

**EVALUATION OF EFFECTIVENESS OF COMMUNICATION CHANNELS USED
TO CREATE AWARENESS ABOUT PLANT CLINICS: CASE OF KIAMBU
COUNTY, KENYA**

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in Agricultural Information and Communication Management.**

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DECLARATION

This thesis is my original work and has not been presented for the award of degree in any other university or institution or for any other purpose.

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DEDICATION

I dedicate this work to my lovely Wife Millicent Penuel and daughter Mellissa Akinyi Ochieng, who have been my pillar during this journey; and to my parents; Eunice and William Jowi; my brothers and sisters who encouraged me not to give up even when it seemed impossible.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAK- Agrochemicals Association of Kenya.

CABI- Centre for Agriculture and Biosciences International.

CBO- Community Based Organization.

FGDs- Focus Group Discussions.

IEBC- Internal Electoral Boundary Commission.

KALRO- Kenya Agriculture and Livestock Research Organization.

KEPHIS- Kenya Plant health Inspectorate Service.

KII- Key Informant Interview.

MoALF- Ministry of Agriculture, Livestock and Fisheries.

NGOs- Non-Governmental Organizations.

NSC- National Steering Committee.

POMS- Plantwise Online Management System.

T&V- Train and Visit.

UoN- University of Nairobi.

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ABSTRACT

Plant clinics were modeled to bridge the gaps in access to extension services besides providing real-time plant health diagnostic services to farmers in timely and appropriate ways. However, studies show that awareness about the clinics is still very low among the smallholders' farmers. This is despite the adoption by stakeholders, communication channels supposed appropriate to create awareness about the clinics. This study strove to evaluate the effectiveness of these channels to create awareness about plant clinics particularly in Kiambu County. It also strove to assess the effects of farmers' socio-demographic characteristics on their analysis and intentions to access information from awareness creation channels. Probability proportional to size sampling was used to sample 130 farmers for household interviews. Purposive and snow-balling sampling techniques were also used to sample 56 respondents for focus group discussions (FGDs) and four respondents for key informant interviews (KIIs). Quantitative data from the household interviews were coded to form indices for effectiveness of the communication channels. These were reinforced with qualitative data from KIIs and FGDs and coherently evaluated to address the study objectives. It also adopted a multiple regression model to determine the causal relationships between farmers' socio-demographics characteristics and their evaluation index for effectiveness of the channels. The study established that the communication channels used in creating awareness about plant clinics are not very effective with mass media channels being less effective than interpersonal channels. It also affirmed that farmers' socio-demographic characteristics have significance on their analysis and intentions to access information from channels of awareness creation. The study recommends capacity building to the players in interpersonal channels on communication skills to create awareness effectively. It also proposes the need to redesign most of the mass media channels and adopt awareness creation policies and frameworks that meet the dynamics of the present communication setups.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study.

Agricultural extension has been imperative in transforming subsistence farming to modern commercial agriculture. This is with a view to promote household food security, improve income, and reduce poverty (Salami *et al.*, 2010). In most developing countries access to extension services has been limited due to the low extension agents to farmers' ratio. In Kenya for example, the current standing ratio of national extension staff to farmers is 1:1500 (Mokeira, 2014). Consequently, knowledge about plant health among smallholder farmers remain indigent resulting to them inappropriately applying crop protection measures and farming technologies. In an attempt to overcome these gaps, the concept of plant health clinics, also called plant clinics were modelled by Centre for Agriculture and Biosciences International (CABI) as an approach to provide readily available, dependable and affordable plant health services to farmers (Danielsen and Matsiko, 2016). As such, CABI aims to steer prosperity through delivery of real-time diagnostic services to farmers on pest and disease management to ensure food security (Srivastava, 2016).

Founded in 1910, CABI is a non-profit making science-based international organization that seeks to solve agriculture and environmental problems. It is funded by the Department for International Development (DFID), the Swiss Agency for Development and Cooperation (SDC), the European Commission through DG DEVCO-EuropeAid, the Directorate General for International Cooperation (DGIS Netherlands), Irish Aid, the International Fund for Agricultural Development (IFAD), the Australian Centre for International Agricultural Research (ACIAR), the Ministry of Agriculture of PR China and Hunger Solutions of Dow AgroSciences. CABI runs the plant clinics through its Plantwise project; a global program

aimed at reducing crop losses and improving food security by collecting and sharing information about plant health (Danielsen *et al.*, 2014). The clinics are based on an approach where farmers can find advice from the extension agents trained as plant doctors to learn the methods of identifying problems linked to crops brought to them (Danielsen and Kelly, 2010). The plant doctors make diagnosis and give recommendations to the farmers on practices and standards that are nationally and internationally accepted (Wright *et al.*, 2016). In a clinic session, the doctors also take record of their interaction with the farmer through a standardized “prescription form” (*Appendix 6*). Data collected include farmer's name, their farm location, type of crops they grow, diagnosed plant health problem and the recommended treatment or control advice given to them. One copies of this form is uploaded for analysis by in-country plant health partners through a set of tools accessible from the Plantwise Online Management System (POMS). The other given to the farmer for reference (Wright *et al.*, 2016). One of the biggest challenges faced by the plant clinic stakeholders was the provision of data to and collection of information from plant clinics in remote areas. However, the problem was solved through successful project pilot and launch of ‘e-plant clinics’, where data collection is done using computer tablets and feedback given through SMS (Wright *et al.*, 2016).

Plant clinics differ from other project led interventions since they provide regular extension services as demanded and defined by the farmers’ queries and not as raised by extension agents or researchers (Danielsen *et al.*, 2011). They provide demand-driven advice to farmers, rather than promoting pre-packaged and technology-centred solutions. Despite being fronted as a superior extension approach, awareness level about plant clinics among the smallholder’s farmers remains low (Leach and Hobbs, 2013; Danielsen *et al.*,2014; Danielsen and Matsiko, 2016; Wright *et al.*, 2016). A major reflection is the low number of farmers visiting and accessing services from the clinics (Mugambi *et al.*, 2016). The plant clinic

approach was first started in Bolivia in 2003, Bangladesh. Uganda and Nicaragua soon followed. Pilot projects have been set up in thirty-four countries all over the world, done as opportunities allow rather than using a predefined approach (Danielsen and Kelly, 2010). In Kenya the clinics were launched in 2010. Presently there are 122 plant clinics in 14 counties distributed in five regions; Central, Eastern, Rift Valley, Western and Nyanza (*Appendix 5*). They are managed by 222 plant doctors of whom 141 are male. Kiambu County has seven operational plant clinics in three sub-counties; Kabete, Kikuyu and Limuru. All the plant clinics in Kenya are run through a synchronized action plan between Plantwise and the county governments on behalf of CABI, but in coordination with the MoAFL, UoN, KALRO, KEPHIS and Katoloni CBO.

Plantwise programme is still experiencing draw backs in achieving its set goal to reaching a cumulative 45 million farmers with timely and locally relevant advice on plant health through plant clinics by the year 2020 and this is pointed out to low awareness about the Plantwise initiative (Plantwise Strategy 2015-2020). The current standing global plant clinic attendance in the 34 countries where they have been established in (*Appendix 4*) is estimates at 18.3 million farmers (40 percent of the target farmers) (POMS). In Kenya only 15,528 and 9,689 male and female farmers respectively had visited the clinics as at December 2017. A report by Plantwise Kenya (2017) revealed that more than 60 percent in a farming population of approximately 304,449 farmers in Kiambu County are not aware of the clinics with only 1500 farmers having visited them since launch. In this regard, Kiarie (2016) highlighted that thousands of farmers in the Kiambu face the risk of food security due to constrain majorly arising from pests and diseases. Their vulnerability to lack of access to plant health services has been amplified by the recent prevalent fall army-worm which is threatening the countries food bucket (Kumela *et al.*, 2018). In spite of the many studies revealing that plant clinics have significant potential to deal with the aforementioned problems, majority of farmers even

those living around the clinic areas are still not aware about their existence, and those aware, show little or no interest to attend or access services from them (Finegold *et al.*, 2015).

1.2 Statement of the problem.

The introduction of plant clinics was meant to augment the existing inept access to extension services. It was also intended to bring research knowledge close to farmers through in-person interactions with the plant doctors (Khaila *et al.*, 2015). The clinics have well been accepted by a majority of stakeholders in the plant health system. However, most recent studies still divulges that their awareness remains low among the smallholder farmers. This is pointed out to the use of ineffective communication channels by CABI and plant clinics' relevant stakeholders in creating awareness about the clinics to the farmers (Cameron *et al.*, 2016). Awareness creation is a very important process though often times overlooked in the diffusion of innovations. In Africa, awareness about agricultural innovations is mainly created through extension officers. Nonetheless, farmers are still receiving inappropriate and ineffectual information in forms that cannot enable them make informed decisions (Alemneh, 2016). In the Plantwise awareness creation paradigm, the extension offices (plant doctors) are the major players in the awareness creation about the clinics. However, the complexity of the information about the clinics cannot suffice the use of communicative localite channels that are best appropriate at the persuasion stage of innovation diffusion. Other awareness creation channels have been incorporated to bridge the gap. Even so, their impacts are still dismal as there is still immense information deficit about the clinics among farmers (Dougoud *et al.*, 2018).

1.3 Objectives of the study.

1.3.1 Overall objective

To evaluate the effectiveness of communication channels used in creating awareness about plant clinics.

1.3.2 Specific objectives.

- 1) To evaluate the effectiveness of mass-media communication channels used in creating awareness about plant clinics.
- 2) To evaluate the effectiveness of interpersonal communication channel used in creating awareness about plant clinics.
- 3) To assess the effects of farmers' socio-demographic characteristics on their analysis and intentions to access information from awareness creation channels.
- 4) To assess level of stakeholder involvement in designing communication frameworks to create awareness about plant clinics.

1.4 Research questions.

- 1) Are mass-media communication channels used in creating awareness about plant clinics effective?
- 2) Are interpersonal communication channels used in creating awareness about plant clinics effective?
- 3) Do farmers' socio-demographic characteristics have an effect on their analysis and intentions to access information from awareness creation channels?
- 4) What is the level of stakeholder involvement in designing communication frameworks to create awareness about plant clinics?

1.5 Justification of the study.

The main reasons why there is minimal impact for most adopted awareness creation channels are that most organizations have sufficiently been unconscious of the dynamics in the communication field to instead adopt ineffective channels to create awareness (Golembiewski, 2018). Most of these organizations are not well aware of their requirements to understand the information need of the farmers prior to packaging their information (Mai, 2016). From a global perspective, the less paid attention to the heterophyllous nature of the current farming community in term of information acquisition makes most developed innovation move into the decline phase unheard (Bai *et al.*, 2013). In light with the significance of the clinics within the plant health system and their low awareness among the smallholder farmers, one could not assume the need to assess the effectiveness of the communication channels used in creating their awareness. Within the confines of the available gaps in diversity with respect to information acquisition, there was a need to further delve on the effect of farmers' socio-demographic characteristics on their analysis of these channels, insofar to ascertain whether it affects their intentions to access information from them. Limiting to the communication channels used to create awareness about plant clinics in Kiambu, analyses provided by this research has illuminated the ineffective communication channels used in creating awareness about plant clinics to assert low awareness. Further, it has provided insights into the possible ways of improving the effectiveness of these channels in farming societies with varied socio-demographic characteristics. The gaps highlighted by this study inform policy decisions on the current awareness creation strategies that meet the present awareness creation.

1.6 Limitation of the study

This study mainly focused on the evaluation of the effectiveness of the communication channels used in creating awareness about plant clinics in Kiambu County with the channels under focus being;

- 1) Interpersonal channels that reach farmers by means of one-on-one interactions between CABI and plant health stakeholders, through the Plant doctors, agro-dealers, fellow-farmers, plant clinic sessions, and plant health rallies to create awareness about plant clinics.
- 2) Mass-media channels that reach several people at once used by CABI, plant health stakeholders, Plant doctors, agro-dealers, and fellow-farmers.

The study was also limited to only assessing the effects of farmers' socio-demographic characteristics such as age, gender, year of farming experience, level of education, and non-formal trainings on their analysis and intentions to access information from awareness creation channels. Besides it also assessed the extent of stakeholder involvement in designing communication frameworks to create awareness about plant clinics.

CHAPTER TWO

LITERATURE REVIEW

2.1 Plant clinics.

Plant clinics are an approach to improve plant-health care. The clinics are opened in strategic public locations at least twice a month to all players within the plant-health system. Each is run by two extension agents (plant doctors) who are trained on pest and disease diagnostics and management. In this regard, the extension agents combine their regular extension roles with the clinic duties (Bentley, 2009). The plant clinic approach is superior to other extension methodologies as they deal with almost all crop problems. The clinics are a valuable entry point to reinforce plant-health care just as in the primary care in the human-health system (Danielsen and Kelly, 2010). At the clinics, farmers bring samples of pest/disease affected crops to the plant doctors (*Figure 1*) who diagnose the problems and make science-based recommendations on ways to manage them (Danielsen and Kelly, 2010). Inherently, the clinics rely on a Plantwise knowledge bank, which serves as a gateway to practical online and offline plant health information, including diagnostic resources, best-practice pest management advice, and plant clinic data analysis for targeted crop protection (Mullen, 1998). Anecdotal results from pioneer areas such as Nicaragua reveal that the clinics have the potential to boost the performance of plant-health stakeholders who exist in all countries but rarely function as a unit (Danielsen and Matsiko, 2016).



Figure 1|Plant clinic session at Lusegiti plant clinic.

The in-person interactions between the plant doctors and the farmers make plant clinics a superior extension approach.

2.2 Information sources and communication channels used to promote public awareness about plant clinics.

There is a clear distinction between an information source and a communication channel as used in the diffusion of innovation. An information source is any entity that instigates the exposure (awareness) of the decision making unit to information about an innovation (Golob *et al.*, 2017). A communication channel, in contrast, is the means through which the information is transferred from the source to the receiver (Mai, 2016). A communication channel can either be disseminative (unidirectional) or communicative (multidirectional). Disseminative channels do not allow for feedback whereas communicative channels allow for feedback from the source and recipient of the information (Etyang *et al.*, 2014). Communication channels can be further categorized broadly into (i) mass media versus interpersonal (face-to-face) channels and (ii) cosmopolite (channels from outside the local social system) channels versus localite (channels from within the social system) (Galstyan *et al.*, 2015). Mass media channels allow few individuals to reach out to larger audiences

(Jenkins *et al.*, 2018); they are entirely cosmopolite, with most being disseminative. Interpersonal channels, on the other hand, can either be disseminative cosmopolite or communicative localite. Communicative localite interpersonal channels are traditional in nature (Rodriguez *et al.*, 2015); their messages are usually conveyed over a short distance and within the boundary of the target group or the participating individuals. For the cosmopolite interpersonal channel, the source of information may or may not be from the system although it involves face-to-face liaison between the participants.

The main source of information about plant clinics is CABI reaching farmers through its Plantwise project (Wright *et al.*, 2016). Classically, Plantwise uses the plant doctors as the primary face-to-face (localite interpersonal) communication channel to create awareness about the clinics (Scheidegger Uar and Graf, 2013). The plant doctors take up the roles of the extension agents who have not been very successful in the dissemination of information about agricultural innovation in most developing countries (Reij and Waters-Bayer, 2014). However, to reach more farmers, Plantwise relies on spill-overs as a result of the plant-health players' interacting i.e plant doctors sharing plant clinic information with agro-dealers and farmers receiving advice at the clinics who in turn share the information with their fellow farmers and peers (Boa, 2007). Conversely, as had been discoursed by van Berkel and Verburg (2014), relying on ripple effects of interaction and the horizontal communication among farmers may not suffice the information need of most farmers. Channeling the information through the agro-dealers may be appropriate though, a majority of them are not cognizant of the dynamics in the awareness creation systems to create an impact (Field *et al.*, 2016). As such, the partnerships between plant clinics and agro-dealers may be viewed with suspicion because of concern about biasness in recommending agro-inputs (Boa *et al.*, 2016). This may mitigate them as channels of communication.

Accordingly, CABI uses cosmopolite interpersonal channels through plant clinic sessions, plant-health rallies and church announcements to create awareness about the clinics. Plant clinic sessions and plant-health rallies offer podia where the plant doctors engage one-on-one with interested farmers (Mur, 2018). The clinic set-up plays a role to create publicity of the clinic activities. Nevertheless, the information richness of the set-up is dependent on the salience of the clinics component and their ability to send a message at a glance (Sifaki and Papadopoulou, 2015). Plant-health rallies are an extension strategy used to provide tailored information about the clinics with goals to create awareness about the Plantwise initiative besides advising farmers on how to manage plant pests and diseases (Mur, 2015). Formally, church announcements are also now being used as platforms by plant doctors to create awareness about the clinics (Negussie *et al.*, 2013).

The use of cosmopolite mass media channels in creating awareness about plant clinics has been promoted both in print and audio-visual. Print based media include branded plant clinic banners and umbrellas, magazines, posters, brochures, and newspapers (Rehman, 2010). The banners and umbrellas bear inscriptions and symbols about the clinics to create awareness. So does the brochures, posters, leaflets, newspapers and magazines used. The audio-visual media employed include premeditated adverts on radio and television programmes, social media blogs and short text messages periodically sent to farmers (Danielsen and Matsiko, 2016)

2.3 Parameters of effective communication channels.

Effective dissemination of information is a highly recognized factor which aid awareness and adoption of agricultural innovations (Kotey *et al.*, 2016). Ever since people have been involved in farming, they have actively sought for information. However, majority still face challenges in finding answers to the myriad of questions they encounter about innovations, even if similar ones arise recurrently (Corsaro, 2017). This is due to most research institutions using ineffective communication channels to create awareness about innovations (Masuda *et*

al., 2018). However, different authors have had varied views with regards to ascertaining the authoritative description of an ‘effective communication channel’. Putting the characteristics of an effective communication channel into perspective, many literatures point out these to designate their parameters. According to Stronge (2018), an effective channel is that which under appropriate circumstances creates familiarity with the target audience. This is significant to establish an egalitarian environment which is indispensable for the success of a communication process (McChesney, 2015). To Hung-Baesecke (2017), it is crucial for a communication channel to be authentic in order to form a surety ground on what information to expect from the source. Moreover, authenticity of used communication channel is critical in the practice of public relations as “research institutions are progressively being pressured by stakeholders demanding greater transparency and responsibility” (Theaker and Yaxle, 2017).

Holmes and Wilson (2017) opined that regardless of the context, a communication channel must be interactive in order for the participants to give feedback to each other. Lewis and Mills (2018), instead, argue that an effective channel is that which is liked as a result of being able to command the attention of its audience. Liked channels are superior at enhancing credibility and dispensing of favorable environments to make proper judgments. Contrariwise, Clark (2015) had outlined that in contemporary societies, it is becoming more challenging for channels to command their audiences’ attention; people do not want to ‘waste time’ and effort looking at media channels many of which are not liked because they are unwelcoming, intrusive and irksome.

the view of Lee (2017), credibility of a channel is key to its effectivity as it defines how the receivers of its information view it to be possessing relevant experiences and trusts to give objective, unbiased and trustworthy information. Moreover, Hocevar *et al.* (2017) highlighted that credibility of a channels is subject to the extent to which it is supposed as having valid

assertions regarding to being conversant with the subject matter being presented. As pointed out by Goodman (2005), media channel conveying information in local languages helps such efforts to foster credibility by maintaining, building and restoring trust to improve awareness creation. Seidl *et al.* (2017) further designated an effective channel as that which is reliable and has a trusted ‘repeatability’ or ‘consistency’ or able to convey the same information over and over again. However, the test for repeatability may not be sufficient enough to create meaning due to the dynamism in our societies. This creates the inabilities to calculate the variance of the actual score of reliability (Hedge *et al.*, 2018).

Based on technical quality, an effective communication channel is that which is rich information-wise. This is informed by Omar (2018) assertion that the technical quality of a channel answers two questions regarding to what it is conveying; feelings or facts. Interpersonal and mass media channels are best at conveying feelings and facts respectively. On the same note, Oliu *et al.* (2010) accorded that technical quality of a channel determines its ability to present information in a distinctive and concise manner. Diffidently, an effective channel should be able to solve the problems of its audience to create an impact on their behavior (Samovar *et al.*, 2015). Useful communication channels are preferred for being able to assist farmers solves farm-related problems. These ultimately affect the channels’ sufficiency to serve the purpose for which they are designed to determine their acceptability (Ojha, 2017).

2.4 Interpersonal or mass media channels in creating awareness?

Studies point out that that the roles played by mass media channels (with wider coverage) have partly been replaced by interpersonal channels (with narrow coverage) in the developing countries (Rogers, 2010). Mass media channels are effective at the awareness stage, while the interpersonal channels are more relevant at the persuasion stage in the innovation-decision process (Dintoe, 2018). However, as pronounced by the media richness theory (Dennis and

Kinney, 1998) the effectivity of a communication media is also dependent on its ability to exploit the available communication cues. As a case in point, mass media channels are characterized by the lack of natural language and non-verbal cues since there is limited eye-contact. This alleviates their quality of communication (Mehrabian, 2017). However, the advent of social media and live video conferencing may change these narratives as they are more interactive, direct and have a variety of both verbal and non-verbal cues (Kowert and Oldmeadow, 2015). Nonetheless, the absence of social cues in social media can lead to negative behaviors, such as flaming. Interpersonal communication channels, on the other hand, have been credited for their immediacy of feedback, transmission of multiple cues and use of natural language to establish personal focuses (Men and Bowen, 2016). Consistent with the Media Synchronicity Theory (Dennis *et al.*, 2008), interpersonal channels helps establish personal focus to foster synchronicity which is a fundamental factor in effective communication (Scott and McGuire, 2017). However, Bancroft and Scott (2017) faults the interpersonal channels based on anonymity. They assert that communicative interpersonal channels limit anonymity, restraining the information recipient's freedom to express their feeling and ideas for fear of reprisal and being criticized.

2.5 Effects of farmers' socio-demographic characteristics on their analysis of effectiveness of communication channels and their intentions to access information from the channels.

Evidences abound that several media channels through their coverage have successfully been used to create awareness on latest innovations. However, their meaningful impacts on plant clinics have not fully been realized (Chadwick, 2017). According to Kuttschreuter (2014), the varied socio-demographics may have significance on how farmers evaluate channels used to create awareness about innovations and thus influencing their intentions to access and accept information disseminated through them (Msoffe and Ngulube, 2016).

Age is said to be a primary latent characteristic affecting farmers' evaluation abilities. However, there is contention on the direction of its effects on choice and intentions to use communication channel. Age was found to positively influence the acceptability of information from extension agents in Ethiopia (Tazeze, Haji and Ketema, 2012) and television and radio programmes in Tanzania (Mwakaje, 2010). These effects are thought to stem from the accumulated knowledge and experience obtained from years of observation and experimenting with various channels (Collins and Halverson, 2018). Older farmers, perhaps because of several years of use and thus trust of particular channels, may not want to jeopardize by trying out to accept information from certain channels. Actually, it is expected that the elderly farmers who decide to accept information from new media channels do so at a slow pace because of their tendency to adapt less swiftly to new phenomenon (Robinson and Godbey, 2010). Nonetheless, age has also been found to negatively correlate to farmers' evaluation of credibility of information from social media in Ghana (Akudugu, Guo, and Dadzie, 2012). In a study by Namulondo (2016) on *'The Effect of Communication Channels on The Adoption of Orange Fleshed Sweet Potatoes (OFSP) in Uganda'*, age was neither significant nor negatively correlated to perception of authenticity of banners, posters and displays creating awareness about sweet potatoes.

Siyao (2012) in Tanzania revealed that the challenges that subsistence farmers face in accessing information from mass media channels influence their evaluation and thus acceptance of "packaged" information about innovations. Subsistence farmers were found to easily access information through media channels that they perceived were very useful and economically within their reach. Majority were therefore ignorant of innovation communicated through channels that required substantial cash outlay to source information from. Such phenomena, however, were a complete contrast in relation to the commercial farmers.

Studies that have sought to establish the effect of education on evaluation of effectiveness of communication channels in most cases relate it to years of formal schooling (Rogers, 2010; Garrison, 2011). Generally education creates favourable mental attitude to evaluate channels. Education was thought to reduce the amount of complexity perceived in comprehension of messages from channels. According to Long *et al.*, (2016), the major hindrances to conceptualization of technically presented information about innovation was farmers' lack of education. In recent reviewed studies, including Erkan and Evans (2016), education positively affected the evaluation of social media and choice to trust information from blogs. However, in a study to assess the impact of plant health rallies to create awareness about a new maize variety in India, education was found to negatively correlate to the farmers evaluation of reliability of the rallies (Kumar, 2017).

Literatures on effects of gender on evaluation of communication channels aren't much. Nonetheless, the available few show mixed evidences and puts emphasis to the roles men and women play in households' decisions to use communication channels. In the most recent studies, Farnworth and Colverson (2015) highlighted that gender had significance on perception of male extension agents to provide non-biased information by female farmers. Conversely, Carr-Hill *et al.* (2018) noted that "efforts in improving women's evaluation skills does not appear warranted as their technical efficiency is estimated to be equivalent to that of males" (p.62). Since use of a channel is guided by the utility expected from it, the efforts put into understanding the information a channel is sending is reflective of the anticipated utility. It might then be expected that the relative roles women and men play in both efforts to evaluate are alike, hence suggesting that males and females evaluate channels similarly.

Agricultural group memberships have roles in farmers' access and acquisition of information about innovations from interpersonal communication channels (Fischer and Qaim, 2012). The groups expose farmers to various channels of communication, more so the face-to-face

channels putting them in expedient positions to evaluate their effectiveness. A number of studies describe farmers' social capital with reference to group membership and puts emphasis on groups involved in agriculture-related activities due to the aforementioned advantages they have on farmers' social index.

2.6 Stakeholders involvement in designing awareness creation frameworks

For up-scaling and sustainability of innovations to be feasible, researchers must include sound communication frameworks as integral parts of the research process (Schut *et al.*, 2017). This is to ensure that new knowledge is available to agricultural stakeholders in forms that they can conceptualise, utilize and possibly disseminate. A common failing in the awareness creation of innovations is the very little engagement with stakeholders during the development and plan for diffusion (Avidar, 2018). This is evident in continuous use of traditional awareness creation channels such academic journals, seminars, workshops, field schools and rallies (Makokha, 2017). So as in the use of media products such manuals, leaflets, brochures, videos and internet materials which still have little impact in creating awareness about innovations amongst smallholder farmers with varied socio-demographic characteristics (Kimaru, 2012). Relying on ripple effects and horizontal communications may not suffice the information needs of most farmers (Van Berkel and Verburg, 2014). The use of certain channels to create awareness about plant clinics may be as a result of low engagement of plant-health stakeholders, and lack of understanding of their communication context. This is coupled with insufficient appreciation of the real costs involved in producing, doling out and accessing information through those channels. The same seriousness put in designing an innovation for proper research output is necessary for the involvement of all relevant stakeholders in coordinating its packaging and dissemination (Saediman, 2015). Production of information materials about innovations and the choice of which channel to use in its dissemination should not only be farmer need driven, but also other stakeholders'.

CHAPTER THREE

METHODOLOGY

3.1 Theoretical framework.

The concept of communication and communication channels.

The study defines communication as the process of passing ideas from a source to a receiver through channels with the intention of changing the receiver's attitude, knowledge and skills. It links to Lasswell (1948) conceptualised model to describe communication as a process that answers questions as to who (source) says what (message), through what means (communication channel), to whom (receiver) and with what effect (change in the receiver's behaviour). It also borrows from Rogers (2010) diffusion of innovation highlights taking into consideration the '*through what means*' (communication channel) outlined by Laswell's model to explain that communication takes places in a social context over a period of time. Further, as defined by Rodgers, the study averred that a communication channel is the means by which messages (information) get from the source to the receiver. Accordingly, the main source of information about plant clinics is CABI reaching farmers through interpersonal channels and mass-media. Hypothetically, mass-media channels allow members of a social system to learn quickly and efficiently about the existence of innovation. So as in interpersonal channels, where individuals are motivated to accept or reject innovations. As a matter of fact, the diversity in interpersonal communication style is one of the most common concerns among diffusion of innovations researchers (Kelder *et al.*, 2017).

The study was equally cognizant that the diffusion process starts with knowledge (awareness) about the innovation and is coherent with persuasion (formation of favourable or unfavourable attitude toward the innovation), decision (engaging in activities that lead to a

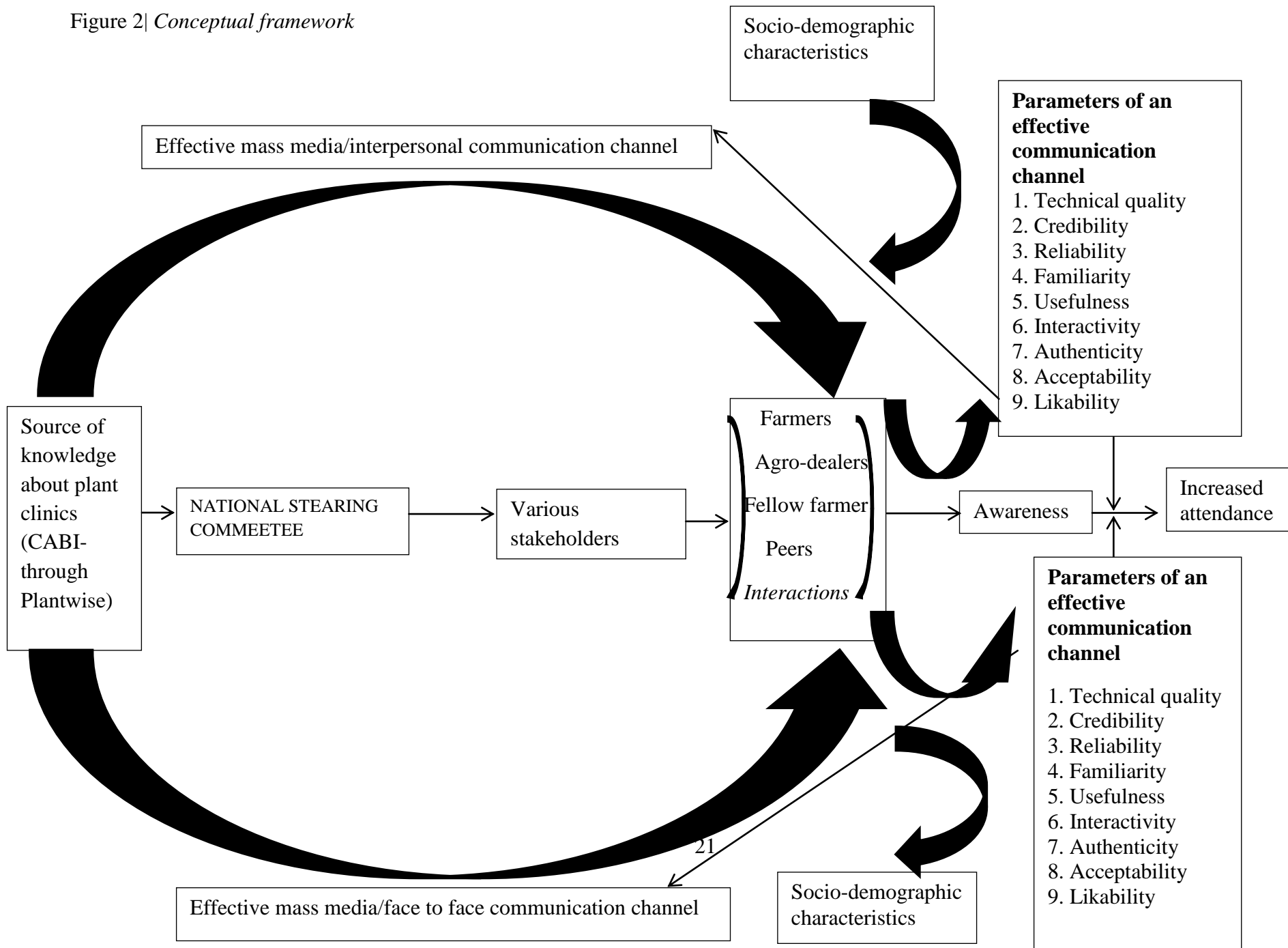
choice to adopt or reject innovations), implementation (putting an innovation into use) and confirmation (seeking reinforcement of an innovation-decision already made) stages of the process. To the study, insights of the role of communication channels in every stages of the innovation decision process was important as provided by the classical study of the diffusion of innovations.

3.2 Conceptual framework.

The study conceptualized a framework to describe the communication pathways in creating awareness about plant clinics by linking Laswell and Rodgers' models. According to the framework, knowledge about plant clinics is generated by CABI (through Plantwise) and made available to key stakeholders through the Plant Health National Steering Committee found in every CABI partnering country. It is from the stakeholders that dissemination and awareness creation is initiated to the farmers. The same information can also be passed directly to the farmers from CABI through Plantwise portal and other relevant media.

Based on the reviewed literatures, the study conceptualised nine parameters to designate an effective communication channel; *Acceptability, Authenticity, Credibility, Familiarity, Interactivity, Likability, Reliability, Technical quality and Usefulness*. These were illustrated in the *Figure 2* below.

Figure 2 | *Conceptual framework*



From the framework, awareness can also be achieved through interactions of farmers with the agro-dealers, peers and fellow farmers. Full awareness depends on how effective the channels were in the dissemination process, with expected results being increased attendance and access of plant health information from the clinics.

3.3 Study area.

The study was conducted in Kiambu County; Kikuyu, Limuru and Kabete sub-counties. The county lies between Latitude: $-1^{\circ} 10' 0.01''$ S and Longitude: $36^{\circ} 49' 59.99''$ E with an area of about 2,543.5 km². Climatically it receives between 200 mm and 600 mm of rainfall annually, with temperatures ranging from the lows of 7°C and highs of 34°C in the low and upper lands respectively. The climate makes it suitable for most crops to be grown. Notably, pineapple in Thika, coffee and tea in Gatundu and Irish potato, cabbage, fruits and flowers in Limuru, both in small and large scale.

Kiambu County enjoys agriculture as her mainstay, contributing about 17.4% of its total GDP. Agriculture is one of her leading employing sectors, providing income to the locals, overly improving their social and economic well-beings (NDUNGU, 2014). Its population stood at 1.1 million as per the 2009 census but was projected to grow at a rate of 2.81 percent per year. Currently, the population is estimated to be 1.7 million (Kalungu, 2017). This growth is attributed to the growth of urban centres, infrastructure development, extensive land use and expansion of subsistence and commercial agriculture. Thanks to the good rainfall patterns and proximity to the Kenyan capital city, Nairobi.

Despite being a pioneer county where plant clinics were launched, thousands of farmers in Kiambu still suffers crop losses due to constrains of accessing proper plant health care services (KIARIE, 2016). Going by the 2017 Plantwise Kenya report, more than 60% of Kiambu farmers are aware about plant clinics.

3.4 Research design.

Respondents for the study were mainly identified from all the plant clinic catchment areas in the three sub-counties of Kiambu;

- a. In Kikuyu; Gikambura, Dagoreti, Nderi, and Lusengeti.
- b. In Limuru; Ngecha.
- c. In Kabete; Wangige and Karura.

The county has 12 sub-counties as shown in the *Figure 3* below;



Figure 3| *Map of the study area.*

Source/ Internet: www.maps-streetview.com

3.4.1 Determination of sample size and data collection.

Probability proportional to size sampling method developed by Yates and Grundy (1953) was used to calculate the sample population as there was a finite population of famers to sample from; 1500 famers who were aware and had been visiting the clinics. This was formulated as follows:

$$n = \frac{Z^2 (1 - p)p}{e^2}$$

Equation 1 | *Formulae to work out the sample size for the households to be interviewed.*

Where; n = sample size; Z = desired Z-value yielding the desired degree of confidence=1.96 (two tailed), p = estimated population proportion (0.5), e = absolute size of the error in estimating p that the study was willing to permit=0.086. Out of this, 130 farmers who were aware and attending the clinics were sampled for the study. The sampling frame was guided by a list of farmers who had visited the clinics in Kiambu County since launch obtained from the Plantwise Online Management System (POMS). Selection of households for interview was random but limited by their proximity to the clinics; 5km radius away from the clinic sites. Structured questionnaires were administered to the selected farmers.

Other target population comprised of plant health stakeholders including the agro-dealers, extension agents/plant doctors, and staffs drawn from the Association of Agro-dealers Kenya (AAK), CABI, Kenya Agriculture and Livestock Research Organisation (KALRO), Kenya Plant Health Inspectorate Services (KEPHIS), Kiambu County government, Ministry of Agriculture Fisheries and Livestock (MoAFL), and the University of Nairobi (UoN). The study applied a purposive sampling and snow-balling sampling techniques to select agro-dealers from the three sub-counties. Fourteen were selected, two from each clinic area. Due to the few number of plant doctors in the county, total-sampling was applied to select all the eighteen. Together with twenty-one farmers identified by the plant doctors to

be having relevant knowledge about plant clinics, three from each clinic area, these groups of persons were clustered for discussions (FGDs). Each group discussion comprised of 8-9 individuals as recommended by Caplan (1990). Seven were conducted, one in each plant clinic area. The remaining interviewees, including one staff each from MoAFL (National coordinator), AAK (Its chairman), Kiambu County (County Plantwise Project Coordinator) and CABI (Country Coordinator for Plantwise, Kenya) were guided through key informant interviews (KIIs). Four were conducted.

3.4.2 Emperical data analysis.

Analysis of effectiveness of communication channels used to create awareness about plant clinics.

Likert type scales of 1-5 were used to rate the acceptability, authenticity, credibility, familiarity, likability, reliability, technical quality, interactivity and usefulness of the channels through which the respondents received the information about plant clinics. Quantitative data from farmer interviews were coded to form indices for effectiveness of the communication channels to create awareness about the clinics. These were reinforced with qualitative data from KIIs and FGDs and coherently evaluated to address the study objectives.

Analysis of effects of farmers' socio-demographic characteristics on their analysis and intentions to access information from awareness creation channels

A linear regression model was adopted to relate the farmer's analysis of effectiveness of communication with their socio-demographic characteristics to ascertain significance on their intentions to access information through those channels. This was specified as:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \dots + b_p X_p + e$$

Equation 2 | *Linear regression model used to relate the effects of a farmer's demographic characteristics on the evaluation of an effective communication channel.*

Defined, the equation was as follows; $ECC(Y) = \beta_0 + \beta A_1 + \beta G_2 + \beta E_3 + \beta R_4 + \beta T_5 + \beta S_6 + e$ where *ECC* - was the effectiveness of a communication channel used to create awareness about plant clinics. It was the dependent variable. The independent variables (socio-demographic characteristics) were designated as *A, G, E, R, T, S*. The *Table 1* below shows the description of the respondents' socio-demographic characteristics and their expected influences on farmers evaluation of effectiveness of the channels.

Table 1| *Description of independent variables.*

<i>Independent Variable</i>	<i>Description</i>	<i>Influence</i>
<i>(A)</i>	<i>Age (in years)</i>	<i>-/+</i>
<i>(G)</i>	<i>Gender(male, female)</i>	<i>- /+</i>
<i>(E)</i>	<i>Level of education (un-educted, primary,secondary,tertiar)</i>	<i>-/+</i>
<i>(R)</i>	<i>Reasons for farming (for food, for income)</i>	<i>-/+</i>
<i>(T)</i>	<i>Number of non-formal trainings (less than five, more than five trainings)</i>	<i>-/+</i>
<i>(S)</i>	<i>Social capital (group membership, number of groups and type of group)</i>	<i>-/+</i>

The study used STATA version 14 to analyze the data. The degrees of correlation (r) between continuous variables were measured using Karl Pearson's coefficient while Spearman correlation was used between discrete independent and dependent variables. Chi-square tests were also applied to analyze the interactivity between the study variables.

CHAPTER FOUR

RESULT ANALYSIS AND DISCUSSIONS

One hundred and twenty three farmers who were aware of the plant clinics and had visited them were interviewed. This translated to 94.6 percent of the targeted population. 100 percent could not be achieved due to logistical issues as some of the plant clinics visiting farmers had since relocated and/or switched ventures.

4.1 Respondents' demography.

4.1.1 Gender and age.

Most (54.5 percent) of the respondents were male. Of all the households interviewed 68.3 percent were male-headed. This is conventional in most African households, where the male gender also doubles up as the primary decision-makers on matters adoption of innovations (Nazziwa-Nviiri *et al.*, 2017). Over 50.4 percent of the respondents were household heads, 42.3 percent were spouses to the household head while 4.9 percent and 2.4 percent were grown up children and relatives to the household head respectively (*Figure 4*).

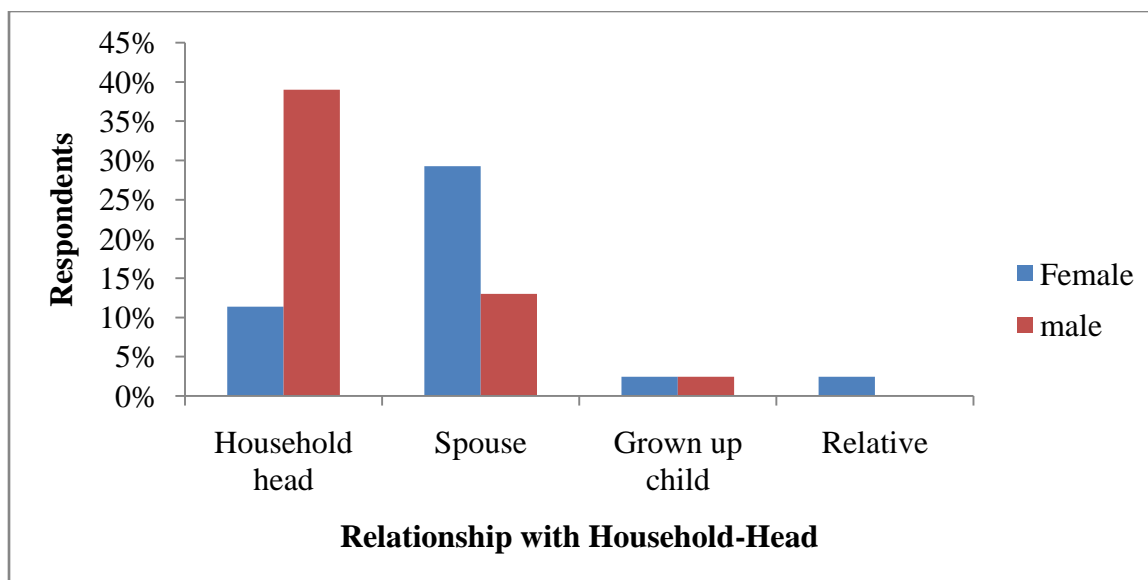


Figure 4| *Proportion (%) of respondent by relationship with household head and gender.*

Source| Authors' survey-2017

The mean ages of the male household heads were 51.16 years while that of the female was 41.17 years. The eldest male and female were 84 and 72 years respectively. There were more female household head, 11.4 percent, within the age bracket of 18-19 years than males at 7.3 percent. This was, however, contrary to those above 70 years of age where there were more males, 8.9 percent, than females, 2.4 percent. This meant that there were more elderly (above 60 years of age) male household heads than female who are aware and visiting the plant clinics (*Table 2*).

Table 2| *Proportion (%) of household heads by age category and gender.*

		Age category						Total (%)
		18-29 (%)	30-39 (%)	40-49 (%)	50-59 (%)	60-69 (%)	>70 (%)	
Gender	F	11.4	10.6	8.1	8.1	4.9	2.4	45.5
	M	7.3	7.3	11.4	6.5	13.0	8.9	54.5
Total (%)		18.7	17.9	19.5	14.6	17.9	11.3	100.0

Source| Authors' survey-2017

Kuschminder (2017) found similar results and reported this as a potential threat to the agricultural system. The male gender controls most of the household activities including decisions on what crop to grow, farming land size among others. Such are also the decisions that greatly impact farm operations (Olsen, 2017). In cases of catastrophes or sudden death of the male household head, all the knowledge and experience acquired during the farming years are lost for the reason that few households have mechanisms to conserve and manage family tacit knowledge. Sociologists shun such ineptness and highlight that for proper enhancement of agricultural production, both the genders should equally be involved in the decision-making process ("Goal 3: Promote gender equality and empower women," 2016).

About 22 percent of the household heads below 40 years were female while only 15 percent were male. A study by Wabwoba and Wakhungu (2013) in Kiambu County reported similar results and made conclusion that the low involvement of the youth in farming in the county was a worrying trend that could affect its goal of achieving economic growth through agricultural investments. This is considering the negativity associated with old age. Older farmers are tenacious and would rather stick to the traditional way of doing things than change to 'unknown ventures' (Lloyd, 2016).

The modal age group was 40-49 years. This was, however, auspicious as this category of farmers are energetic, enthusiastic and less risk-averse. They can invest in and easily adopt innovations as long as they are packaged and appropriately communicated. Correspondingly, Blau (2017) explained that most of them are technologically oriented and exposed to various sources of information.

4.1.2 Education level

About 12.2 percent of the household heads had no education, 64.2 percent had primary education. Approximately 18.7 percent had secondary education while only 4.9 percent had tertiary education. The high percentage of farmers with education in this study demystifies the overly expressed notion that agriculture is for the uneducated. It was also noteworthy that there was a significant association ($\chi^2=36.213$, $df =18$, $p=0.007***$) between plant clinic areas and education. Most farmers without education were from the Lusigeti clinic area (*Figure 6*).

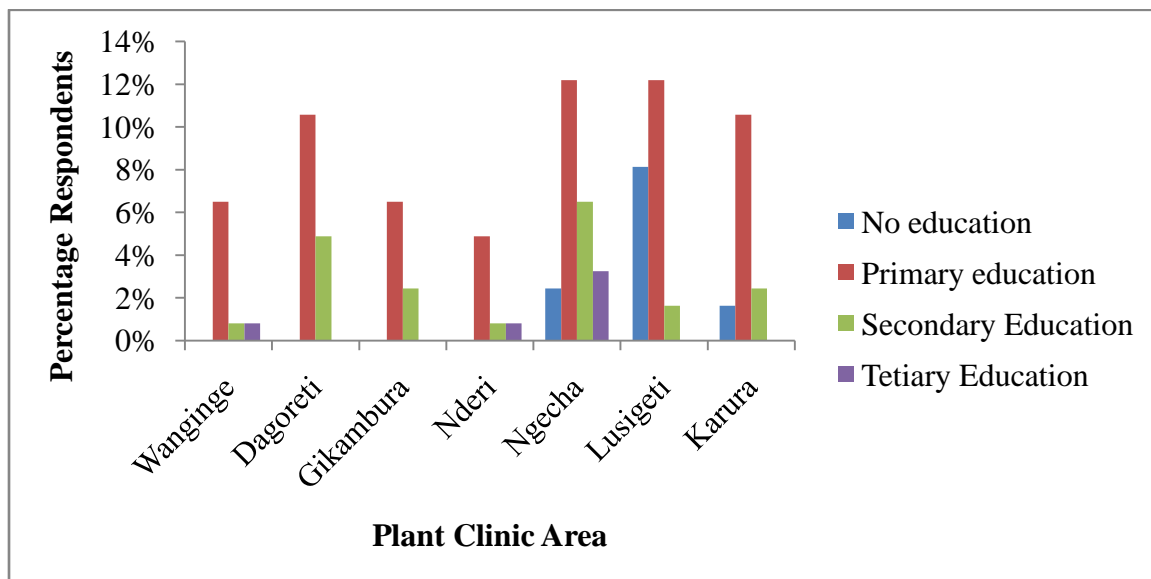


Figure 5| *Proportion (%) of household heads in each plant clinic area by education level.*

Source| Authors' survey-2017

Ngecha plant clinic area had the highest number of farmers with secondary education and Dagoreti plant clinic area had no respondent with tertiary education. Majority of the household heads with no education received the information about plant clinic through interpersonal channels. The same was true for farmers with tertiary education (*Table 3*).

Table 3| *Proportion (%) of household heads by education level and communication channel used.*

		Education level				Total (%)
		No education (%)	Primary education (%)	Secondary Education (%)	Tertiary Education (%)	
Communication channel used	Mass-media	4.9	30.1	13.0	1.6	49.6
	Interpersonal	7.3	33.3	6.5	3.3	50.4
Total		12.2	63.4	19.5	4.9	100.0

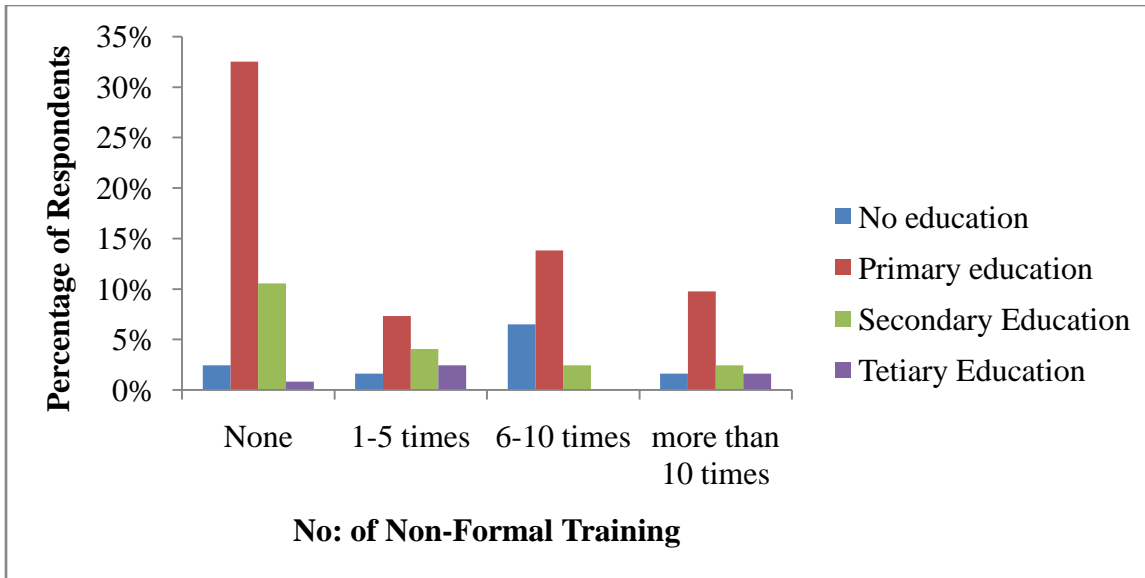
Source| Authors' survey-2017

4.1.3 Farming experience

This was defined by the period in years a household heads had directly been involved in farming. The study categorised them into three groups; those with less than 10 years of farming experience, those with between 11-20 years and those with more than 20 years of farming experience. Over 36.6 percent had less than ten years of farming experience, 33.3 percent had between 11-20 years. About 30.1 percent had more than 20 years of farming experience.

