )

b) If No, please explain why……...

……

…….

c) I have attended a plant clinic *(Tick one)*

Once ( ) Twice ( ) Thrice ( ) More than three times ( ) specify…….

d) The number of samples I have presented to the plant clinic in the last one year? ……

10. Farmers' demand for services from plant clinic services can be improved by:

……

…..

SECTION D

Accessibility of plant clinics services

11. From my farm, the nearest plant clinic venue is……..km
12. Accessibility of plant clinics services can be improved by

……

……..

SECTION E

Perception of relevance of plant clinics

13. Indicate the extent to which you agree with the following statements on the relevance of plant clinics by cycling the response that best describes your opinion.

Key SA = Strongly agree, A = Agree, NS = Not sure, D = Disagree, SD = Strongly disagree

Example: Crop production is the main source of income for most residents of Nakuru County. A

SA A NS D SD

a) Plant clinics services are pertinent to farmers' needs.

SA A NS D SD

b) Plant clinics provide information that is required by farmers.

SA A NS D SD

c) Services provided at the plant clinics are appropriate to the local farmers.

SA A NS D SD

d) Recommendations provided at the plant clinics are applicable.

SA A NS D SD

e) Plant clinics services are timely.

SA A NS D SD

f) Information available at plant clinics is current and updated.

SA A NS D SD

14. Plant clinics can be made more relevant to the current crop protection needs of farmers by doing the following:

……

……...

SECTION F

Perception of quality of services provided at the plant clinics

15. Indicate the extent to which you agree with the following statements on the quality of services provided at the plant clinics by cycling the response that best describes your opinion.

Key SA = Strongly agree, A = Agree, NS = Not sure, D = Disagree, SD = Strongly disagree

Example: Whitefly is a serious crop pest in Nakuru-North Sub-County.

SA A NS D SD

a) Plant clinic services are reliable.
SA A NS D SD

b) The staff manning the plant clinics responds promptly.
SA A NS D SD

c) The staff manning the plant clinics are well qualified for the work.
SA A NS D SD

d) Staff manning the plant clinics are polite.
SA A NS D SD

e) A trusted institution is running the plant clinics.
SA A NS D SD

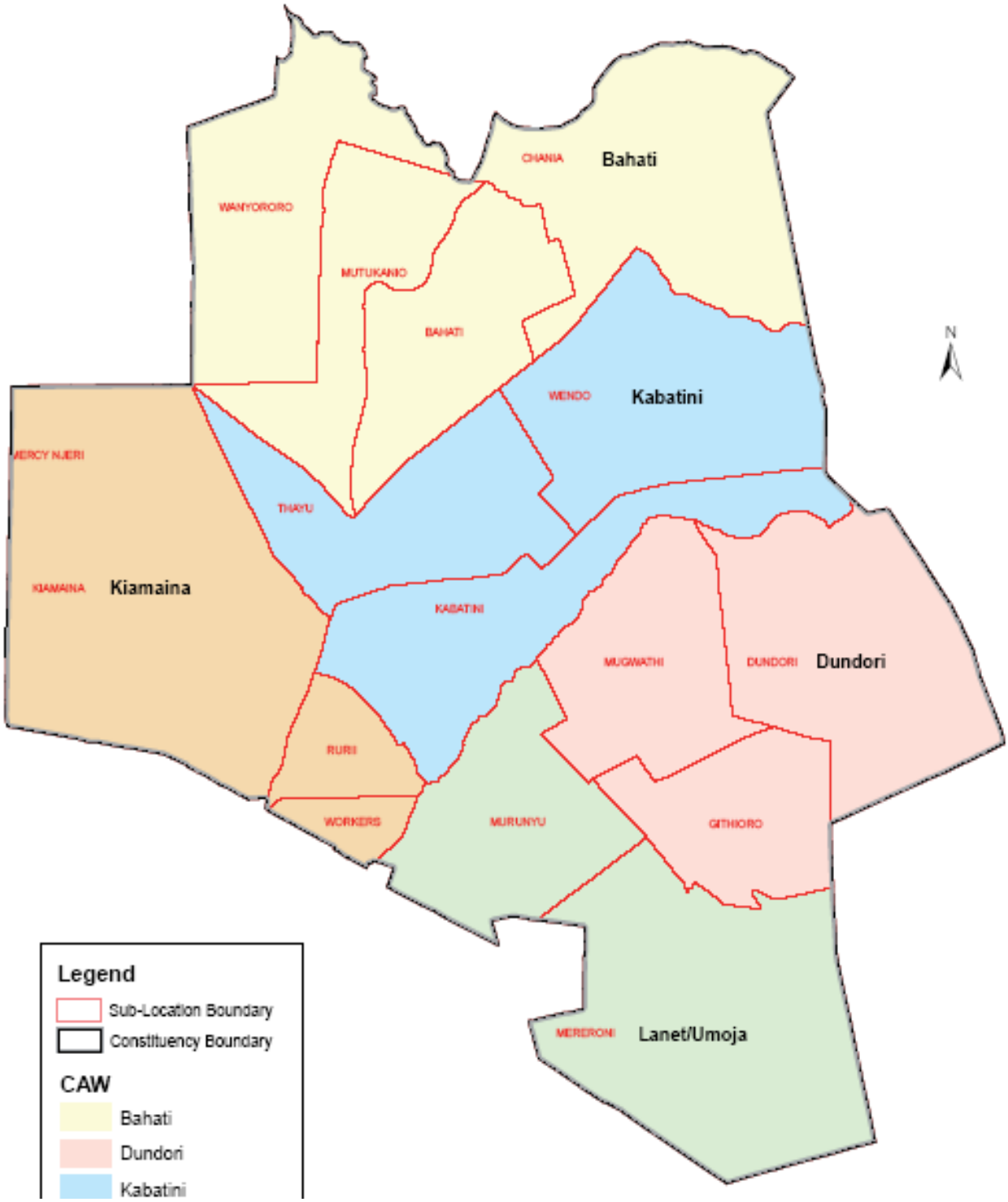
f) Plant clinics have appropriate equipments for their work.
SA A NS D SD

16. The quality of services provided at the plant clinicscan be improved by doing the following:

……

……

APPENDIX B: MAP OF NAKURU- NORTH SUB-COUNTY SHOWING THE ADMINISTRATIVE UNITS



Source: Nakuru North Assistant County Commissioner's Office, (2013).

APPENDIX C: AUTHORITY FROM NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION TO CONDUCT THE RESEARCH.

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/91598/9204**

Date: **11th May, 2016**

Daniel Njuguna Muchiri
Egerton University
P.O Box 536-20115
EGERTON.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Relationship between selected factors and farmers demand for plant clinic services in Nakuru-North Sub-County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **10th May, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. STEPHEN K. KIBIRU, PhD.
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nakuru County.

The County Director of Education
Nakuru County.

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 9104

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MR. DANIEL NJUGUNA MUCHIRI
of EGERTON UNIVERSITY, 0-20300 NYAHURURU,has been permitted to conduct research in *Nakuru County*

on the topic: *RELATIONSHIP BETWEEN SELECTED FACTORS AND FARMERS DEMAND FOR PLANT CLINIC SERVICES IN NAKURU-NORTH SUB-COUNTY, KENYA*

for the period ending:
10th May,2017

Permit No : NACOSTI/P/16/91598/9204
Date Of Issue : 11th May,2016
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation