THE ROLE OF INFORMATION DISSEMINATION APPROACHES ON CLIMATE CHANGE AND FOOD SECURITY IN JOWHAR, SOMALIA

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL INFORMATION AND COMMUNICATION MANAGEMENT

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DEDICATION

I dedicate this project to my family and supervisors for their support during this study: My colleagues and friends also deserve the credit for the moral support.

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I would like to thank all my lectures who taught me AICM.

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ACRONYMS AND ABBREVIATIONS

CH_4	Methane
CO_2	Carbon dioxide
DV	Dependent variable on climate change
DV	Dependent variable on Food security
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
NGO	Non-Governmental Organization
REDD	Reduction Emissions from Deforestation and Forest Degradation in Developing Countries
UNDP	United Nations Development Programs
WB	World Bank

ABSTRACT

The current study sought to investigate the role of information dissemination approaches on climate change and food security in Jowhar District of Somalia republic. The emerging threats worldwide to food productivity and sustainability are considered to be effects of climate changes. The objectives of the study were to determine existing information dissemination approaches on climate change in Jowhar district, Somalia; establish the roles of information dissemination on food security and climate change in Jowhar district, Somalia; and to establish institutional factors influencing information dissemination on food security and climate changes in Jowhar district, Somalia. The study used descriptive and correlation research methods. The target population comprised of nongovernmental organizations, project managers and the general population in Middle Shabelle. The sample population comprised of 80 respondents. The study had a response of 75% of the target population. Purposive sampling and random sampling were used to sample out the respondents. Primary and secondary data was gathered using a semi-structured questionnaire and knowledge test through interviews. Statistical Package for Social Sciences computer program was used to generate data and analyse descriptive and correlation of various variables. The findings showed radio, television, and mobile phones were the major information dissemiantion channels. With a significance of p value >0.001 , the study concluded that climate change had an effect on food security. It is recommended that findings resulting from the reveal, inform and make clear the nature of climate change information on food security among farmers and identify the best approaches in agricultural information dissemination in future mitigation purpose of climate changes in Jowhar district Somalia.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

One of the major threats to food productivity and sustainability in Africa is climate change. This comes because of greenhouse gas emissions (GHG) from human activities. Carbon dioxide is one of the greenhouse gases contributing to global warming and climate change. Carbon dioxide emissions are generated from deforestation, burning of fossil fuels, changes in land use among other human activities (Nisbet 2012). This trend underlines the importance of understanding agro forestry, and other mitigating measures to improve policy making with respect to land use, agriculture and harnessing Green House Gas emissions. In humankind's pursuit of well-being, there is both influence and respond to climate. Anthropogenic emissions of greenhouse gases affect the heat balance of the Earth, and thus resulting changes in precipitation patterns, temperature extremes, and rising sea levels affect how society develops. The dynamic interaction between humans and climate is not new, but the scale of the interaction has reached unprecedented proportions (Feng, and Gunilla (2011). The two researchers hold the view that successful communication must consider both the means of communication and the nature of information.

Technology enhances the mode by which the information is transferred from the source to the receiver. The mode of the content refers to the form of the message such as text, audio, image, and audio visual. It is also the formatting of the information to suite a particular audience. The information disseminated via mass media may be

reformatted if it is disseminated via conferences and seminars (Sarrat, 2010; Feng, and Gunilla, 2011; Nisbet, 2012). Dissemination of information requires a strategy that considers the concepts as independent even when their effects are interrelated (Majid, and McDowell, 2012).

In the light of Majid and McDowell (2012) and Macintosh *et al*, (2012) communication strategies on climate change and food security should be developed with the understanding of their intricacy that climate change affects food security, and some activities done to address food security were the causes of climate change. Climate change affects natural biodiversity, rainfall, temperatures, livestock productivity, migration, and arable land. In sub Saharan regions farming activities depend on rainfall for agriculture. As a mitigation measure, the people who live in sub Saharan region require information on methods that can improve their land productivity. Farmers require information on farm inputs, irrigation methods, and breed and varieties that suit a specific climatic condition (Majid and McDowell, 2012; Maystadt *et al*, 2013).

According to Bojang (2010) food security is the ability of a specific population to access food for healthy life in a sustained manner. Food security is envisaged in four dimensions; availability, accessibility, utility and stability. The accessed food should be able to be used given cultural diversity and biological reasons. Food production, storage, and distribution are important components of food security. Food that is produced and stored might go into wastage and leading to future shortages. In addition,

if the production is not consistent, the available food may not be replenished in time. The issue of unpredictable weather conditions as a result of climate change impact on food production. Other than the rainfall, the farmers need information on factors on production such as the correct farm inputs and market requirements. Food security is also viewed in terms of complementarily. A particular food produced in a certain region may require a food complement from a far off region. For instance if product on of cereals is guaranteed in a region that imports meat, the meat suppliers must be able to supply in a corresponding manner (Bojang, 2010; Bennett, and Franzel, 2013).

Furthermore, Siedenburg *et al* (2012) and Macintosh *et al* (2012) stated that information on climate change and its effects will not only help farmers, but also local and international organizations that do funding, research, and policy development. This explains why the international organizations come in for strategic roles that touch on industrialists, politics, and competing interests. Climate changes are associated with desertification while in other regions it causes flooding and rise in sea levels. This explains why communication on climate change and its effects should be done by considering factors that are specific to the region of study (Tol, 2009; Nahry and Mohamed, 2011).

One of the strategies on climate change and food security is adaptation. This refers to ensuring that agricultural practices are sustained despite the changing conditions. The farmers come up with better ways to practice agriculture despite the change in climate. This is achieved by research and generation of breeds and crop varieties that meet the

new conditions, introduction of better methods of irrigation and educating farmers on better agricultural practices. Adaptation is first achieved by identifying the problem within the area of interest. As noted before, the effects of climate change vary from one place to another. There the adaption methods must be tailored towards problems of the area. The manner in which the information is shared is critical and systemized work as asserted by Goetzinger, and Valentine (2006), Amusan (2014), and Feng, and Gunilla (2011). The approaches may include conferences, workshops, seminars, scholarly exchanges, mass media and internet. The current study therefore investigates the climate change situation and best approaches in mitigating the changes in the Jowhar District. Further, the study will inform the international organizations on the areas they may fund and offer strategic help.

1.2. Statement of the Problem

According to Maxwell, *et al.,* (2012), Somalia was declared experiencing famine in 2011. This was after a systematic analysis by Famine Early Warning System Network (FEWS NET), Food Security, and Nutrition Analysis Unit for Somalia (FSNAU). Further, Abdi (2013) aptly put that 43% of the Somalia population lived on less than a dollar by 2002 and the economic situation has deteriorated since then. Livestock account for about 40% of the Somalia per capita income because of drought, sandstorms, deforestation and poor agricultural practices (Abdi, 2013). Siedenburg, *et al* (2012) added that climate changes have affected small-scale farmers and pastoralists by causing irregular rainfall seasons and increasing desertification.

Deteriorating climate conditions and poor agricultural practices have caused apparent poverty. Information on mitigation measures and approaches to manage the effects of climate change are greatly hampered. This is attributed to insufficient funding, poor communication channels, emerging and unstudied issues on climate change in relation to agriculture, and poor management of the resources (Amusan, 2014; Abdi, 2013; Maxwell *et al.,* 2013). Monetary and human resources are critical in dealing with the effects of climate change. Individual farmers and institutions depend on the resources to institute measures of adaptations and advanced agricultural practices. In return, the agricultural produce is high, and food security is guaranteed. The problem of resources in communication on climate change and food security is manifest in the flow of adaptation funds. It is against this backdrop; communication channels play a vital role in reaching out to the financiers, educating the locals on climate change, food security, and sharing information on research areas that need attention on mitigation, management, and adaptation. The study intends to reveal approaches in communication to the organizations and individuals who can fund strategies of food security and management of the effects of climate change. The findings further guide the communication on the effects of climate change and food security to the local citizens in Somalia. In this respect, this study sought to establish the role of information dissemination approaches on climate change effects and food security the case of Jowhar district, Somalia.

1.3. Justification of the study

Previous studies and reports from the government and NGOs have reported food insecurity and the effects of climate change in Somalia. Reconnaissance of this study also affirmed the issues raised on the subject. In this respect, the findings of the study were critical in establishing the approaches to solutions in the problem statement. The empirical study gives the government and organization robust information on policy formulation and development of the objectives. Intervention and mitigation measures are also to be enhanced.

1.4. Purpose of the study

The purpose of the research was to study the role of information dissemination approaches on climate change and food security the case of Jowhar district, Somalia.

1.4.1 Specific Objectives

Specific objectives included:

1. To determine existing information dissemination approaches on climate change and food security change in Jowhar district, Somalia.
2. To establish the roles of information dissemination means on food security and climate change in Jowhar district, Somalia.
3. To establish institutional factors influencing information dissemination on food Security and climate changes in Jowhar district, Somalia

1.5. Research Questions

The study was guided by the following research questions:

1. What are existing information dissemination approaches on climate and food security change in Jowhar district, Somalia?.
2. What are the roles of information dissemination means on food security and climate change in Jowhar district, Somalia?.
3. What are institutional factors influencing information dissemination on food Security and changes in Jowhar district, Somalia?

1.6. Significance of the study in generating knowledge on climate change and food security

The proposed study informed the existing knowledge on extension service provider on effective approaches in mitigation of climate change and food security in Somalia. Findings further contributed to policymaking institution as a measure to promote efficient and sustainable agriculture. The findings and recommendations of the study will be useful to providers of extension services as they formulate extension messages for use in Johwar. The study findings are useful to institutions of higher learning and research centers through building onto existing knowledge on food security and climate changes mitigation in arid areas of Somalia republic.

1.7. Significance of the study on education about food security and climate change

The study established effective communication channels that will help in educating the people who live in Jowhar district on food security and climate change. The research determined the nature of the content to be communicated and the means of

communication. The nature of content will be classified as one that targets the local farmers, scholars, environmentalists, and population at large (Amusan, 2014; Abdi, 2013; Maxwell *et al*., 2013)

In addition, the researcher will establish the nature of information to be sent out to potential investors and financiers of management of effects of climate change and food security programs. These distinct approaches will help in solving the current problem. Besides information packaging, the means of reaching out to the relevant parties are vital in solving the stated problem. The study brought out the convenient and effective means in the light of physical location, communication capacity of the locals, and programs such as conferences, workshops, and exchanges on the climate change and food security (Norris, 2012; Feng and Gunilla, 2011; Goetzinger, and Valentine, 2006). The study provided crucial information that will prove useful to people in Jowhar and in the international community too as most of them are devoid of the details on climate change and food security (Jylha *et al*., 2010; Macintosh *et al*., 2012; Sterner *et al*., 2012). The study informed the measures and programs that are instituted on food security. This will be vital especially in the area of study given the challenge of food shortages, deteriorating agricultural conditions and overdependence on imports and agricultural grants. The study pointed out the current measures of food security in Jowhar and suggested alternative measures that are applied elsewhere in the world (Maxwell *et al*., 2013; Siedenburg *et al*., 2012).

1.8. Limitations of the study

The locals of the Jowhar district may not be conversant with the technical knowhow on climate change signs. In addition, the respondents may not have coherent information on the trends on food security in relation to climate change. This is because of long-term disruption of order due to civil war, international forces, and the effects of terrorism. By extension, the respondents may not differentiate the causes of food insecurity due to violence and causes of food insecurity due to climate change.

1.9. Delimitations of the Study

The geographical location of Jowhar District is in the South central zone of Somalia. The capital of the district is Jowhar. The study considered the following locations; Horseed, Hantiwadag, Shekh Oyaye, and Kulmis. This approximately covers 60,000 KM^2 with an estimated population of 1.6 million. These sub divisions will assist in navigating to gather information that may otherwise be hindered by the large Jowhar district.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Scholarly discourses are critical in informing research process. The following literature review investigated four main areas that studied the definitions and conceptualizations of climate change and food security. Four components of food security were considered; including availability, access, utilization, and stability. The other aspect of the literature review is information dissemination strategies. Information can be disseminated for awareness, understanding or for action to be taken. The study also reviewed media and non-media channels of information dissemination. The critique of the related literature gave an overview of the academic articles used in the study and analyzed the conceptualizations and methods of the studies.

2.2. Climate change

2.2.1. Definition of Climate change

According to Tol (2009) and Jylha *et al.* (2010), climate change is the alterations of the physical climatic condition due to greenhouse gas emissions. Increase in temperature is the fundamental characteristic of the changes in the physical climatic conditions. This has an effect on other physical conditions such as pressure, radiations, and precipitation (Tol, 2009; Jylha *et al.*, 2010).

2.2.2. Conceptualizations and dimensions of climate change

Bojang (2010) and José, *et al.* (2013) observed that climate change is a global phenomenon. The activities that cause climate change may be taking place in far part of the world and causing effect in different parts. This characteristic makes climate change face contesting views, skepticism, and a drive for extensive research in the field. Carbon dioxide and Methane are the major greenhouse gases that cause global warming. Carbon dioxide is generated by when fossil fuel breaks into its constituent components. The process of carbon dioxide, methane, and related gas emissions causing climate change are complex and intricate (Tol, 2009; Jylha *et al*., 2010).

Tol (2009) stated that 24 billion metric tons of carbon dioxide was emitted in the year 2000 alone. This has a direct effect on the climate change, which in turn affects the land use, production, lifestyle, and Gross Domestic Product (GDP). The measure of the effects of climate change is a function of the economic indicators such as the GDP. This is also broken down into the specific aspects of the economy that are affected. Various scholars and studies have systemized the effects of global warming on the economy. Nordhaus recorded a 0.9 impact on economy on a 2.5 change in temperature. Tol (2009) found out that a 2.5 change in temperature would influence the economy by a factor of -1.9. He also observed a 2.3 economic impact on the change temperature of 1.0. The trends in the economic impact differ from one place to another. This explains the reason for customizing the effects of climate change to specific regions of interest (Tol, 2009; Jylha *et al*., 2010).

Climate change causes anxiety among the people of the targeted area. Strained resources and the desire for people to be given priority of adaptation may stiffen relations of the people within the locality. Levels of interest may also be determined by the objectives of the organizations and individuals who are funding or managing the adaptation program. The third aspect on adaptation is identification of the participants. The government, individuals, communities, and partnering organizations are vital participants in the adaptation process (Bojang, 2010).

The fourth aspect in adaptation is establishing the empirical baseline. Successful adaptation program must be anchored on credible, empirical information. This helps in the formulation of the parameters of operations. In this case, the targets are more specific, the priorities are easily determined, and resources are allocated prudently. In this respect, Food and agriculture Organization (FAO), through Sustainable Land Management (SLM) trains and builds capacity of Farmers in Africa. Some of the aspects considered in building capacity of the farmers include water conservation, environment, biodiversity, land use, and farm inputs that increase productivity. It has been established that through channels such as Clean Development Mechanism (CDM), small-scale farmers can contribute to reduction of the impact of carbon emissions by practicing afforestation, agro forestry and reforestation. Communities and groups of farmers can receive information through seminars and workshops in which easy to recall relations such as Reduced Deforestation and Degradation (REDD) improve the knowledge of farmers on better agricultural practices (Bojang, 2010; Bennett, and Franzel, 2013; Frankenberger *et al*., 2014; Hamza and Corendea, 2012).

To this end, two aspects stand out in this study. The first aspect represents the human and institutions that work hand in hand to deliver on the second aspect that is the phenomenon of climate change and food insecurity. The human component encompasses the individuals, the community in the Jowhar District, the climate change and food security scholars, and the individuals who serve in various institutions such as the government organs and NGOs. Institutional component refers to the international organizations, the governments, and companies that provide strategic resources in managing effects of climate change and food security. What makes institutions, individuals fail or succeed in the management of the effects of climate change, food security is the depth, and the extent of information shared between them.

2.2.3. Climate change mitigation and adaptations

This is the measure taken to reduce the greenhouse gasses. Reduction of overdependence on the fossil fuel, encouraging afforestation, and agro forestry are some of the methods used as a mitigation measure on climate change (Bojang, 2010). Measures to reduce deforestation and forest degradation should be encouraged for farmers and charcoal burners. Elaborate measures that involve international organizations and governments may be formulated in form of policies and protocols. The Kyoto protocol and the subsequent changes on the protocol was a significant mitigation measure (Bojang, 2010; José *et al*., 2013). Although individual governments did not show significant steps in implementing the Kyoto protocol and the subsequent protocols that were advanced on it, the UN continues to make impressive strategies.

In 2008, FAO, UNDP, and UNEP initiated a UN-REDD program that was aimed at reducing the greenhouse emissions. Mitigation and adaptation measures require three steps of implementation. First, is to raise awareness on the effects of climate change and the suggested mitigation measures. Second step involves working with the local communities and the partners in the programs. The local inhabitants of the areas facing the effects of climate change play an important role in its success because they are conversant with the social and economic issues related to the mitigation and adaptation measures. The third step in mitigation and adaptation is policy development and advocacy. This is done by concerted efforts of the stakeholders. Policy formulation provides a legal and systematic frame work of dealing with the climate change and its effects (Bernward, 2013; Bojang, 2010; José *et al.*, 2013).

Adaptation and mitigation of the causes and effects of climate change also depends on the agricultural practices. Agriculturalists should be encouraged to develop adapting crops, livestock, and trees. Adaptation capacity can be enhanced by training the workers through workshops, scholarships, agricultural exchange programs, the farmers should also be able identify and use mechanized and technology oriented farm input. Investing in research, early warning systems on the drastic changes of the climate should be employed as means of mitigation and adaptation (Moss, 2009; Bernward, 2013; Bojang, 2010). In perspective of the Jowhar district, assessing the exposure and adaptive capacity of Somalia, the impoverished state is one of many Northeast African states in a position of extreme vulnerability with limited capacity to effectively

respond to impending climate change impacts. Consequently, Somalia stands to experience the mass displacement and forced migration of its population due to unmitigated exposure to climate stress and dwindling resources.

Although it is considered a primarily agricultural state, with 80% of the population is dependent upon agriculture in 2008, Somalia has only 2% arable land (Abdi, 2013), of which, 69% is dedicated to the grazing of low-intensity livestock and 17% is under forest. Somalia is expected to experience land degradation, declining ecosystems, water stress, threats to food security, and the revitalization of already prevalent armed conflict. In 2009, 250 million Africans faced significant risk of water shortages (Moss, 2009). If access to water is restricted through a rise in temperature and evaporation or increased competition, the entire Somali state is affected. As a recent example of this, 2012 saw over 10 million people in dire need of international aid and faced with the result of extensive exposure to climate stress; famine. The harsh drought resulted in extreme water scarcity, limiting the agricultural sector and directly threatening the security of each individual. Faced with limited water storage, increased risk of disease, dehydration, and hunger families were forced to flee their homes in the search of water and food. Although Somalia is now recovering from this famine, it is clear that the state is unable to provide its population with necessary food and water security in the face of natural disaster and within both rural and urban settings.

2.3. The Concept of Food security

Bojang (2010) defined food security as the availability of food that promote healthy life to a given population, and that the future availability of the food must be guaranteed.

2.3.1. Components of Food Security

2.3.2. Availability

Availability refers to the total quantity of food present within a given area, within a specified time. Availability of food considers food from the domestic market, imports from the international market, local produce, food from the stock, and food aid. Indicators of food availability are the available arable land, cereals per yield, cereal domestic supply, share of food aid, food supply, food production index and permanent cropland (Bojang, 2010; Frankenberger, 2014). Jowhar faces the challenge of food availability as indicated by Abdi (2013). The international organizations such as FAO helps Somalia deal with the situation by providing food aid to regions that have acute food shortage.

2.3.3. Access

Access refers to the physical ability and possibility of reaching to the food. Access also considers the economic ability of the population to share or partake of the food by means of purchase, barter trade, assistance, and borrowing. Accessibility of food also refers to the physical definition in terms of the distance to be covered to access the food. Fart of distance negates the essence of security in terms of the physical access.

Infrastructure in terms of the means and mode must be put into perspective. Access is also affected by the socio-cultural values. The affective domain such as belief, culture, social group, attitudes, and perceptions can be a barrier to access of the food. Indicators of access include, Consumer price index, GDP per capita, water sources and the size of population (Majid, and McDowell, 2012; Bojang, 2010; Frankenberger *et al*., 2014; Mukhebi, 2009).

2.3.4. Utilization

The utility component refers to the dietary and nutritional values of the food. The other aspect on utility is the safety. The food that is taken should not cause harm to the health of the person. Utility also considers the facilities, utensils, methods of storage, preservations, preparation methods, and availability of water. Food utility also involves the relevant information on the preparation and complementarily aspects. Some foodstuff are ready to use while others must be reprocessed and cooked before consumption. Safety of food involves the information of the nutritional composition, date of manufacture and expiry time utility can be determined by amount of wastage, and mortality rate (Thornton, and Cramer, 2012; Majid, and McDowell, 2012; Bojang, 2010; Frankenberger *et al.*, 2014).

2.3.5. Stability

Stability in food security refers to “at all time.” Sustained supply at all seasons is a vital component in food security. Storage and preservation help in short-time stability. Long-term stability is anchored in the entire system of production and supply. There

must be guarantee that the farm inputs will be available to facilitate production. If the rain fails, there must be alternative sources of water and irrigation may be employed. Options on importations, suppliers and distributors enhance stability (Mukhebi, 2009; Majid, and McDowell, 2012; Bojang, 2010).