4.1.4 Non-formal training

About 46.3 percent of the household heads had non-formal trainings. Out of this proportion, 49.0 percent had attended between 1-5 non-formal trainings while those who had between 6-10 and more than 10 trainings were both 25.5 percent. Only 3.5 percent of the household heads had no non-formal training at the same time no education (*Figure 7*).



Source/ Authors' survey-2017

Figure 6| Proportion (%) of household heads by level of education and non-formal training.

The study also established a negative significant association ($\chi^2=20.104$, $df=9$, $p= - 0.017^{**}$) between levels of education and number of non-formal trainings. The more educated household heads had less number of non-formal trainings and vice-versa. Comparable results had been obtained by Kalenda (2015) when assessing the relationship between non-formal trainings and adult education among wheat growing communities in the Czech Republic.

Of all the household heads with no non-formal trainings 63.2 percent were female. A positive significant relationship ($\chi^2= 23.194$, $df = 3$, $p<0.001^{***}$) was established between number non-formal trainings and gender. More male household heads had non-formal trainings than females. The low number of women involved in such training is common in most developing countries for family related reasons as their participation in the agricultural economy has been under-looked. Traditionally the female farmers' agricultural produce are sold locally or consumed within the household ("From promoting gender equality to empowering women," 2014). Attempts to access such training are therefore thwarted by their roles in the farming system. Likewise, McIntyre (2017) elucidated that the

heavy workloads of the female gender limit their availability regarding to time to participate in the non-formal trainings. These coupled with social norms and negative perceptions that women have a less decision-making prowess, they are excluded from the trainings. Men on the other hand have easier access to trainings on innovations mainly due to their strong position as household heads and higher chance to access off-farm mobility (Garikipati, 2008). Efforts should therefore be made to break such barriers to reach more women through such trainings. Women involvement in the agricultural activity, their decision-making power and hitherto, their underutilized potential as done through training may increase the awareness about plant clinics, and ultimately attendance. They are the least attendees (Mugambi *et al.*, 2016).

4.1.5 Reasons for farming

According to Ngwili, Maina and Irungu (2015) farming is done as a means to livelihood for over 75 percent of Kenyans. This can directly be done for food or indirectly for income or both. But for whatever purpose, the reason for which a farmer does farming may define his/her ability to access information through particular communication channels (Elias *et al.*, 2016). The *Table 4* below gives a summary of the percentage household heads by reasons for farming and communication channels through which they received the information about plant clinics.

Table 4| *Proportion (%) of household heads by reason for farming and communication channel used.*

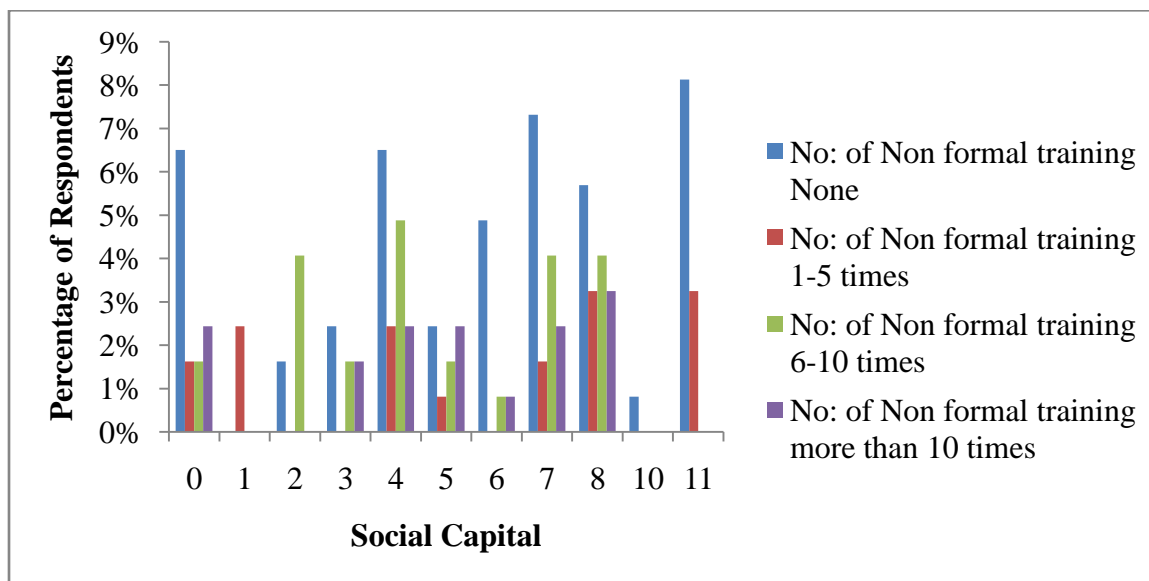
		Reason for farming			Total (%)
		For food (%)	For Income (%)	Food and income (%)	
Communication channel used	Mass-Media	13.8	16.3	19.5	49.6
	Interpersonal	22.8	11.4	16.3	50.4
Total (percent)		36.6	27.6	35.8	100.0

Source| Authors' survey-2017

More household heads who do farming for food received the information through interpersonal communication channels.

4.1.6 Social capital.

Over 83.7 percent of the household heads were members of at least a group with 46 percent of them in groups involved in agriculture related activities. Lusengeti plant clinic had the highest number of respondents in agriculture related group, 13.0 percent. Ngecha plant clinic had 14.6 proportion of her interviewed household heads not in agriculture related groups. The study established a positive significant statistical relation ($\chi^2=46.841, p = 0.026^{**}$) between the number of non-formal training and social capital of the household heads. Majority of the household heads with high social capital also had more non-formal trainings (*Figure 8*).



Source/ Authors' survey-2017

Figure 7| *Proportion (%) of household heads by social capital and non-formal training.*

Similar results were obtained in a study by Sseguya *et al.*, (2018) who emphasized that farmers' social capital improves their disposition to access non-formal trainings.

Plant clinic area.

POMS records indicated that Wangige and Dagoreti plant clinics had a considerably high attendance since launch, 233 and 452 respectively. This may be due to their locations. The two are in agricultural markets that draw agribusiness farmers from all over the country. This was contrary to Ngecha plant clinic where local farmers do more of livestock production than crop production. Farmers from Ngecha were therefore reluctant to attend the clinics which only deal with crops. It had the least number of farmers attending the clinics; 122 farmers. Lusengeti plant clinic area had the highest number of household heads doing farming for food, 28.9 percent. Most farmers from the area reported losing crops to drought for the past two seasons prior to the study and, therefore, resorted to subsistence farming as they mostly did rain-fed agriculture. According to the study, the most and least used channels were plant doctors (27.4%) and agro-dealers (5.7%) respectively (*Table 5*).

Table 5| *Proportion (%) of respondents by communication channels used*

Communication channel	Proportion
Plant doctors	27.6
Fellow-farmers	10.6
Agro-dealers	5.7
Plant health rallies,	12.2
Plant clinic sessions	14.6
Church announcements	17.1
Plant clinic banners, umbrella	5.9
Brochures, posters, leaflets	6.5

Note. N=123. Source: Author 2018.

However, no respondent recorded receiving the information about plant clinics through newspapers, magazines, radio, television, social media blogs or text messages. The *Table 6* displays the mean parameter rating of the communication channels by the household interview respondents. The average mean rating for effectiveness of interpersonal channels was 2.97 i.e. $\left\{ \frac{3.24+2.88+2.93+3.03+2.73+2.99}{6} \right\}$ while the average mean rating for effectiveness of mass media channels was 2.94 i.e. $\left\{ \frac{2.39+2.76}{2} \right\}$. The threshold for most effective communication channel was 5.0 i.e. $\left\{ \frac{5*9}{9} \right\}$ (sum of total maximum likert scale rating divided by the number of parameters).

Table 6| *Summary of mean rating of parameters of communication channels*

Communication channels	<i>Familiarity</i> \bar{x}	<i>Authenticity</i> \bar{x}	<i>Interactivity</i> \bar{x}	<i>Likability</i> \bar{x}	<i>Credibility</i> \bar{x}	<i>Reliability</i> \bar{x}	<i>Technical quality</i> \bar{x}	<i>Usefulness</i> \bar{x}	<i>Acceptability</i> \bar{x}	<i>ECC</i> \bar{x}
Plant Doctors	2.96	3.12	3.26	2.88	3.70	2.94	3.33	3.35	3.76	3.24
Fellow-farmers	2.23	1.84	3.12	2.77	3.56	2.69	2.38	3.85	3.08	2.88
Agro-dealers	2.89	2.86	3.55	1.71	2.57	2.86	1.98	4.62	2.83	2.93
Plant-health rallies	2.40	3.27	4.01	3.23	2.33	2.60	2.98	3.81	3.61	3.03
Plant-clinic sessions	2.74	2.95	3.02	2.95	2.89	1.72	1.95	3.21	2.79	2.73
Church announcements	3.52	3.56	3.35	3.63	3.11	4.07	1.61	2.95	2.84	3.02
Banners and umbrellas	2.49	3.44	1.86	2.31	2.26	1.32	1.89	2.12	2.52	2.39
Brochures, leaflets, posters	3.32	3.11	3.18	3.02	1.74	3.45	3.09	3.58	3.36	2.74

Note. N=123, ECC=Effectiveness of communication channel, \bar{x} =Mean rating index for parameters of effective communication channel. Scale of effectiveness: Not effective at all ≤ 1 ; not effective ≤ 2 ; less effective ≤ 3 ; effective ≤ 4 ; very effective ≤ 5

Source: Author; 2018

The study took photographs of the plant clinics sessions and rallies and highlighted them as in the below *Figures 9 and 10*.



Figure 8| *Plant health rally held at Nderi plant clinic area- Kikuyu sub-county*
(Source: Author; 2017).

The rallies are aimed at creating awareness about the Plantwise initiative besides sensitizing farmers on emerging plant health problems.



Figure 9| *Plant clinic set-up in Karura ward- Kabete sub-county.*
(Source: Author; 2017).

The plant doctors operate under umbrellas whose efficiency is subject to the weather conditions of the day. The set-up is temporary; raised at dawn and removed at dusk on clinic days.

4.2 Evaluation of effectiveness of communication channels used in creating awareness about plant clinics

4.2.1 Familiarity

Inadequate sensitization was majorly emphasized by the FGD respondents as to why most farmers were not very familiar with the plant-health rallies. About 32.6% of the household interview respondents stated that the ‘plant logo’ on the banners though familiar, was not simulcasting enough. Some underscored the lack of varied symbols on the banners and umbrellas to bring out the expected familiarity. About 4.8% highlighted that the colors used on banners and umbrellas were familiar as they resembled those used by the ‘Kenyan electoral body’. This however, created a huge disconnect to associate them with the clinics.

In a FGD, the plant doctors accounted starting off by use of simple leaflets and then advanced to the use of more familiar brochures and posters to create awareness about the clinics. Accentuating as to why they resorted to church announcements, they supposed that they were taking advantage of the homophilous nature of their targets, particularly congregations. In churches, announcements are a norm and are done in full knowledge of the members. The validity of their accounts was affirmed by the high familiarity index of the church announcements (*Table 6*).

About 25% of the household interview respondents made references of their low familiarity with the plant doctors to their limited movements. The doctors are stationed at the clinics and make rare farm visits, unless need arise. The proximity of Kiambu County to Kenyan capital city (Nairobi) places her farmers in expedient positions to access agro-dealers, who are

readily available both in the city and its environs. This was consequential. The respondents were more familiar with the agro-dealers (*Table 6*) than even the plant doctors who are the main source of plant clinic information at the grassroots.

4.2.2 Authenticity

Majority (64.4%) of the household interview respondents who attended plant-health rallies applauded the fact that a platform for two-way exchange and sharing of information was provided to them. However, with 36.3% of them delineating correspondence of the plant clinic session with mobile herbal clinics, the authenticity of this media channel was at stake. Mobile herbal clinics have always been faulted for giving misleading information with aims of selling their agro-products (Frankema, 2009).

Most of the respondents who received the information through church announcements rated the channel genuine in creating awareness. This might have rode on a canard that in churches the ‘gospel is the truth’, and announcements are part of the gospel. Nonetheless, a FGD respondent reported that a times the announcements are carelessly presented, and lacked congregation involvement.

In-depth analyses of the responses from the FDGs revealed significant dearth in the fellow-farmers’ ability to provide foolproof feedback on the queries they received about the clinics. This portrayed them as being disseminative (unidirectional) rather than communicative (multi-directional) channel of awareness creation. About 55.8% of the household interview respondents admitted seeking additional information from other sources to make sense of the information about the clinics they received from the fellow-farmers. One such source was the internet. However, the internet has a plethora of information which times can be overwhelming thereby creating self-conflict of what to and not to trusts (Fleming, 2015). When farmers have to seek additional information from other sources, the initial source may

be perceived less authentic (Greene *et al.*, 2011). A review of the Plantwise portal revealed much that had been done to strengthen the link between the agro-dealer to the plant clinics in order to improve their authenticity. However, majority of the respondents still viewed them as less authentic channels to create awareness about plant clinics.

4.2.3 Interactivity

Banners and umbrellas had the least interactivity mean rating (*Table 6*). Majority (79.6%) of the household interview respondents who received the information through them emphasized their ‘silence’ on many issues about plant clinic activities. The banners stress more on who the major stakeholders running plant clinics at the expense of outlining the operationalization of the clinics (*Figure 1; Figure 10*). This, as indicated by 62.6% of the same respondents, negatively impacted the clarity and thus interactivity of the clinic session activities’ to create awareness. Majority (89.6%) of those who received the information through interpersonal channels commended their ability to encode the information in languages that were more understandable. The agro-dealers had the second highest mean rating for interactivity (*Table 6*). This was auspicious as the interactive nature of the agro-dealers has made them effective particularly when dealing with knowledge-intensive agricultural information (Adolwa *et al.*, 2017). Similarly, the possibility to ask questions and get feedback during and after the clinic sessions, plant-health rallies and church announcements gave the of respondents’ opportunities to seek clarification about the clinics. However, the disseminative nature of most fellow-farmers limited their interactivity.

4.2.4 Credibility and Likability

In a study to assess the relationship and effects of likability and credibility on sale of a product, Mutum and Wang (2011) established that credibility of the producing company had significance on the likability of the product and further its sale. In areas where farmers have options of information sources to choose from, perceived credibility and likability of the

source become inseparable. Such phenomena were also experiential in the plant clinic scenario. A correlation analysis by the study established a significant positive association ($df=122$, $correlation\ coefficient=0.309$, $p=0.015^{**}$) in credibility and likability rating of the channels used to create their awareness.

Information from ‘mobile herbal clinics’ have questionable credibility (Aziato and Antwi, 2016). Their correspondence to the plant clinics as stated by some FGD respondents informed the likability rating of the clinic sessions. With majority of the household interview respondents (62.6%) also faulting the clarity in the services offered at the clinics, it was easy for them to lose trust in their ability to give objective and non-biased information. A FGD respondent averred associating the plant-health rallies with political activities by virtue of where they were held; a chief camp. Anyway, this might have been because this study was undertaken just after a period of intense politicking in Kenya.

Majority of the FGD respondents’ highlighted the brochures, leaflets and posters’ lack of visual attraction and sufficient details about the clinics. However, being that most were in local language, it became easy to comprehend the message they were sending. Some respondents though, argued that the drive for the agro-dealers to sell their agro-products limited their credibility and further likability to create awareness about plant clinics.

4.2.5 Reliability

The plant doctors stated that few plant-health rallies had been organized in their clinic areas. Same was affirmed by the Kiambu county Plantwise desk officer during a KII, who stressed on the high financial cost involved in organizing rallies. To the household interview respondents, this was challenging as most could not envisage when the rallies would be.

All the clinics are stationed but operate on definite days, twice a month (*Table 7*). The study established that they were opened on an average 4.61 hours a day. This was despite the

Plantwise portal indicating that the clinics are opened for 8 hours a day. In their defence, the plant doctors explained that it was expected as they work under umbrellas whose efficiency is subject to weather conditions.

Table 7|*Schedule and average operation time of each clinic in Kiambu County*

<i>Plant clinic</i>	<i>Plant clinic session day</i>	<i>Average operation time (hrs.)</i>
Gikambura	1 st and 3 rd Friday of the month	5.80
Lusengeti	1 st and 4 th Monday of the month	5.20
Dagoreti	2 nd and 4 th Wednesday of the month	4.60
Karura	2 nd and 4 th Wednesday of the month	3.10
Ngecha	2 nd and 4 th Friday of the month	3.26
Nderi	2 nd and 4 th Tuesday of the month	6.10
Wangige	1 st and 4 th Thursday of the month	4.24

Source|Authors survey-2017

The banners and umbrellas are temporary and lack lead information to the plant doctors. The irregular plant clinics' operation interval also disadvantages the farmers. It becomes impracticable for farmers without contacts to the plant doctors to wait for the clinic services for serious plant-health problems identified when they aren't in sessions. Such farmers opt to seek help elsewhere. That notwithstanding, during a FGD, some plant doctors indicated that the county government had less priority for the clinic sessions forcing them to at times skip the clinic day to attend to other county duties. Similarly, the discontinuous and untimely visit of the plant doctors to the farmers also impaired their reliability.

4.2.6 Technical quality

The household interview respondents were asked to rate these channels based on their information richness and physical attribute to create awareness. About 23.6% of those who received the information through banners cited their inability to comprehend the messages

they were relaying. To them, the “*ZAHANATI YA MIMEA*” and or “*PLANT-HEALTH CLINIC*” (Figure 1; Figure 9) inscriptions proved a jargon. To some, the writings sent messages of ‘false hope’, being that all the services expected from a ‘clinic’ are not offered at the plant clinics. Most of the clinics only offer plant-health diagnostic and recommendatory services. About 60% of the respondents who received the information through brochures reported their lack of succinct information about the clinics.

Work ethics calls for health-workers to be in specific regalia. However, in most period of the study, the plant doctors were not in Plantwise branded attires. This made it difficult for farmers to associate them with the clinics. In fact, a majority of the respondents were being informed that they were always being served by Plantwise plant doctors at the time of the interviews. A FGD respondent raised questions as to how knowledgeable the agro-dealers were about plant clinics. However, during a KII, the AAK chair indicated that most agro-dealers had been sensitized about the clinics in addition to being provided with Plantwise fact-sheets that could even help them make diagnosis.

4.2.7 Acceptability

A study by Ogunremi (2016) revealed that local residence age, language among other factors determined the acceptability of extension agents by farmers. This study did not take this dimension to assess the acceptability of the PDs. Nonetheless, it believed that such consideration were tangential in determining the Plant doctors acceptability to create awareness about plant clinics as most had such attributes.

4.2.8 Usefulness

The household interview respondents were asked to rate the channels based on their ability to solve their farm-related problems. Besides the information about the clinics, majority of the respondents recounted receiving useful advice on control of plant pests and diseases. Those

rating the usefulness of the channels otherwise highlighted the need to include livestock-health advisory services in the framework to help solve agricultural problems in entirety.

4.3 Socio-demographic characteristics affecting farmers' analysis and intentions to access information from mass-media communication channels.

The study established that farmers' reason for farming, social capital, and level of education had significance on on their analysis and intentions to access information from mass-media channels used in creating awareness about plant clinics (*Table 8*).

Table8| *Results of regression analysis on influence of farmers' socio-demographic characteristics on their evaluation of effectiveness of mass-media channels used in creating awareness about plant clinics*

Socio-demographic profile of household heads	coefficient	Std. Err	T	P> t
Gender	0.431	1.452	0.297	0.768
Age of Household head	0.056	0.054	1.046	0.300
Farming Experience	0.226	1.923	0.117	0.907
Non formal training	0.373	0.704	0.530	0.599
Reason for farming	6.729	1.638	4.108	0.000***
Social capital	-0.413	0.204	-2.022	0.048**
Education level	-0.413	2.477	2.909	0.005***
Constant	10.209	3.297	3.096	0.003

Source| Authors survey 2017

*_10% confidence level, **_5% confidence level. ,***_1% confidence level. Number of observations =61.

4.3.1 Reason for farming

The respondents were categorised as either farmers for income (commercial) or farmers for food (subsistence). Majority of the household heads, 40.1 percent, doing farming for income received the information about plant clinics through brochures, leaflets and posters. Only 18.1 percent of the household heads doing farming for income received the information through banners or umbrellas. About 13.1 percent doing farming for food received the information through brochures, leaflets and posters (*Table 9*).

Table 9/ *Proportion (%) of household heads by reason for farming and communication channel used.*

		Communication channel	
		Brochures, leaflets and posters	banners or umbrellas
Reason for farming	For Food	13.1	28.7
	For Income	40.1	18.1

Source/Authors survey-2017

According to Bhatta and Doppler (2010), there have been existing socio-economic gaps between subsistence and commercial farmers in the developing countries. Commercial farmers are socio-economically advantaged to do self-analyses of communication channels to use in accessing information about innovations (Baral and Shah, 2016). Normally, the commercial farmers have higher chances to source information through various channels owing to the vast financial resources available at their disposal (Castellacci, 2015). In this study majority of the farmers for income rated the mass-media channels less effective in creating awareness about plant clinics. The timing of most mass media channels were playing much to their disadvantage. Due to the unreliability of the banners and umbrellas, majority of the respondents could not envisage them as they are temporary, rose late and removed early

before they could come back from their daily activities. This was the case in most plant clinic areas where the clinics were not in market areas; Lusigeti and Karura. This scenario impacted the commercial farmers' reliability ratings of most mass media as channels of awareness creation. Be that as it may, about 23 percent of the farmers for income were also less familiar with the umbrellas and banners. However, to majority of them, the banners and umbrellas had so much correspondence to those used by the Kenyan IEBC voter registration centers that also targeted the market areas.

4.3.2 Social capital

Farmers with higher social capital rated the mass-media less effective in creating awareness than farmers with lower social capital. The findings of this study augments Bae (2018) arguments that social networks influence farmer's reasoning and disposition to various communication channels. Both women and men use formal and informal social networks to learn about and gain access to innovations. Social capital provides leverages for farmer evaluation of effective communication channel. Most farmers with high social capital were more familiar with the plant doctors than those with low social capital. However, majority of them perceived their fellow famers as less credible channels of awareness creation with such affecting their ability to convey authentic information about plant clinics.

4.3.3 Education level

Majority of the respondents with low education viewed the mass-media channels as less effective in creating awareness about plant clinics. This implies that the introduction and awareness creation of plant clinics through most of these mass-media channels may not suffice amid farmers without education. With the banners and umbrellas branded in non-local languages, majority of the uneducated farmers were not able to discern the messages that they were sending. In light of this, all the household heads with no education rated the clinic banners and umbrellas to be having the worst technical quality to create awareness. This

further informed their acceptability of their messages. Consequently, the inability to comprehend the logo on the umbrellas and banners by the same respondent contributed to them faulting the authenticity of the channels. Most household heads without education felt that the umbrellas and banners were vague and careless in creating awareness.

4.4 Socio-demographic characteristics affecting farmers' analysis and intentions to access information from interpersonal communication channels.

Farmers' Gender, farming experience, social capital and education level of the household heads had significance on their evaluation of the effectiveness of interpersonal channels used to create awareness about plant clinics (*Table 10*).

Table10| *Results of regression analysis on influence of farmers' socio-demographic characteristics on their evaluation of effectiveness of interpersonal channels used in creating awareness about plant clinics.*

Socio-demographic profile of household heads	coefficient	Std. Err	T	P> t
Gender	0.431	1.452	0.297	0.021**
Age of Household head	0.056	0.054	1.046	0.569
Farming Experience	0.226	1.923	0.117	0.033**
Non formal training	0.373	0.704	0.530	0.000
Reason for farming	6.729	1.638	4.108	0.483*
Social capital	-0.413	0.204	-2.022	0.007***
Education level	-0.413	2.477	2.909	0.026**
Constant	10.209	3.297	3.096	0.000

Source| Authors survey-2017

*Note: *_ 10% confidence level, **_ 5% confidence level,***_1% confidence level. Number of observations =62.*

Age was found not to significantly affect farmers analysis of communication channels used to create awareness. However, it was noteworthy to highlight that majority of the elderly

farmers received the information about plant clinics through interpersonal channels than the younger farmers (*Figure 10*).

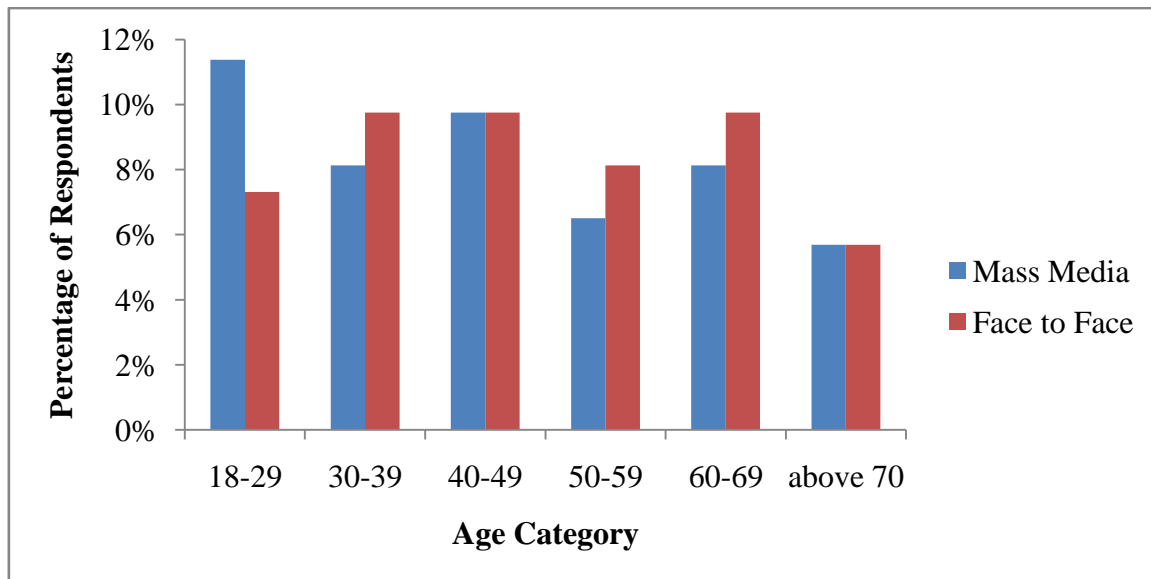


Figure 10| Proportion (%) of household heads by age category and communication channel.

Source| Authors' survey-2017

4.4.1 Gender

Majority of the male respondents rated the interpersonal channels as effective in creating awareness. They were familiar with the interpersonal communication channels than the female respondents. As highlighted by Okello *et al.* (2014), the awareness and adoption of agricultural innovations are linked to access to important information source. Yet, there remains a large gap between men and women's access to the extension agents and agro-dealers. Women have less access (Shrira *et al.*, 2018). Familiarity to these communication channels are subject to their access (Figueiredo *et al.*, 2011). Therefore, the low access to these channels by the female respondents may justify their low familiarity with the plant doctors and agro-dealers. A study by the World Bank/IFPRI (2010) in Ghana found that meeting with extension agents was the greatest predictor to the awareness and adoption of agricultural innovations, with the likelihood of adoption approximately 18 percent greater for those who had access to an extension agent. Further, the likelihood to access an extension

agent was subject to their frequency to visit farms. Being stationed, the extension agent (plant doctors) and the agro-dealers make limited visits to the farmers. Accordingly, Kiambu County has an approximate 304,449 farmers directly or indirectly employed in the agricultural sector. About 60 percent of them are women. This implies that a majority of the farmers have less access to the plant doctors. Equally, it is not feasible for all these farmers to be served by less than twenty plant doctors in the whole county. Nowander, majority of them are not familiar with the plant doctors.

4.4.2 Education level

Majority of the household head with education rated the interpersonal channels effective in creating awareness about plant clinics. A bivariate correlation analysis revealed a negative relationship ($df = 60$, $correlation\ coefficient = 0.364$, $p = -0.004$) between the respondents' level of education and likability of the interpersonal channels. Based on the information richness theory, a communication channel is considered effective depending on its ability to communicate in varied means. Education is believed to enhance farmers' ability to access, process and analyze information disseminated through various means (Schmidt and Pearson, 2016). The extension agents have long been effective in persuasion to adopt innovations due to their ability to facially express themselves, use body language, apply vocal tonality and give real-time feedback (Grünig and Kühn, 2017). It would be graceless to contend that farmers with no or low education were not able to interpret these stated cue. However, education gave the farmers an edge to comprehend and internalize any slight message sent by the extension agents to affirm effectivity to create awareness. As such, in reference to the 'seeing is believing' rationale, a respondent without education discoursed that after learning how efficiently a fellow farmer had controlled fall army worms, she got curious to ask the source to the information about control of fall army worm. That's how she got to know about the plant clinics. The farmer felt she had benefited more because she not only got to know

about the plant clinics, she also experienced the process of fall army worm control, attributing it to her likability of fellow farmers as awareness creation channel. In this regard, the personal contacts among the farmers yielded fruits as they were able to share their experiences and get feedback. To apply this, Plantwise and relevant plant clinic stakeholders should strive to add value on the already established farmer to farmer dissemination approach by training farmers perceived to lead by example often called model, master, or lead farmers on better ways to create awareness about plant clinics.

Most farmers with low education rated the plant health rallies effective in creating awareness. According to Wang *et al.* (2015) less educated farmers are more likely to prefer plant health rallies as awareness creation channels. They therefore, would presume rallies as effective communication channel. Highly educated farmers on the other hand are often more reluctant to attend rallies. They perceive them as less likable channels of awareness creation as a result of them causing intrusion and annoyance.

4.4.3 Farming experience

Farming experience had a significant negative influence on farmer's evaluation of effectiveness of the interpersonal channels. Majority of the household heads with more than 10 years of farming experience rated the interpersonal channels as less effective in creating awareness than those with less than 10 years of farming experience. This was in consensus to Adesope *et al.* (2012) which outlined that farming experience is negatively correlated to their evaluation of sources of information about organic farming practices and is significant at - 0.01** levels. Farmers who have long been in farming are able to compare and contrast newly adopted communication channel from previous experiences. They tend to put less value on new channels that do not fall in line with their previous experiences and vice versa.

4.4.4 Non-formal training

Household heads with non-formal training rated the interpersonal channels very effective than those without non-formal trainings. According to Abram (2017) non-formal training provides podia that try to strike a balance in societies between those who have access to formal education and those who do not. A comparison of evaluations done by two respondents, one without non-formal training and another with non-formal training but both without education and received the information about plant clinics through interpersonal channels revealed notable variances. The respondent with the non-formal training at various interjections of the interview gave references to the communication attributes of the trainers they had in the non-formal trainings to rate the interpersonal channel. He rated the channel (fellow farmer) as being less authentic, less credible and with poor technical quality to create awareness about plant clinics. This was unlike the respondent with no non-formal training who gave a clean bill of health to the interpersonal channel. This may then imply that in the non-formal trainings, what is learnt goes beyond the theme taught being that the trainers are characteristically oriented to practical life skills which are in most cases useful for the participants who acquires them (Gan *et al.*, 2016).

4.4.5 Social capital

Most respondents with higher social capital rated the interpersonal communication channels effective in creating awareness. In a study by Garner (2017), it was revealed that in social groups there are greater chances that they include varied members of an agricultural society. Among them are the extension agents, lead farmers, and peer farmers. In describing the characteristics of members of the groups, Garner outlined that extension agents and lead farmers were indeed always willing to share information with others. They are early adopters of technologies, good communicators with facilitation skills, literate and gender sensitive. They are therefore highly placed in the groups' social ladder. Being in groups with

individuals of such personalities exposes a farmer to various spheres of life. They become more capable to evaluate channels of communication based on their previous experience with other group members.