2.4. Information dissemination strategies

Information dissemination strategies show the relation between the climate change and food security in the Jowhar District. It ought to show that the people who are targeted as the beneficiaries are aware of the concepts of the effects of climate change, and the food security. The communication should also be taken to the potential financiers of the mitigation and adaptation measures in the region. Although organizations may not engage directly in the mitigation and adaptation measures, their role in facilitation of the information to reach the right people is also critical. The people of Jowhar district require intermediate organizations and individuals who can present their situation in manner that global organizations can engage in management programs of the food security and effects of climate change. In the similar way, information ought to be packaged in a manner that will suite the locals in understanding and taking action on the situation of food security and climate change (Sarrat, 2010; Senior *et al*., 2013; Goetzinger and Valentine, 2006)

This marks the initial general overview of an idea, object, and phenomenon. At this point, the information is more thematic and avoids the empirical details. Creating awareness may be done through seminars, workshops, through mass media such as the

radio, TV, and print media. At this level, the recipient may not process the information (Senior *et al.*, 2013; Goetzinger and Valentine, 2006; Mares, *et al*, 2010).

2.4.2. Information dissemination for Understanding

The details and the process of arriving at the conclusion are studied. At this level, information is disseminated to a given audience or group of people and the audience may be required to do some analysis, processing of the information and an evaluation process may follow. The evaluation process may not be formal, but the facilitators may find effective ways to get feedback from the people who received the information. Information dissemination for understanding food security and climate change also figures out the potential benefits of the information to the user. Therefore, the information must be specific, objective, and quantifiable in the process of receiving the feedback (Senior *et al*., 2013; Goetzinger and Valentine, 2006).

2.4.3. Information for Action

Information for action is disseminated to specified audience. The information is customized to solve a given problem, or meet a specific need of the population. Information for action is disseminated to people in position for leadership, those with skills, technical knowhow, and those who will make meaning of the information. Dissemination of information for action is a structured process that comes with a plan of action, plan for sourcing the resources, timeframes, specific deliverables, and an outline of the costs and benefits analysis for both the financier and the people within the locality. In the case of food security and climate change, the evaluation process

may take many years. The analysis, and evaluation does not target individual professionals or the staff of people hired for the projects. Rather, the broader concept of the two phenomena is assessed in terms of its impact to the target population (Senior *et al*., 2013; Goetzinger and Valentine, 2006).

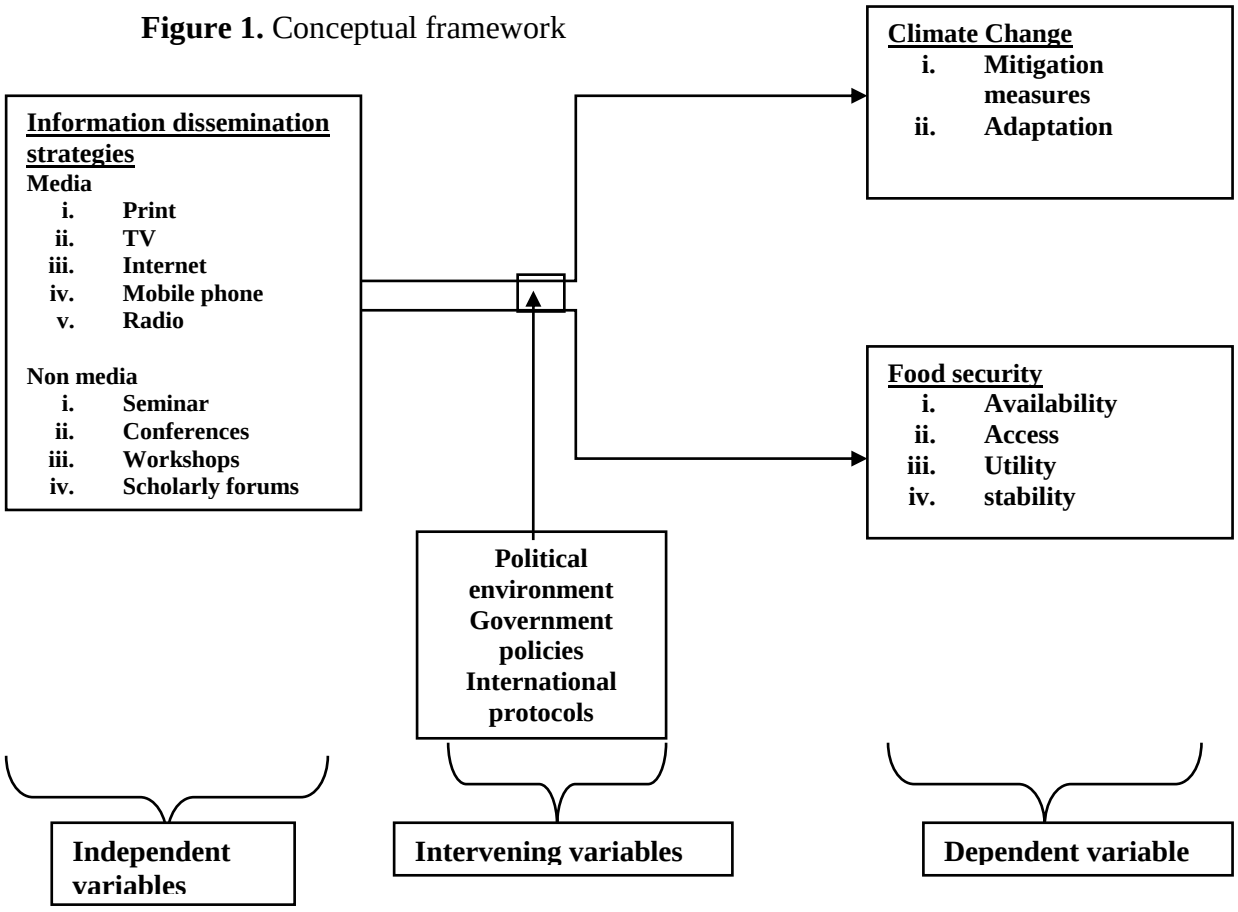
2.4.4. Information dissemination channels

The main channels of information dissemination include Print, TV, internet, Mobile phone, and Radio, non-media; seminar, conferences, workshops, and scholarly forums. According to Goetzinger and Valentine (2006), dissemination channels determine the strategy adopted by organizations in delivery of information regarding a given project. The channels are the devices, networks, and technological means of source, transmission, and reception of information. Hamza and Corendea (2012) believe that the complexity of the information required in dealing with the effects of climate change and food security makes it harder for the public to participate in the mitigation and adaptation measures. The long term effects of global warming and the difficulty in linking food security to climate change makes many governments and individuals skeptical of the objective mitigation measures and adaptation. The failure of governments to adhere to the Kyoto protocol and the subsequent adjusted pacts is a sign of skepticism associated with the dealing with the effects of climate change. Agriculture remains the most affected with climate change and its impact is both in short term and long term.