4.4.6 Reasons for farming

Most commercial farmers were very familiar with the plant health rallies in creating awareness. The Country Plant Clinic Coordinator during a KII highlighted that the plant health rally targeted market places in order to meet more farmers. Commercial farmers' frequent visit to the market places accordingly increased their chances to encounter the rallies, thus the familiarity. Conversely, majority of the subsistence farmers rated the plant clinics sessions as less reliable. Boserup *et al.* (2013) averred that subsistence farmers have limited movement as result of majorly spending more times in their farms which are their main source of livelihood. With most of the plant clinics operating irregularly, they had little chances to encounter the clinic sessions. Danielsen *et al.* (2012) had also echoed the inconveniences caused to the subsistence farmers due to the unreliability of the plant clinic sessions. They highlighted that the irregularity of plant clinic operation was part of the many reasons why most non-plant clinic users were not aware of the clinics and a majority of subsistence farmers attended the clinic sessions impulsively.

4.5 Level of stakeholders involvement in designing frameworks to create awareness about plant clinics.

The low awareness level about plant clinics requires the involvement of multiple stakeholders to participate and plan for the adoption of effective communication channels to create awareness. With the vital role of the stakeholder, both private and public, in various activities including; (1) running plant clinics (2) supporting plant clinics with equipment and technical knowledge (3) contributing to programme governance through steering committee membership and (4) producing extension material. It becomes inevitable not to include them

in the awareness creation strategies about plant clinics. During a KII, the Country Plant Clinic Coordinator highlighted the existence of consultations with stakeholders both at the National government and the County government in developing frameworks to create awareness. She also maintained that these are done in consultations with all the relevant stakeholders within the plant health system. However, the extent of involvement is determined by the National Steering Committee (NSC). The interviewed KALRO official acknowledged the same, but stated that in as much as there is stakeholder involvement, it is partial due to the robust and dynamic nature of the communication process. This makes it difficult to involve all the stakeholders at every stage of the development process. Analysis of Plantwise annual reports and the strategic plan 2015-2020 revealed an existence of interaction and intention to partner with various stakeholders to improve the Plantwise initiative. In spite of the various levels of involvement, the 2015 Plantwise annual report indicated that in Kenya, a number of opportunities and engagement with the private sectors had been low. This called for the need to include private sector stakeholders in the roll-out and awareness creation about the plant clinics. Currently, much has been done to turn around the situation. Katoloni CBO was brought on board to help roll out plant clinics in Machakos County.

A study by the American Institute of Research (AIR) on the impact of Plantwise in Kenya had its baseline preliminary report concluded that CABI Kenya was gradually improving the institutional coordination in the plant health system. It also observed new interactions between plant health stakeholders to even help train more plant doctors. This was positive to confirm stakeholder involvement. However, the remaining gap is how far the stakeholders are being involved in designing the communication strategies aimed at creating awareness about plant clinics. Nevertheless, for a widespread plant clinic awareness creation and scaling-up, there is still need to invest more in broad partnerships, including farmers' organizations, more

community based organizations (CBOs) and local NGOs for farmer mobilization and capacity building because as it stands, most of them still feel left out.

CHAPTER FIVE

SUMMERY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMERY AND CONCLUSIONS

The findings of this study highlighted existing gaps in the awareness creation about plant clinics in Kiambu County. In as much as there is partial coherence in the planning for awareness creation about plant clinics, in Kiambu the use of available technologies have not fully been exhausted. Within the Plantwise communication strategy, all the channels to be used in creating awareness about plant clinics are well outlined. The set back is the actual implementation and use of the channels. Du (2015) explains that planning for communication and actual implementation of the communication strategies must go hand in hand for a good result. With the current advancements in technologies, models for information communication to create changes in agriculture must suit the dynamics. Even with the high levels of cell phone and internet penetration in Kenya (Talisuna, 2014), Kiambu County has not effectively utilized them in creating awareness about plant clinics. No respondent reported receiving the information about plant clinics through cell phones and its their auxiliary products. There has also been little use of the internet by the stakeholders involved in creating awareness about plant clinics. CABI, the Kenyan national and county governments have open access websites with information about plant clinics. However, they are yet to fully engage the farmers in the use of such media to create awareness about plant clinics. So is the use of social media platforms such as Facebook, Whats-App and Twitter

which are currently the most used channel of communication in the world and is popular amongst people of all cadres (Köseoğlu and Tuncer, 2016).

In terms of the utilization of other ICTs, the current plant clinics awareness creation methodologies in Kiambu are not focused on the use of television and radio programmes that again, no respondent reported receiving the information about plant clinics through. The use of television, radio, newspapers, and magazines can reach far more people. Kiambu County is endowed with local radio programmes and TV channels (Maina and Thinguri, 2016) airing varied programs. *Utugi* TV, for instance, airs exclusively agricultural programs and as reported by Plantwise Kenya, was at one point used to create awareness about plant clinics. Nonetheless, *Utugi* TV has only has 0.01 percent national viewership and therefore had little impact in the awareness creation about plant clinics.

Effectiveness of communication channels used to create awareness about plant clinics

As it stands, Plantwise approaches to disseminate information about plant clinics is top-down. This requires the involvement of farmer, which does seem insufficient. The farmers have cited various gaps in both interpersonal and mass-media channels in creating awareness. Their evaluations indicate that most of these communication channels are less effective in creating awareness about plant clinics. Majority of them are not familiar with banners and umbrellas, which as they also indicate are least interactive, of low credibility and with poor technical quality. These affect the general acceptability of these channels to create awareness about plant clinics. The plant clinic sessions are supposed to be very unreliable in their operations. Their succinct infrastructure makes them have a poor technical quality to create awareness. The low number of extension agents (Plant doctors) seems to limit their capacity to consistently visit and provide feedback to farmers. Fellow farmers and agro-dealers are also incapacitated to create awareness. Most farmers still feel that their fellows are less

authentic channels used to create awareness. The strong drive to sell the agro-products limits the credibility of agro-dealers as used channel to create awareness.

In addition, farmers' socio-demographic characteristics had significance on their analysis and intentions to access information from awareness creation channels. However, for this study age had no significant influence on farmers evaluation of the effectiveness of the communication channel used to create awareness about plant clinics in Kiambu County.

5.2 RECOMMENDATIONS

With its propinquity to Nairobi City, Kiambu County farmers are more expedient position to access several media stations specialised in wide range of programs. For instance, *Inooro* FM with 2.7 percent national listenership and 60.7 percent locally (within Mt. Kenya region) has a program '*Mugambo wa Murimi*' (Voice of the farmers) aired from Monday to Friday in the morning and evenings (6.45 am - 7.00 am and 8.45 pm - 9.00 pm) educating farmers on various agricultural practices. Incorporating a message meant to create awareness about plant clinics in the program can be auspicious to its awareness creation. Equally, actual inclusion of television programmes, the use of social media and adoption of flexible mobile approach to the plant clinic model can be appropriate. The plant health banners and umbrellas a very stale information-wise to create awareness about the clinics. Remodeling these channels may suffice the awareness creation. As such, including on the banners information on what days the clinics operate, what time they are opened and closed, what services are offered and at what cost and contacts to the persons incase of inquiries about the clinics operationalization can also be appropriate. Correspondingly the banners should permanently be established in strategic positions to provide continuous awareness. The logo on the banners should appropriately be designed to distinguish it from that used by the Kenyan electoral body.

The plant doctors and agro-dealers should be brought abreast on current effective ways to create awareness about the innovations through trainings. Besides, dependence on the

spillovers and horizontal communication among the farmers may not suffice. If it has to be so, then certain farmers identified as lead farmers within communities should be trained and charged with responsibilities to create awareness. Farmers in Kiambu are a diverse group with multifaceted ability to evaluate various communication channels. In a group of 123 farmers, the difference is evident. With this in mind, policymakers both in the county and national government need to reassess the communication strategies used to create awareness about plant clinics because for increased food production to be realized, then there must be access to right plant health information. CABI is championing for this through the plant clinics, they want farmers to lose less produce and feed more people.

Regardless of who are responsible for coming up with policy frameworks to create awareness about innovations, the farmers must be involved. They are directly affected by these policies. All the same, they are the ones who are expected by their hard work and dedication to feed nations and help supply food to the burgeoning world population. It is therefore no longer acceptable for them to be kept aloof of the designing process of effective communication strategies to create awareness about innovations, plant clinics inclusive.

REFERENCES

- Abram, S. (2017, March). Learning to Meet (or How to Talk to Chairs). *In Meeting Ethnography* (pp. 54-76). Routledge.
- Adesope, O., Matthews-Njoku, E., Oguzor, N., and Ugwuji, V. (2012). Effect of Socio-Economic Characteristics of Farmers on Their Adoption of Organic Farming Practices. *Crop Production Technologies*.
- Adolwa, I. S., Schwarze, S., Bellwood-Howard, I., Schareika, N., and Buerkert, A. (2017). A comparative analysis of agricultural knowledge and innovation systems in Kenya and Ghana: sustainable agricultural intensification in the rural–urban interface. *Agriculture and Human Values*, 34(2), 453-472.
- Akudugu, M. A., Guo, E., and Dadzie, S. K. (2012). Adoption of modern agricultural production technologies by farm households in Ghana: What factors influence their decisions. *Journal of biology, agriculture and healthcare*, 2(3).
- Alemneh, D. (2016) Harnessing Social Media for Promoting Tourism in Africa: An Exploratory Analysis of Tweets. *iConference 2016 Proceedings*.
- Avidar, R. (2018). Engagement, Interactivity, and Diffusion of Innovations. *The Handbook of Communication Engagement*, 505-514. doi:10.1002/9781119167600.ch34.
- Aziato, L., & Antwi, H. O. (2016). Facilitators and barriers of herbal medicine use in Accra, Ghana: an inductive exploratory study. *BMC complementary and alternative medicine*, 16(1), 142.

- Bae, M. (2018). Understanding the effect of the discrepancy between sought and obtained gratification on social networking site users' satisfaction and continuance intention. *Computers in Human Behavior*, 79, 137-153.
- Bai, H., Yang, J., & Wang, J. (2013). Research on the current situation of the open source community in China from the network perspective. 2013 6th International Conference on Information Management, Innovation Management and Industrial Engineering. doi:10.1109/iciiii.2013.6702966
- Bancroft, A., & Scott Reid, P. (2017). Challenging the techno-politics of anonymity: the case of cryptomarket users. *Information, Communication & Society*, 20(4), 497-512.
- Baral, N. R., and Shah, A. (2016). Techno-Economic Analysis of Cellulosic Butanol Production from Corn Stover through Acetone–Butanol–Ethanol Fermentation. *Energy and Fuels*, 30(7), 5779-5790.
- Bentley, J. W., Boa, E., Danielsen, S., Franco, P., Antezana, O., Villarroel, B., & Herbas, J. (2009). Plant health clinics in Bolivia 2000—2009: operations and preliminary results. *Food Security*, 1(3), 371-386.
- Bentley, J. W., Danielsen, S., Phiri, N., Tegha, Y. C., Nyalugwe, N., Neves, E., and Sharma, D. R. (2018). Farmer responses to technical advice offered at plant clinics in Malawi, Costa.
- Bentley, Jeffery W., Eric Boa, Solveig Danielsen, Pablo Franco, Olivia Antezana, Bertho Villarroel, Henry Rodríguez et al. "Plant health clinics in Bolivia 2000—2009: operations and preliminary results." *Food Security* 1, no. 3 (2009): 371-386.

- Bhatta, G. D., and Doppler, W. (2010). Farming Differentiation in the Rural-urban Interface of the Middle Mountains, Nepal: Application of Analytic Hierarchy Process (AHP) Modeling. *Journal of Agricultural Science*, 2 (4).
- Blau, P. (2017). *Exchange and power in social life*. Routledge.
- Boa, E. (2007). Plant Healthcare for Poor Farmers: An Introduction to the Work of the Global Plant Clinic. *APSnet Feature Articles*. doi:10.1094/apsnetfeatures-2007-1007
- Boserup, E., Tan, S. F., and Toulmin, C. (2013). *Woman's role in economic development*. Routledge.
- Cameron, K. H., Somachandra, K. P., Curry, C. N., Jenner, W. H., & Hobbs, S. L. (2016). Delivering actionable plant health knowledge to smallholder farmers through the Plantwise program. *Journal of agricultural & food information*, 17(4), 212-229.
- Caplan, S. (1990). Using focus group methodology for ergonomic design. *Ergonomics*, 33(5), 527-533.
- Carr-Hill, R., Rolleston, C., Schendel, R., & Waddington, H. (2018). The effectiveness of school-based decision making in improving educational outcomes: a systematic review. *Journal of Development Effectiveness*, 10(1), 61-94.
- Castellacci, F. (2015). Institutional Voids or Organizational Resilience? Business Groups, Innovation, and Market Development in Latin America. *World Development*, 70, 43-58.
- Chadwick, A. (2017). All Media Systems Have Been Hybrid. *Oxford Scholarship Online*. doi:10.1093/oso/9780190696726.003.0003

- Clark, T. J. (2015). *The painting of modern life: Paris in the art of Manet and his followers*. Princeton University Press.
- Collins, A., and Halverson, R. (2018). *Rethinking education in the age of technology: The digital revolution and schooling in America*. Teachers College Press.
- Corsaro, W. A. (2017). *The sociology of childhood*. Sage Publications.
- Danielsen, S., Matsiko, F. B., & Kjær, A. M. (2014). Implementing plant clinics in the maelstrom of policy reform in Uganda. *Food Security*, 6(6), 807-818.
- Danielsen, S., & Matsiko, F. B. (2016). Using a plant health system framework to assess plant clinic performance in Uganda. *Food Security*, 8(2), 345-359. doi:10.1007/s12571-015-0546-6.
- Danielsen, S., and Kelly, P. (2010). A novel approach to quality assessment of plant health clinics. *International Journal of Agricultural Sustainability*, 8(4), 257-269.
- Danielsen, S., Centeno, J., López, J., Lezama, L., Varela, G., Castillo, P., Boa E. (2011). Innovations in Plant Health Services in Nicaragua: From Grassroots Experiment To a Systems Approach. *Journal of International Development*, 25(7), 968-986.
- Day, R., Abrahams, P., Bateman, M., Beale, T., Clottey, V., Cock, M., ... & Gomez, J. (2017). Fall armyworm: impacts and implications for Africa. *Outlooks on Pest Management*, 28(5), 196-201.

- Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information systems research*, 9(3), 256-274.
- Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS quarterly*, 32(3), 575-600.
- Dintoe, S. S. (2018). Educational technology adopters: A case study in University of Botswana. *International Journal of Education and Development using Information and Communication Technology*, 14(1), 52-90.
- Dougoud, J., Cock, M. J., Edgington, S., and Kuhlmann, U. (2018). A baseline study using Plantwise information to assess the contribution of extension services to the uptake of augmentative biological control in selected low-to lower-middle-income countries. *BioControl*, 63(1), 117-132.
- Du, P. (2015). Coordinated Turn-Taking as Problem Talk Strategy. *Intercultural Communication in the Chinese Workplace*, 168-179.
- Elias, A., Nohmi, M., Yasunobu, K., & Ishida, A. (2016). Farmers' satisfaction with agricultural extension service and its influencing factors: a case study in North West Ethiopia. *Journal of Agricultural Science and Technology*, 18(1), 39-53.
- Erkan, I., & Evans, C. (2016). The influence of eWOM in social media on consumers' purchase intentions: An extended approach to information adoption. *Computers in Human Behavior*, 61, 47-55.
- Etyang, T. B., Okello, J. J., Zingore, S., Okth, P. F., Mairura, F. S., Mureith, A., & Waswa, B. S. (2014). Exploring relevance of agro input dealers in disseminating and

communicating of soil fertility management knowledge: The case of Siaya and Trans Nzoia counties, Kenya

- Farnworth, C. R., & Colverson, K. E. (2015). Building a gender-transformative extension and advisory facilitation system in sub-Saharan Africa. *Journal of Gender, Agriculture and Food Security*, 1(1), 20-39.
- Field, M., Jonsson, A. P., & Ehsani, M. (2016). LEARNING THROUGH FEEDBACK LOOPS. *Harnessing the Power of Collective Learning: Feedback, accountability and constituent voice in rural development*, 220.
- Figueiredo, N., Silva, F., Georgieva, P., and Tom, A. (2011). Advances in Non-Invasive Brain Computer Interfaces for Control and Biometry. *Recent Advances in Brain-Computer Interface Systems*.
- Finegold, C., Oronje, M., Leach, M. C., Karanja, T., Chege, F., and Hobbs, S. L. (2015). Plantwise Knowledge Bank: Building sustainable data and information processes to support plant clinics in Kenya. *Agricultural Information Worldwide*, 6, 96-101.
- Fischer, E., & Qaim, M. (2012). Linking smallholders to markets: determinants and impacts of farmer collective action in Kenya. *World Development*, 40(6), 1255-1268.
- Fleming, K. L. (2015). Accommodation, Avoidance and Submission: How the Interpretation of Biblical Submission as the Low-Self Conflict Modes Affects the Christian Marriage Relationship. *Nova Southeastern University Press*.

- Frankema, E. (2009). Has Latin America Always Been Unequal? *A Comparative Study of Asset and Income Inequality in the Long Twentieth Century*. doi:10.1163/ej.9789004175914.i-294
- Galstyan, S., Kagan, S., & Harutyunyan, T. (2015). Towards Understanding Diffusion Barriers and Drivers to Organizational Adoption of Innovative *Food Safety Management System in Armenia*: a Qualitative Analysis.
- Gan, L., Yin, Z., and Tan, J. (2016). Rural Households' Formal Credit Demand and Availability. *Report on the Development of Household Finance in Rural China (2014)*, 85-106.
- Garikipati, S. (2008). The impact of lending to women on household vulnerability and women's empowerment: evidence from India. *World Development*, 36(12), 2620-2642.
- Garner, B. (2017). Communicating social support during crises at the farmers' market: A social exchange approach to understanding customer-farmer communal relationships. *International Journal of Consumer Studies*, 41(4), 422-430.
- Garrison, D. R. (2011). E-learning in the 21st century: A framework for research and practice. *Taylor and Francis*.
- Ge, X. (2010). Information-Seeking Behavior in the Digital Age: A Multidisciplinary Study of Academic Researchers. *College and Research Libraries*, 71(5), 435-455.
- Gender, Ethnicity and Political Agency. (2013).
- Golembiewski, R. (2018). Reframing and Engaging with Organizational Learning Constraints. *In Current Topics in Management* (pp. 61-86). Routledge.

- Golob, U., Verk, N., & Podnar, K. (2017). Knowledge Integration in the European CSR Communication Field: An Institutional Perspective. *In Handbook of Integrated CSR Communication (pp. 273-291)*. Springer, Cham.
- Goodman PhD, M. B. (2005). Restoring trust in American business: the struggle to change perception. *Journal of Business Strategy*, 26(4), 29-37.
- Greene, J. A., Choudhry, N. K., Kilabuk, E., and Shrank, W. H. (2011). Online social networking by patients with diabetes: A qualitative evaluation of communication with Facebook. *Journal of general internal medicine*, 26(3), 287-292.
- Grünig, R., and Kühn, R. (2017). Solving Complex Decision Problems.
- Hedge, C., Powell, G., & Sumner, P. (2018). The reliability paradox: Why robust cognitive tasks do not produce reliable individual differences. *Behavior Research Methods*, 50(3), 1166-1186.
- Hocevar, K. P., Metzger, M., and Flanagin, A. J. (2017). Source Credibility, Expertise, and Trust in Health and Risk Messaging. *Oxford Research Encyclopedia of Communication*.
- Holmes, J., & Wilson, N. (2017). *An introduction to sociolinguistics*. Routledge.
- Hung-Baesecke, C. J. F., & Bowen, S. A. (2017). Ethical engagement at a time of crisis in the social era. *Social Media and Crisis Communication*, 68.
- Idah, M., Frances, W., James, M., Florence, C., and marylucy, O. (2016). Diagnostic support to plantwise plant doctors in Kenya. *Journal of Agricultural Extension and Rural Development*, 8(11), 232-239.

- Jenkins, H., Ford, S., & Green, J. (2018). *Spreadable media: Creating value and meaning in a networked culture*. NYU press.
- Kalenda, J. (2015). Development of non-formal adult education in the Czech Republic. *Procedia-Social and Behavioral Sciences*, 174, 1077-1084.
- Kalungu, J. W. (2014). *GENDER AND CLIMATE CHANGE ADAPTATION IN KENYA* (Doctoral dissertation, MANCHESTER METROPOLITAN UNIVERSITY).
- Kelder, S. H., Hoelscher, D. M., and Shegog, R. (2017). Social Cognitive Theory Applied to Health and Risk Messaging. *Oxford Research Encyclopedia of Communication*.
- KENYA: Vision 2030 Implementation. (2008). *Africa Research Bulletin: Economic, Financial and Technical Series*, 45(7), 17915A-17915C.
- Khaila, S., Tchuwa, F., Franzel, S., and Simpson, B. (2015). The farmer-to-farmer extension approach in Malawi: a survey of lead farmers.
- KIARIE, S. W. U. (2016). EFFECTS OF TRENDS OF CLIMATE VARIABILITY AND SMALL-SCALE FARMERS' PERCEPTION AND ADAPTATION STRATEGIES IN KIJABE LOCATION, KIAMBU COUNTY, KENYA (Doctoral dissertation, KENYATTA UNIVERSITY).
- Kimani, E. M., and Tonui, J. K. (2016). Financial factors influencing growth of Horticultural sector in Nakuru County, Kenya.
- Kimaru, W. S. (2012). Enhancing communication for effective dissemination of soil fertility management in the Central Highlands of Kenya.

- Köseoğlu, Ö., and Tuncer, A. (2016). Designing Social Media Policy for Local Governments: Opportunities and Challenges. *Social Media and Local Governments*, 23-36.
- Kotey, D. A., Assefa, Y., Obi, A., & Van Den Berg, J. (2016). Disseminating Genetically Modified (GM) maize technology to smallholder farmers in the Eastern Cape province of South Africa: Extension personnel's awareness of stewardship requirements and dissemination practices. *South African Journal of Agricultural Extension*, 44(1), 59-74.
- Kowert, R., & Oldmeadow, J. A. (2015). Playing for social comfort: Online video game play as a social accommodator for the insecurely attached. *Computers in human behavior*, 53, 556-566.
- KUMAR, G. (2017). A STUDY ON PRODUCTION, CONSUMPTION AND MARKETING PATTERN OF MAIZE AMONG THE TRIBAL FARMERS OF SURGUJA DISTRICT OF CHHATTISGARH (Doctoral Dissertation, Indira Gandhi Krishi Vishwavidhyalaya, Raipur).
- Kumela, T., Simiyu, J., Sisay, B., Likhayo, P., Mendesil, E., Gohole, L., and Tefera, T. (2018). Farmers' knowledge, perceptions, and management practices of the new invasive pest, fall armyworm (*Spodoptera frugiperda*) in Ethiopia and Kenya. *International Journal of Pest Management*, 1-9.
- Kuschminder, K. (2017). Reintegration Dimensions of the Analytical Groups. *Reintegration Strategies*, 121-151. doi:10.1007/978-3-319-55741-0_5

- Kuttschreuter, M., Rutsaert, P., Hilverda, F., Regan, Á., Barnett, J., and Verbeke, W. (2014). Seeking information about food-related risks: The contribution of social media. *Food quality and preference*, 37, 10-18.
- Lasswell's model. (1948). Retrieved from <https://www.communicationtheory.org/lasswells-model/>
- Leach, M. C., & Hobbs, S. L. (2013). Plantwise knowledge bank: delivering plant health information to developing country users. *Learned publishing*, 26(3), 180-185.
- Lee, S. (2017). How to Make Digital Advertising More Influential.
- Lewis, D., & Mills, G. R. (2018). The Bullseye Principle: Mastering Intention-Based Communication to Collaborate, Execute, and Succeed. *John Wiley & Sons*.
- Lloyd, D. M. (2016). Farmer perspectives on the transition to organic agriculture: An Oregon study of farmer motivations and barriers.
- Long, T. B., Blok, V., & Coninx, I. (2016). Barriers to the adoption and diffusion of technological innovations for climate-smart agriculture in Europe: evidence from the Netherlands, France, Switzerland and Italy. *Journal of Cleaner Production*, 112, 9-21.
- Mai, J. E. (2016). Looking for information: A survey of research on information seeking, needs, and behavior. *Emerald Group Publishing*.
- Maina, E., and Thinguri, R. (2016). Effects of Students Suspension On Their Sociological Wellbeing In Boarding Secondary Schools In Nakuru County, Kenya. *The International Journal of Social Sciences and Humanities Invention*.

- Makokha, J. (2017). Emerging Technologies and Science Teaching. In Science Education (pp. 369-383). *SensePublishers*, Rotterdam.
- Masuda, Y. J., Liu, Y., Reddy, S. M., Frank, K. A., Burford, K., Fisher, J. R., & Montambault, J. (2018). Innovation diffusion within large environmental NGOs through informal network agents. *Nature Sustainability*, *1*(4), 190.
- McChesney, R. W. (2015). *Rich media, poor democracy: Communication politics in dubious times*. New Press, The.
- McIntyre, M. E. (2017). A Uganda Case Study: Using Non-Formal Education to Increase the Quality of Education.
- Mehrabian, A. (2017). *Nonverbal communication*. Routledge.
- Men, R. L., & Bowen, S. A. (2016). *Excellence in internal communication management*. Business Expert Press.
- Mokeira, E. (2014). THE ROLE OF GOVERNMENT IN AGRIBUSINESS ACTIVITIES IN DEVELOPING RURAL COMMUNITIES IN KENYA: A CASE STUDY OF SMALL SCALE DAIRY FARMERS IN GITHUNGURI SACCO LIMITED (Doctoral dissertation, United States International University-Africa).
- Msoffe, G. E., & Ngulube, P. (2016). Agricultural Information Dissemination in Rural Areas of Developing Countries: A Proposed Model for Tanzania. *African Journal of Library, Archives & Information Science*, *26*(2).
- Muchai, S. W., Muna, M. W., Mugwe, J. N., Mugendi, D. N., and Mairura, F. S. (2014). Client focused extension approach for disseminating soil fertility

- management in Central Kenya. *International Journal of Agricultural Extension*, 2(2), 129-136.
- Mugambi, I., Williams, F., Muthomi, J., Chege, F., and Oronje, M. (2016). Diagnostic support to Plantwise plant doctors in Kenya. *Journal of Agricultural Extension and Rural Development*, 8(11), 232-239.
- Mullen, J. (1998). Plant clinic handbook. *Crop Protection*, 17(8), 682-683.
doi:10.1016/s0261-2194(98)80001-x
- Mur, R. (2018). Profiling of Plant Clinic Users. doi:10.1079/cabicomm-25-8086
- Mutum, D., and Wang, Q. (2011). Consumer generated advertising in blogs. *E-Marketing: Concepts, Methodologies, Tools and Applications*, 1, 198-211.
- Mwakaje, A. G. (2010). Information and communication technology for rural farmers market access in Tanzania.
- NAMULONDO, B. (2016). THE EFFECT OF COMMUNICATION CHANNELS ON THE ADOPTION OF ORANGE FLESHED SWEET POTATOES (OFSP) IN UGANDA: A CASE STUDY OF GULU DISTRICT (Doctoral Dissertation, University of Nairobi).
- Nazziwa-Nviiri, L., Van Campenhout, B., & Amwonya, D. (2017). *Stimulating agricultural technology adoption: Lessons from fertilizer use among Ugandan potato farmers* (Vol. 1608). Intl Food Policy Res Inst.

NDUNGU, B. W. (2014). *MARKET ORIENTED DAIRYING AND ITS IMACT ON WOMEN'S DECISION MAKING IN THE NORTH RIFT, KENYA* (Doctoral dissertation, UNIVERSITY OF NAIROBI).

Negussie, E., Karanja, P., Day, R., Romney, D., Reeder, R., Boa, E., ... & Murage, N. (2013). *ROLE OF PLANT HEALTH CLINICS IN MEETING THE NEEDS OF SMALL-SCALE FARMERS FOR ADVISORY SERVICES: EXPERIENCES FROM EASTERN AFRICA*. In *Proceedings, International Conference on Innovations in Extension and Advisory Services, 15-18 November 2011, Nairobi, Kenya* (pp. 1-9). The Technical Centre for Agricultural and Rural Cooperation (CTA).

Ngwili, N. M., Maina, J., & Irungu, P. (2015). Characterization of fish farming systems in Kiambu and Machakos counties, Kenya. *International Journal of Fisheries and Aquatic Studies*, 3(1), 185-195.

Ogunremi, J. B. (2016). Awareness, Training Needs and Constraints on Fishing Technologies among Small Scale Fishermen in Ondo State, Nigeria. *Journal of Agricultural Science*, 8(6), 169.

Ojha, P. K. (2017). *Study on Effectiveness of different Extension Teaching methods under KVK System of Bihar* (Doctoral dissertation, Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur).

Okello, J., Zhou, Y., Kwikiriza, N., Ogutu, S., Barker, I., Schulte-Geldermann, E., ... Ahmed, J. (2016). Determinants of the Use of Certified Seed Potato among Smallholder Farmers: The Case of Potato Growers in Central and Eastern Kenya. *Agriculture*, 6(4), 55. doi:10.3390/agriculture6040055

- Oliu, W. E., Brusaw, C. T., and Alred, G. J. (2010). *Writing that Works with 2009 MLA and 2010 APA Updates: Communicating Effectively on the Job*. Macmillan.
- Olsen, F. E. (2017). The myth of state intervention in the family. In *Law and Families* (pp. 3-32). Routledge.
- Omar, A. (2018). Social media: research on changing the roles of journalists. *Journal of New Media and Mass Communication*, 5(1), 1-13.
- Plan, A. I. S. *For better Plant Health in Africa*.
- Rehman, F. (2010). Development of a strategy to enhance the role of print media in the dissemination of agricultural information among farmers' in the Punjab, Pakistan.
- Reij, C., & Waters-Bayer, A. (2014). *Farmer innovation in Africa: a source of inspiration for agricultural development*. Routledge.
- Research Institute (IFPRI), I. F. (2016). Unraveling the role of innovation platforms in supporting coevolution of innovation: Contributions and tensions in a smallholder dairy-development program.
- Rivera, W. M., and Qamar, M. K. (2003). Agricultural extension, rural development and the food security challenge. Rome: *Food and Agriculture Organization of the United Nations*.
- Robinson, J., and Godbey, G. (2010). Time for life: *The surprising ways Americans use their time*. Penn State Press.
- Rodriguez, L., Kulpavaropas, S., Annamalai, D., Wright, J., & Evans, J. F. (2015). Trends in information needs and communication channel use among rural women in Africa,

Asia, and Latin America, 2000–2012. *Journal of Agricultural & Food Information*, 16(3), 221-241.

Rogers, E. M. (2010). *Diffusion of innovations*. Simon and Schuster.

Rogers, Everett M., and D. Williams. "Diffusion of." *Innovations (Glencoe, IL: The Free Press, 1962)* (1983).

Rogers, E. M., and Recorded Books, Inc. (2010). *Diffusion of Innovations, 4Th Edition*
Place of publication not identified: Free Press.

Saediman, H. (2015). IMPROVING AGRICULTURAL RESEARCH COORDINATION AT SUBNATIONAL LEVEL IN INDONESIA: AN ASSESSMENT OF OPPORTUNITIES FOR STRENGTHENING PROVINCIAL TECHNOLOGY COMMISSION. *International Journal of Agricultural Extension*, 3(2), 123-136.

Salami, A., Kamara, A. B., & Brixiova, Z. (2010). Smallholder agriculture in East Africa: Trends, constraints and opportunities. Tunis: *African Development Bank*.

Samovar, L. A., Porter, R. E., McDaniel, E. R., & Roy, C. S. (2015). *Communication between cultures*. Nelson Education.

Scheidegger, Urs and Benno Graf 2013 Plantwise SDC contribution Phase 1 (2012-2013) External Evaluation. Delémont and Bern: SDC.

Schut, M., Andersson, J. A., Dror, I., Kamanda, J., Sartas, M., Mur, R., ... & Velasco, C. (2017). Guidelines for innovation platforms in agricultural research for development: decision support for research, development and funding agencies on how to design, budget and implement impactful innovation platforms.