Other social and economic factors have also been affected by climate change. For instance, change in weather conditions has increased migration and pastoralist cannot predict where to move in the change of the season. The place they hope to go to in anticipation of better weather conditions may turn to be as forecasted. This is an indication that by extension climate change also affects cultural practices and lifestyle. Therefore, experts must establish the best channel and strategy to put the phenomenon of climate change in the perspective of all the stakeholders. This is critical because the elaborate nature the effects of climate change require extensive, comprehensive, and concerted effort. If the small-scale farmers engage in mitigation and adaptation measures while on the other hand the government protects the industrialists whose enterprises increase greenhouse gases, the farmers' efforts have little impact. In essence, the strategies of information dissemination on the effects of climate change and food security are the fundamental determinant of the success or the failure in mitigation and adaptation measures. The channels must be effective and the information must make sense to the stakeholders (Bennett, & Franzel, 2013; Senior *et al*., 2013; Goetzinger & Valentine, 2006; Abdi, 2013)

2.5. Conceptual Framework

Figure 1. Conceptual framework



Source: Author's conceptualization

The conceptual framework will seek to present the schematic view of role of information dissemination approaches of climate change and food security: The case of Jowhar district, Somalia. The conceptual framework relates the independent and the dependent variables.

A dependent variable is one that is the result or effect of another variable. The variable is assumed to change based on the independent variable. In other words, this variable depends on the cause (independent variable) (Sekaran and Bougie, 2010). The study

has two dependent variables (DV). Climate change will be considered as the first dependent variable (DV1). DV1 has two levels/conditions which include adaptation and mitigation. The second dependent variable (DV2) has four levels/conditions, which include availability, access, utility, and stability.

An independent variable is one that identifies the conditions or forces that act on something else. It is the variable that has an impact or affects other variables (Sekaran and Bougie, 2010). The Independent Variable (IV) includes media; Print, TV, internet, Mobile phone, and Radio, non-media; seminar, conferences, workshops, Scholarly forums.

Intervening variables are those that show the mechanism or link between the independent and dependent variables. They show mechanism behind the causal relation that exists between dependent and independent variables (Sekaran and Bougie, 2010). The changes in the government policies and political environment are intervening variables.

2.6. Theoretical Review

Several theoretical approaches have been used to investigate the determinants of acceptance and use of information technology (Venkatesh *et al*, 2003). However each theory has its own advantages and limitations. A research theory is a set of explanations about complex phenomena, considered to be part of science. It identifies the variables that affect the problem of interest to the researcher. Research theories explain and tell the important concepts that need to be measured in a particular research. They also test relationships between important variables in a study (Borgatti,

2005). Results from research theories in turn, form part of the body of knowledge in science. Theory is about what we know and how we know it. Theories provide an abstract understanding of the communication process (Miller, 2002). A brief summary of relevant models used in technology adoption and use studies is given, followed by a detailed description of the theoretical framework to be adopted in this particular study.

Roger's diffusion of innovation theory has been adopted by various scholars to explain aspects of technology diffusion (Kiplang'at and Ocholla, 2005; Migiro, 2006). The theory emphasizes the role of individual behavior in the technology diffusion process and it considers time as an important factor in the rate of diffusion. The model classifies the users into five adopter categories, namely innovators, early adopters, early majority, late majority, and laggards, depending on when they adopted the technology. This theory informs current study into consideration various information dissemination technologies available and use. The theory is considered an important factor of the rate of diffusion of information among various farmers in Jowhar district.

2.7. Research gap

As noted in the constructs that were used to formulate the variables, there evidence from research by scholars and organizational reports that the effects of climate change affect food security. In some regions of Somalia, the NGOs have strived to educate the locals on food security and climate change. However, the impact has been insignificant. Researchers may find it important to effectiveness of the channels and means of communication.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

The following chapter discussed research methodology used in the study of the subject; the role of information dissemination approaches on climate change effects and food security in Somalia. Research design details the nature of research that is being conducted; study area, the target population, and the procedure of sampling the required population and the methods of data collection. It goes further to discuss the validity and reliability of the instruments of research and methods of data analysis.

3.2 Study area

The geographical location of Jowhar District is in the South central zone of Somalia. The capital of the region is Jowhar. There are four locations in the region, Horseed, Hantiwadag, Shekh Oyaye, and Kulmis. This approximately covers 60,000 KM^2 with an estimated population of 0.6 million. Navigating to gather information may be challenging as this is a huge area. Further, to the West, Shebelle is bordered by Hiran, north is Galgudud, and to the south is the Lower Shebelle and Banadir region. To the east is 400 Km coastline. The study surveyed the communication strategies in the four locations. The district imports rice, spaghetti, cooking oil, sugar, and maize. The major exports are bananas, livestock, and livestock products.

3.3. Research Design

This research will adopt quantitative research design and specifically the non-experimental research design focusing on the descriptive research design. This design is suitable because it involves answering essential fact finding questions like Who, Where, How, When, Which, and How much (Cooper and Schindler, 2001). The use of descriptive study will be essential for this study because usually, this design helps to depict the participants accurately. The researcher can do this through observation, case study or survey. In this study, the researcher will go about descriptive research by use of survey and specifically using a questionnaire to help know more about the participants and hence establish a relationship between political risks and foreign direct investment.

The research will establish the role of information dissemination approaches on climate change and food security in Johwar. Descriptive studies are usually based on previous understanding of a research problem (Zikmund, 2003). The researcher will integrate this aspect by consulting a number of reputable and authoritative sources written by experts in the field of climate change, food security and communication. This will help to find reliable information from secondary sources to help reinforce the understanding of the research problem.

3.4. Target Population

The subject of the study considered three categories of population. The first category is the NGOs working in Shebelle region and their objectives are in line with the effects of

climate change and food security. The study targeted 4 NGOs from the 4 locations in the Jowhar District. They have been targeted because they facilitate or fund the projects that relate to the subject of this study. The second category of population is the project managers. The project managers are the link between the NGO, the public and government. Similarly only the managers of the project in line with the research were targeted. The third category is the general population of Shebelle region. The response from the public will be vital in getting information on the extent of the effects of climate change and food security. Further, it is the direct beneficiary of the adaptation and mitigation measures in the region. The core mandate of the project managers and the NGO determine the extent of the information gathered that relates to the subject of the study (McCluskey and Lalkhen, 2007; Tewksbury, 2009).

3.5. Sampling procedure

3.5.1. Sampling frame

The sampling frame can be part of a population or identical to that population. It may also relate to the population indirectly (Lohr, 2010). The sampling frame for this research includes the NGOs working in Shebelle region, the project managers and general population. The respondents in this sample frame all have an idea about the effects of climate change. Besides, they interact with the information dissemination approaches discussed in this study.

3.5.2. Sample size

Purposive sampling was used to determine the NGOs and the Project managers that were to participate in the study. Purposive sampling guided the researcher in collecting data for the factors that are relevant to the study (McCluskey and Lalkhen, 2007; Kothari, 2008; Tewksbury, 2009). Random sampling was be used in selecting the 20 respondents from each of the 4 locations. Random method gives equal chance to all the people from the target population. The researcher collected information both from primary and secondary sources. Purposive sampling was critical because there was need to filter and target only the managers of the projects in line with climate change and food security. The study targeted 4 NGOs with projects on climate change and food security. Therefore, the sample size consisted of 84 respondents: 20 from each of the four locations and 1 manager from each of the four NGOs.

3.6 Source of data

The research used both secondary and primary data sources. Primary sources will include use of questionnaires to collect data from the respondents. Secondary sources of data will entail collecting data from magazines, journals, newspapers, websites and books that relate to the study. The information from the sources will include weather seasons and patterns, amount of rainfall, livestock, vegetation, carbon emission, tree planting, and migration because of climate change. Such information will especially be derived from the records and correspondence platforms of the 4 NGO respondents in the Jowhar District. The respondents will be required to respond on items that require descriptive information on specific levels of the two variables. For instance, the item

may require a response on how often they have heard information on climate change in the radio. The response options may include, daily, weekly, fortnightly, monthly, once per term. Each of the response will be coded on a likert scale with weighted numerical. Daily =5, weekly= 4, fortnightly = 3, monthly = 2, once per term =1.

3.7. Research instruments

The study gathered information using questionnaires, document analysis sheet, and interview schedule in collecting the data. The instruments are considered appropriate because of the nature of the data to be collected, the objectives of the study and the study period. The instruments have been chosen for this study because of their convenience, depth of the required information and the nature of information required for the variables. The target population should find research instruments usable and familiar in their contexts.

3.7.1. Questionnaire

In the view of Mugenda (2011) and Kothari (2008) questionnaire is a data collection instrument with set of items that need response. The response given on the items constitute the required data for the study. In this study, both open ended and closed items have been used. Open-ended items are suitable for the descriptive aspects of the variables. It gives the respondent freedom to express their opinion on the items. Closed items are objective with specific leads. The respondent is guided with specified options (Kothari, 2008).

Questionnaires take relatively a short time to complete. They are easily tailored to suite a wide range of readership while retaining the objective of the required data. The information entered in the questionnaires is easy to quantify or translate into the subject of study. Questionnaires provide data that can provide trends, rates of change, and deductive characteristics (McCluskey & Lalkhen, 2007; Kothari, 2008; Tewksbury, 2009).

3.7.2. Interview schedule

This is where the researcher gets information from the respondent by verbal means. The researcher asked questions on the items of the schedule and the response was noted. Structured and semi-structured interviews were used. Semi structured interview allows for discussion and in-depth information particular issues. Questionnaires may supplement the information gathered by interview (McCluskey & Lalkhen, 2007; Kothari, 2008; Tewksbury, 2009). The researcher used interviews to collect data from the project managers.

3.7.3. Document analysis sheet

This is a data sheet that guides the researcher on the specific information to gather from an NGO regarding its information dissemination strategy in relation to climate change and food security. The sheet stipulates the objectives of the NGO, the achievements in climate change or in food security and its role in the global agenda on climate change and food security. The data sheet will narrow down to the channels of

information dissemination, its impact on Dependent variable1 (DV1) and Dependent variable 2 (DV2). This instrument will be used on the sample population of the NGOs.

3.8. Validity and reliability of research instruments

Mugenda (2011) and Kothari (2008) defined reliability as the measure of consistency in the results. When the test retest of the research gives similar results, the instrument is said to be reliable. Reliability of the instrument will be established in the piloting process.

Mugenda (2011) and Kothari (2008) observed that validity refers to the accuracy with which the instrument determines the data on the study variables. The data must be accurate and meaningful. The validity was achieved by tailoring the items of the questionnaire to the variables of the study. The researcher further sought expert opinion and discussion with the colleagues and members of the faculty.

3.9. Procedure for data collection

Upon the approval of the proposal, research permit was obtained from the National Council of science and technology. The authority to conduct the research was also sought from the Jowhar district Commissioner. The researcher pre-visited the intended location of the research to familiarize in person and created rapport with the people in the locality.

The data was collected by printing questionnaires for the target sample population and the target sample size. The researcher used the principle of one- questionnaire – one – respondent. This method prevented duplication of the response. To eliminate any

element of suspicion, the questionnaire contained a brief introduction objectifying the process. The introduction part also guided the respondent on the manner of response such as use of symbol (tick) for objective questions. The questionnaire contained objective items and subjective items. Objective items required the respondents to tick where possible, agree or disagree write yes or no, true, or false, or arrange objects of likert in descending or ascending order. Subjective items involved filling in the blank spaces (McCluskey and Lalkhen, 2007; Tewksbury, 2009).

3.9. Data analysis

Data processing started when all the data collection instruments had been received from the research sample. The researcher converted the raw data into formats that facilitates analysis and synthesis. The initial point of coding was the interpretation of the information on responses such as tick or mark or symbols. For instance, a tick may not be entered the database, but an interpreted form of the tick would help the researcher feed the database with viable information. Further, each questionnaire was given a coded identification (McCluskey and Lalkhen, 2007; Kothari, 2008; Tewksbury, 2009). The researcher compared, contrasted, and synchronized the data from the three distinct population samples; NGOs, Project managers, and the public.

The following relation describes main factors

Independent Variable influence on Dependent Variable 1 . . . . (i)

Independent Variable influence on Dependent Variable 2 . . . . (ii)

Independent Variable influence on Dependent Variable1 x Dependent Variable2. (iii)

Equation (i) is the main factor 1, equation (ii) is the main factor 2 and equation (iii) is the interaction factor.

This means that Information dissemination strategies can influence climate change distinctively. In this case, Information dissemination strategies are the independent variable (IV) and climate change is Dependent variable (DV1). Information dissemination strategies can influence food security distinctively. Therefore, information dissemination strategies are independent variable (IV) and influences Dependent variable (DV2), food security. Information dissemination can also influence food security and climate change.

The empirical findings of the research relied on mathematical formulae, inspection, and statistical tools that determine divergence, central tendencies and abstracts that are special to the study. The mean, variance guided the researcher to establish a rank on the components of the specific variables. In doing this, Statistical Package for Social Sciences (SPSS)and graph pad software assisted the researcher in data processing. The independent variables media and non-media are supposed to be independent from each other. The research tools will provide information that can be represented in form of charts, tables, and graphs. Graphical or tabular representation will enhance interpretation of the information in terms of comparison of the variables (McCluskey & Lalkhen, 2007; Kothari, 2008; Tewksbury, 2009).

Analysis of the results was based on the values of the following likert scale parameters: Strongly disagree = 1, Disagree = 2, Not aware = 3, Agree = 4, Strongly agree = 5. In relating the values of the likert scale to the variables, the values of the

likert scales were weighted. This was done by first multiplying the frequency of occurrence with each the value of the likert scale. Then find the sum of each of the product. To find the mean, divide the sum by the number of respondents. This was represented as shown in the relation below

$(\Sigma f x) / N$ …….……iv

Where f is the frequency of the variable, x is the weighted vale on the likert scale, and N is the sum of the respondents.

The study indicated that climate change and food security are dependent variables while information dissemination strategies is the independent variable. The analyses considered the standard deviation of the dependent variable to enable the researcher determi -=Mne the interaction of food security and climate change. Two - way ANOVA were used to test the hypothesis of the study on the role of information dissemination strategies on food security and climate change.

Calculation of the ANOVA tests

$SS_{BETWEEN} = \Sigma [(M_C - M_G)^2 n_c]$, where M_c is the condition mean, n_c is the number of the respondents, and M_G is the grand mean.