- Scott, S., & McGuire, J. (2017). Using Diffusion of Innovation Theory to Promote Universally Designed College Instruction. *International Journal of Teaching and Learning in Higher Education*, 29(1), 119-128.
- Seidl, L., Tosovic, D., & Brown, J. M. (2017). Test-retest reliability and reproducibility of laser-versus contact-displacement sensors in mechanomyography: Implications for musculoskeletal research. *Journal of applied biomechanics*, 33(2), 130-136.
- Shah, B., and Kaushik, S. (2015). Innovative use of social media platform WhatsApp during influenza outbreak in Gujarat, India. *WHO South-East Asia Journal of Public Health*, 4(2), 213.
- Shrira, I., Wisman, A., and Noguchi, K. (2018). Diversity of historical ancestry and personality traits across 56 cultures. *Personality and Individual Differences*, 128, 44-48.
- Sifaki, E., & Papadopoulou, M. (2015). Advertising modern art: a semiotic analysis of posters used to communicate about the Turner Prize award. *Visual Communication*, 14(4), 457-484.
- Siyao, P. O. (2012). Barriers in Accessing Agricultural Information in Tanzania with a Gender Perspective: The Case Study of Small- Scale Sugar Cane Growers in Kilombero District. *The Electronic Journal of Information Systems in Developing Countries*, 51(1), 1-19.
- Srivastava, M. P. (2016). Food security through plant health management. *Agrotechnology*, 05(02).

- Sseguya, H., Mazur, R. E., & Flora, C. B. (2018). Social capital dimensions in household food security interventions: implications for rural Uganda. *Agriculture and Human Values*, 35(1), 117-129.
- Stronge, J. H. (2018). Qualities of effective teachers. ASCD.
- Talisuna, A. O. (2014). Efficacy of Mobile Phone Short Message Service (SMS) Reminders on Malaria Treatment Adherence and Day 3 Post-Treatment Reviews (SMS-RES-MAL) in Kenya: A Study Protocol. *Journal of Clinical Trials*, 05(02).
- Tazeze, A., Haji, J., and Ketema, M. (2012). Climate change adaptation strategies of smallholder farmers: the case of Babilie District, East Harerghe Zone of Oromia Regional State of Ethiopia. *Journal of Economics and Sustainable Development*, 3(14), 1-12.
- Theaker, A., & Yaxley, H. (2017). *The Public Relations Strategic Toolkit: An essential guide to successful public relations practice*. Routledge.
- Van Berkel, D. B., and Verburg, P. H. (2014). Spatial quantification and valuation of cultural ecosystem services in an agricultural landscape. *Ecological indicators*, 37, 163-174.
- Wabwoba, M. S., and Wakhungu, J. W. (2013). Factors affecting sustainability of community food security projects in Kiambu County, Kenya. *Agriculture and Food Security*, 2(1), 9.
- Wang, M., Ye, T., and Shi, P. (2015). Factors Affecting Farmers' Crop Insurance Participation in China. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 64(3), 479-492.

Wright, H. J., Ochilo, W., Pearson, A., Finegold, C., Oronje, M., Wanjohi, J., ... & Rumsey, A. (2016). Using ICT to strengthen agricultural extension systems for plant health. *Journal of agricultural & food information*, 17(1), 23-36.

APPENDICES

Appendix 1

Farmer interview schedule (farmers visiting plant clinics)

My name is undertaking research to evaluate the effectiveness of communication channels used to create awareness about plant clinics. I would like to invite you to take part in the study concerning the plant clinics activities. Pest and diseases that cause damage /injury to crops are a source of crop loss in the farm. Following this, plant clinics were introduced to help farmers reach quality plant health services to minimize the losses. This research I am undertaking is looking at whether the communication channels used to create awareness about plant clinics are effective.

The questionnaire will take 30 minutes. All you say will be confidential and participation is voluntary. If you agree, I will ask you some questions.

Name of Respondent; _____

Date _____

Duration of start of interview _____

SECTION A: HOUSEHOLD DEMOGRAPHIC, SOCIAL AND ECONOMIC CHARACTERISTICS		
1.	Sub-county	
2.	Location	
3.	Sub-location	
4.	Plant clinic area	
5.	Village	
6.	Respondent	<i>1=Household head, 2= spouse of the household head, 3=grown up child, 4= relative, 5= other (specify)</i>
7.	Gender of Decision maker of farm operation.	<i>1=Male 2= female</i>
8.	Age of household head ____ years	
9.	Educational level of Household Head?	<i>1=no education, 2=primary education, 3=secondary education, 4=tertiary education (Specify)</i>
10.	How many years of farming experience_____	<i>1=less than 10 years, 2=11-20 years, 3=Above 20 years</i>

11.	Approximately how many non-formal trainings have you attended since you started farming? _____	<i>1=None 2=1-5 times 3=6-10 times 4=more than 10 times</i>
12.	Occupation of Household head_____	<i>1=Farming,2=Business,3=Employed</i>
13.	Why do you do farming?	<i>1=for food 2=for income 3= for both income and food</i>
14.	Approximately how much income do you earn from your farm in a season?	<i>1=0-5,000Ksh 2=5,001-10,000Ksh 3=10,000-15,000Ksh 4=15,000Ksh and above</i>
15.	Are you currently a member of any farmers" group or local association in this village?	<i>1=yes 2=No Indicate</i>
16.	Number of the groups that you are a member_____ Activities -1st group_____ 2nd group_____ 3rd Others_____	<i>If yes, indicate the number of groups below and activities of the group 1=Merry-go round,2=Savings and credit 3=Agricultural related activities, 4=Marketing,5= Other(specify)</i>

SECTION B: COMMUNICATION CHANNEL USED

17.	a) What kind of information channel do you currently use? (You can make more than one choice). _____	<i>1=Television 2= Mobile text messages 3= Fellow farmer 4= Radio 5= Newspaper 6= Telephone calls 7= Extension officer 8 Farmers magazines 8=Others (please specify)</i>
	b) Which one do you prefer?	
	c) Give reasons	
18.	Through what channel did you get the knowledge about plant clinics? _____	<i>1.Face to Face 2.Mass media (If mass media go to question28)</i>
19.	From whom did you get the information?(source) _____	<i>1= extension agent 2=peer 3=fellow farmer 4= agro dealers 5. Other</i>

SECTION C: EVALUATION OF COMMUNICATION CHANNEL USED

20. How familiar with the source?

(Familiarity)

1-Least familiar

5- Most familiar

Rate in a scale of 1-5

1= extension agent

1	2	3	4	5

2=peer

1	2	3	4	5

3=fellow farmer

1	2	3	4	5

4=agro dealers

1	2	3	4	5

5=Other

1	2	3	4	5

21.	How did you feel about the source of the information? (authenticity)	<p><i>1= extension agent</i></p> <table border="1" data-bbox="719 259 1513 367"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>2=Peer</i></p> <table border="1" data-bbox="719 445 1513 553"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 651 1513 759"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 893 1513 1001"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 1173 1513 1281"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>						<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>						<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>						<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>						<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>					
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22.	Were you able to give back to the source? (interactivity) ____	<p><i>1= extension agent</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>2=peer</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>3=fellow farmer</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>4= agro dealers</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>5=Other</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p>																																																		

23.	<p>How much did you like channel? (Likability).</p> <p>1-least likable</p> <p>5- Most likable</p>	<p>Rate in a scale of 1-5</p> <p><i>1= extension agent</i></p> <table border="1" data-bbox="719 293 1457 398"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=peer</i></p> <table border="1" data-bbox="719 501 1457 607"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 656 1457 761"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 864 1457 969"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 1019 1457 1124"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5										
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24.	<p>How accurate was the information?(reliability)</p> <p>1-least Reliable</p> <p>5- Most reliable</p>	<p>Rate in a scale of 1-5</p> <p><i>1= extension agent</i></p> <table border="1" data-bbox="719 1223 1457 1328"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=peer</i></p> <table border="1" data-bbox="719 1377 1457 1482"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 1532 1457 1637"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 1686 1457 1792"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 1841 1457 1946"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5										
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25.	<p>How would you rate the physically measurable attributes of the source being able to meet professionally acceptable standard (technical quality)</p> <p>1-Least technical quality 5-Highest technical quality</p>	<p><i>Rate in a scale of 1-5</i></p> <p><i>1= extension agent</i></p> <table border="1" data-bbox="719 293 1457 398"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=peer</i></p> <table border="1" data-bbox="719 450 1457 555"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 607 1457 712"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 763 1457 869"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 920 1457 1025"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5					
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26.	<p>Do you find the channel helpful in solving other farm problems? (Usefulness) _____</p>	<p><i>1= extension agent</i></p> <p><i>a)Yes</i> <i>b)No</i></p> <p><i>2=peer</i></p> <p><i>a)Yes</i> <i>b)No</i></p> <p><i>3=fellow farmer</i></p> <p><i>a)Yes</i> <i>b)No</i></p> <p><i>4= agro dealers</i></p> <p><i>a)Yes</i> <i>b)No</i></p> <p><i>5=Other</i></p> <p><i>a)Yes</i> <i>b)No</i></p>																																																		

27.	<p>How would you rate the credibility of the source? 1-Least Credible 5- Most Credible</p>	<p><i>Rate in a scale of 1-5</i> <i>1= extension agent</i></p> <table border="1" data-bbox="719 293 1457 398"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=peer</i></p> <table border="1" data-bbox="719 450 1457 555"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 607 1457 712"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 763 1457 869"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 920 1457 1025"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5										
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28.	<p>How you rate the acceptability of the source/ information channel 1-least acceptable 5- Most acceptable</p>	<p><i>Rate in a scale of 1-5</i> <i>1= extension agent</i></p> <table border="1" data-bbox="719 1122 1457 1227"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=peer</i></p> <table border="1" data-bbox="719 1279 1457 1384"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=fellow farmer</i></p> <table border="1" data-bbox="719 1480 1457 1585"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=agro dealers</i></p> <table border="1" data-bbox="719 1682 1457 1787"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>5=Other</i></p> <table border="1" data-bbox="719 1839 1457 1944"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5										
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		<i>End interview for farmers who got the information through face to face channels</i>																																												
29.	From what channel did you get the information? _____	1=plant clinic sessions, 2=plant health rallies, banners or umbrella, 3=mass extension campaigns such as use of magazines, brochure, newspapers, radios. 4= others specify																																												
30.	How familiar are you with the source? (Familiarity) 1= Least Familiar 5=Most familiar	<i>Rate in a scale of 1-5</i> <i>1=plant clinic sessions</i> <table border="1" style="width:100%; text-align:center;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <i>2=plant health rallies, banners or umbrella,</i> <table border="1" style="width:100%; text-align:center;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <i>3=mass extension campaigns such as use of magazines, brochure, newspapers, radios.</i> <table border="1" style="width:100%; text-align:center;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <i>4=Other</i> <table border="1" style="width:100%; text-align:center;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>					1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5					
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31.	<p>How did you feel about the source of the information? (authenticity)</p>	<p><i>1=plant clinic sessions</i></p> <table border="1" data-bbox="719 271 1509 427"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td><i>d</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>2=plant health rallies, banners or umbrella,</i></p> <table border="1" data-bbox="719 506 1474 663"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td><i>d</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>3=mass extension campaigns such as use of magazines,</i></p> <table border="1" data-bbox="719 730 1474 887"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td><i>d</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>4=Other</i></p> <table border="1" data-bbox="719 1077 1509 1178"> <tr> <td><i>Undisputed</i></td> <td><i>Genuine</i></td> <td><i>False</i></td> <td><i>careless</i></td> <td><i>Vague</i></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>	<i>d</i>										<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>	<i>d</i>										<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>	<i>d</i>										<i>Undisputed</i>	<i>Genuine</i>	<i>False</i>	<i>careless</i>	<i>Vague</i>										
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34.	<p>How accurate was the information ?(reliability)</p> <p>1= least reliable 5- most reliable</p>	<p><i>Rate in a scale of 1-5</i></p> <p><i>1=plant clinic sessions</i></p> <table border="1" data-bbox="719 1066 1457 1171"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=plant health rallies, banners or umbrella,</i></p> <table border="1" data-bbox="719 1272 1457 1377"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>3=mass extension campaigns such as use of magazines, brochure, newspapers, radios.</i></p> <table border="1" data-bbox="719 1529 1457 1635"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>4=Other</i></p> <table border="1" data-bbox="719 1686 1457 1792"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5					
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35.	<p>How would you rate the physically measurable attributes of the source being able to meet professionally acceptable standard (technical quality)</p>	<p><i>Rate in a scale of 1-5</i></p> <p><i>1=plant clinic sessions</i></p> <table border="1" data-bbox="719 1892 1457 1998"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table> <p><i>2=plant health rallies, banners or umbrella,</i></p>	1	2	3	4	5																																			
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36.	<p>Do you find the channel helpful in solving other farm problems? (Usefulness) _____</p>	<p><i>1= plant clinic sessions</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>2=plant health rallies, banners or umbrella,</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>3=mass extension campaigns such as use of magazines, brochure, newspapers, radios.</i></p> <p><i>a)Yes</i></p> <p><i>b)No</i></p> <p><i>4= others specify</i></p> <p><i>a)Yes</i></p> <p><i>b) No</i></p>																														
37.	<p>How would you rate the credibility of the source?</p> <p>1= Least credible 2= Most credible</p>	<p><i>Rate in a scale of 1-5</i></p> <p><i>1=plant clinic sessions</i></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table> <p><i>2=plant health rallies, banners or umbrella,</i></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table> <p><i>3=mass extension campaigns such as use of magazines, brochure,</i></p>	1	2	3	4	5						1	2	3	4	5															
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38.	<p>How you rate the acceptability of the source/ information channel?</p> <p>1=Least credible 2=Most credible</p>	<p><i>Rate in a scale of 1-5</i></p> <p><i>1=plant clinic sessions</i></p> <table border="1" data-bbox="719 656 1457 763"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>2=plant health rallies, banners or umbrella,</i></p> <table border="1" data-bbox="719 813 1457 920"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>3=mass extension campaigns such as use of magazines, brochure, newspapers, radios.</i></p> <table border="1" data-bbox="719 1070 1457 1178"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p><i>4=Other</i></p> <table border="1" data-bbox="719 1272 1457 1379"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	1	2	3	4	5						1	2	3	4	5						1	2	3	4	5						1	2	3	4	5					
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39.	<p>Is there anything that can be done to improve the mode in which knowledge about plant clinics is communicated</p>																																									

Appendix 2

Focus Group Discussion Question Guide

Plant clinics

1. What is your role in the plant health system?
2. For how long have you been a player within the system?
3. Have ever attended any plant clinic session?
 - a. If Yes=How much did you like the services offered at the plant clinics?
4. From your own assessment are you satisfied with the number of farmers visiting the plant clinics?
 - i. If not satisfied, would you suggest some of the reason for the low attendance of farmers to the clinics?

(Probe: informant who associates low attendance to low awareness level.

Asks following questions)

- a) Do you have any strategy in place to increase awareness level amongst the farmers.*(If strategy is through use of communication as an attempt, probe why use of a chosen communication channel,)*
 - b) How would explain the relationship between awareness level of the plant clinics and its attendance by the farmers?
 - ii. If satisfied, what measures have you put in place to maintain or improve this attendance? Do you agree that the attendance is attributed to awareness level?
5. As a stakeholder in the plant health system, have you ever made any attempt to increase the awareness level of the plant clinics amongst the farmer's
 - a. If Yes

- i. Through what communication channels have you made the efforts to relay information about plant clinics?
 - ii. What considerations did you put in place to decide on the above-chosen communication channels?
 - iii. In your assessment is the above-chosen communication channel effective in increasing awareness level about the plant clinics?
- b. If No
- i. Would you like to raise the awareness level of the plant clinics amongst the relevant stakeholders?
 - ii. What channel would you adapt to do this? For any chosen channel elaborate why?
6. Do you think increased awareness about the plant clinics would have a direct impact on the number of farmers attending the plant clinics? If No Why?

Appendix 3

Key Informant Interview Question Guide

1. What are the communication and knowledge sharing strategy by Plantwise on creating awareness about plant clinics
2. What were the guiding principles on the above stated communication strategy as far as awareness creation of the plant clinics is concerned
3. Would you suggest the reason why the awareness level of plant clinics is still low amongst the farmers and other relevant stakeholders within the plant health system?
4. Do you think the low awareness level could be a significant direct influence on the low attendance of the farmers to the clinics?

5. Do CABI and Plantwise involve its stakeholders in designing and developing frameworks used in creating awareness about plant clinics?

Communication channels used to diffuse knowledge about plant clinics

1. As an institution(CABI Kenya) what measures have you put in place to make clinics popular amongst the farmers and other relevant stakeholders
2. Have you ever been involved in creating awareness about plant clinics? If yes, what channel do you use to diffuse this knowledge?
3. What prompted you to use the above-chosen channel?
4. What challenges do you encounter in the creation of awareness about plant clinics through the above-stated channel?

Collaborations and partnerships

1. Do you ever work with other institutions, NGOs or government agency in the creating awareness about clinics?
2. Have you ever received any support from the National Government or any stakeholder to help roll planned frameworks in creating awareness about plant clinics?(probe)

Appendix 4

Plantwise programme global distribution



Figure 11. Plantwise Programme countries (as at end of 2017)