$SSA = \Sigma [(M_A - MG)^2 nA]$, where SSA is the sum of squares.

The study considered M_A as the mean value of the role information dissemination on climate change. M_G is the grand mean (the mean of the levels in the main effect1 and main effect2), and N_A is the number of respondents in main effect1.

dfA: This is the degree of freedom in the main factor of climate change

$SSB = \Sigma [(MB - MG)^2 nB]$ where , SSB is sum of square for the effect of information dissemination on food security. M_B is the mean value of information dissemination on food security. M_G is the grand mean (the mean of the levels in the main effect1 and main effect2), and n_B is the number of respondents in main effect1 = 60.

dfB is the degree of freedom of main factor of food security

The interaction effect between climate change and food security

$SS_{A \times B} = SS_{BETWEEN} - SSA \times SSB$

$df_{AXB} = (A - 1)(B - 1)$. Degree of freedom for the interaction between main factor (climate change) and the second main factor (food security), the researcher applied the SPSS on the significance of the effects

CHAPTER FOUR

4.0. RESULTS

4.1. Introduction

The chapter highlighted presentation of the research and analysis of the findings. The data was analyzed to establish the role of information dissemination approaches on climate change and food security in Jowhar, Somalia. The data contained items that are related to the subject of the study and the general information about the respondents.

4.2. Response rate

The response in Hant Wadaaq was 80%, Horseed was 60%, Kuimis was 80%, and bulo sheikh was 80%. The overall response was 75% (Table 1).

Table 1: Response rate (75)

Level	Location				
	Hant Wadaaq	Horseed	Kuimis	Bulo sheikh	Ovearall (district)
Target	20	20	20	20	80
Actual respondents	16	12	16	16	60
Percentages (%)	80	60	80	80	75

Source : Author's survey field data 2014

4.3. General information about the respondents

The researcher sought the general information about the respondents and the objectivity of the organizations and institutions that facilitate information dissemination on climate change or food security.

4.3.1. Level of education

The study established that 6% (4) of the respondents have primary school education, 31% (19) have secondary school education, 18% (11) have college education, 30% (18) have university education, 10% (6) of the respondents have masters degree, none of the respondents have doctorate education, and 3.3% (2) considered their education as not applicable (Table 2).

Table 2: Level of education of the respondents

Level	Location and frequency					
	Hant Wadaaq	Horseed	Kulmis	Bulo sheikh	Ovearall (district)	Percentage (%)
Primary	1	0	1	2	4	6
Secondary	4	3	5	7	19	31
College	9	1	0	1	11	18
University	1	6	8	3	18	30
Graduate	1	1	3	1	6	10
Doctorate	0	0	0	0	0	0
Not applicable	1	0	0	1	2	

Source : Author's survey field data 2014

4.3.2. Occupation of the sample

The study established that 22.6% of the respondents were teachers, 18.8% were farmers, 33.9 % are employed in NGOs, 1.86% is civil servants, and 39.6% are self employed (Table 3).

Table 3: Occupation of the sample

Occupation	Location and frequency					
	Hant Wadaaq	Horseed	Kulmis	Bulo sheikh	Ovearall (district)	Percentage (%)
Teacher	4	4	3	5	12	22.6
Farmer	3	2	4	1	10	18.8
Employed in NGO	2	3	2	2	9	33.9
Civil servant	1	0	0	0	1	1.86
Self employed	6	2	6	7	21	39.6

Source : Author's survey field data 2014

4.3.3. Organization's effectiveness

The ability of the organizations to meet their objectives in the district is below average (56.25%). Organizations and other institutions that provide information on climate change and food security fall short of their expectations (Table 4).

Table 4 : Organizational effectiveness

Level of effectiveness	Location				
	Hant Wadaaq	Horseed	Kulmis	Bulo shekh	Ovearall (district)
	14	10	6	15	56.25%

Source : Author's survey field data 2014

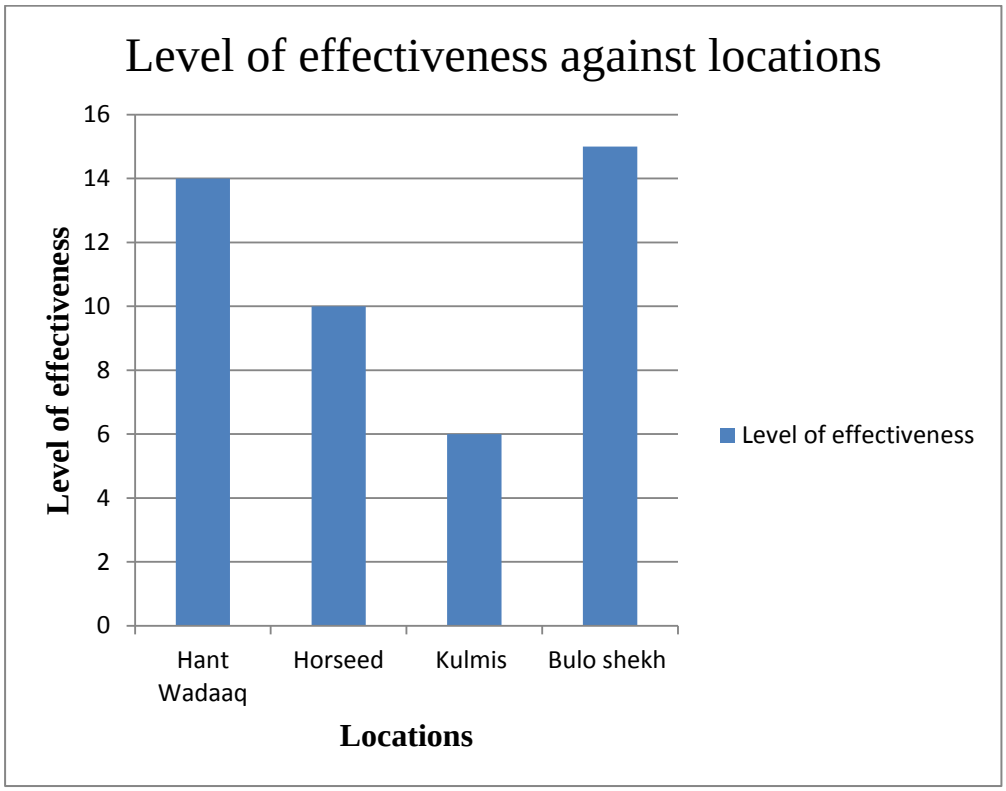


Figure 2 : Level of effectiveness against locations

4.3.4. Information dissemination strategies

Various approaches are used in information dissemination in Jowhar district. These include the radio, mobile phone, television, internet, workshops, conferences, seminars, scholarly meetings, magazines, newspapers, and books. Dependence on radios, television and mobile phone for information on climate change and food security is relatively high compared to scholarly meetings, internet, seminars and

workshops which is low. Sources of information that require readership such as books, newspapers, and magazines are very low.

4.3.5. Television

The study noted that 19 of the respondents indicated information dissemination by TV was very high, 7 indicated high, 8 were moderate, 6 low, and 3 believed that information dissemination by TV was very low (Table 5).

Table 5 : Television

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	7	4	4	0	
Horseed	4	0	2	1	0
Kulmis	4	1	2	2	1
bulo Sheikh	4	2	0	3	

Source : Author's survey field data 2014

4.3.6. Radio

The response showed that information dissemination by radio was very high (23), high (14), moderate (7), low (5), and very low (1) (Table 6).

Table 6: Radio

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	5	4	4	2	0
Horseed	7	0	2	1	0
Kulmis	5	3	1	0	1
Bulo sheikh	6	7	0	2	0
Total	23	`14	7	5	1

Source : Author's survey field data 2014

4.3.7 Mobile phone

Mobile phones are used in information dissemination with 17 people indicating very high, 12 high, 3 moderate, 5 low, and 9 very low (Table 7)

Table 7: Mobile phone

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	3	5	1	2	3
Horseed	6	1	1	1	2
Kulmis	3	5	0	0	2
Bulo sheikh	5	1	1	2	2
Total	**17**	**12**	**3**	**5**	

Source : Author's survey field data 2014

4.3.8. Internet

The study sought to determine the role of the internet in information dissemination. The response was as follows; 8 indicated very high, 5 high, 12 moderate, 8 low, 16 very low (Table 8)

Table 8: Internet

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	3	1	7	1	2
Horseed	0	1	2	2	5
Kulmis	3	2	0	3	4
Bulo sheikh	2	1	3	2	5
Total	8	5	12	8	16

Source : Author's survey field data 2014

4.3.9. Books

Books are used in information dissemination with 3 people indicating very high, 6 high, 9 moderate, 9 low, and 14 very low (Table 9)

Table 9: Books

	Very high	High	Moderate	Low	Very low
Hant Wadaaq	1	1	2	8	3
Horseed	0	3	2	1	4
Kulmis	0	0	4	0	4
bulo sheikh	2	2	1	0	3
Total	3	6	9	9	14

Source : Author's survey field data 2014

4.4.0. Newspapers

Newspapers are used in information dissemination with 2 people indicating very high, 1 high, 7 moderate, 11 low, and 22 very low dependence on newspaper for information (Table 10)

Table 10: Newspaper

Distracts	**Very high**	**High**	**Moderate**	**Low**	**Very low**
Hant Wadaaq	1	0	3	5	6
Horseed	0	0	1	0	7
Kulmis	0	1	1	4	1
Sheikh Oyaaye	1	0	2	2	8
Total	2	1	7	11	22

Source : Author's survey field data 2014

4.4.1. Magazines

The researcher determined the role of magazines in information dissemination. The response was as follows; 0 indicated very high, 2 high, 4 moderate, 9 low, 26 very low (Table 11)

Table 11: Magazines

Distructs	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	1	3	6	7
Horseed	0	1	0	0	7
Kulmis	0	0	1	1	4
Bulo sheikh	0	0	0	2	8
Total	0	2	4	9	26

Source : Author's survey field data 2014

4.4.2. Workshops

The study sought to determine the role of workshop in information dissemination. The response was as follows; 3 indicated very high, 3 high, 6 moderate, 11 low, 21 very low (Table 12)

Table 12: Workshops

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	0	2	2	8
Horseed	0	0	1	6	3
Kulmis	2	2	2	3	2
Bulo sheikh	1	1	1	0	8
Total	3	3	6	11	21

Source : Author's survey field data 2014

4.4.3. Conferences

Conferences are used in information dissemination with 1 person indicating very high, 4 high, 6 moderate, 14 low, and 22 very low (Table 13)

Table 13 : Conferences

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	1	0	6	8
Horseed	0	0	2	4	4
Kulmis	1	2	3	2	4
Bulo sheikh	0	1	1	2	6
Total	1	4	6	14	22

Source : Author's survey field data 2014

4.4.4. Seminars

Seminars are used in information dissemination with 3 people indicating very high, 2 high, 5 moderate, 15 low, and 23 very low (Table 14)

Table 14. Seminars

Districts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	0	1	6	9
Horseed	0	0	2	4	3
Kulmis	2	1	1	3	4
Bulo sheikh	1	1	1	2	7
Total	3	2	5	15	23

Source : Author's survey field data 2014

4.4.5. Scholarly forum

Scholars forum enable experts in the academic circles share information on climate change and food security. The study sought to determine the role of scholarly forum in

information dissemination. The response was as follows; 0 indicated very high, 1 high, 5 moderate, 11 low, 28 very low (Table 15)

Table 15. Scholarly forum

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	0	0	5	11
Horseed	0	0	2	0	7
Kulmis	0	0	2	5	4
Bulo sheikh	0	1	1	1	6
Totals	0	1	5	11	28

Source : Author's survey field data 2014

4.4.6. Information dissemination for general awareness

The study sought to determine whether information dissemination was done for general awareness. The response was as follows; 22 indicated very high, 11 high, 8 moderate, 8 low, 6 very low (Table 16)

Table 16. Information for general awareness

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	8	3	4	0	1
Horseed	5	1	0	3	1
Kulmis	3	4	1	3	4
Bulo sheikh	6	3	3	2	0
Total	22	11	8	8	6

Source : Author's survey field data 2014

4.4.7. Information for understanding

The study sought to determine whether information was disseminated for understanding. The response was as follows; 2 indicated very high, 12 high, 11 moderate, 10 low, 12 very low (Table 17)

Table 17.Information for understanding

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	2	3	5	2	4
Horseed	0	3	2	1	1
Kuimis	0	2	2	2	5
Bulo sheikh	0	4	2	5	2
Total	2	12	11	10	12

Source : Author's survey field data 2014

4.4.8. Information that leads to taking action

The researcher sought to determine whether the disseminated information could enable the stakeholders take action. The response was as follows; 3 indicated very high, 6 high, 11 moderate, 7 low, 16 very low (Table 18)

Table 18. Information that leads to taking action

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	0	4	2	5
Horseed	1	1	3	0	3
Kuimis	1	2	2	3	3
Bulo sheikh	1	3	2	1	5
Total	3	6	11	7	16

Source : Author's survey field data 2014

4.4.9. Information dissemination for entertainment

The study noted that 1 of the respondents indicated that chances that information could be for entertainment were very high, 2 high, 6 moderate, 15 low, and 16 very low (Table 19)

Table 19. Information for entertainment

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	0	0	1	8	7
Horseed	0	1	2	3	2
Kulmis	1	1	0	0	1
Bulo sheikh	0	0	3	4	6
Total	1	2	6	15	16

Source : Author's survey field data 2014

4.5.0. Role of the disseminated information on climate change

The role of information dissemination could be to help in adaptation, mitigation, relocation and for embracing international requirements on reduction of greenhouse emissions. The study established that information for adaptation is high with the frequency of 22, information dissemination that helps the residents relocate is moderate, information for mitigation measures is high with a frequency of 24, information for mitigation measures is high at 23, and a high frequency of 20 in the adoption of the strategies to reduce on greenhouse emissions. Farmers and the organizations working in the district require information that will guide them into achieving their objectives. Adaptation in this case refers to the development of new breeds that cope with the climatic changes. Lack of information on mitigation and

adaptation measures may lead to high levels of relocation and poor adoption of the international protocols on climate change.

4.5.1. Adaptation

The frequency for adaptation being very high is 10, high is 22, moderate 7, low is 4, and 4 is very low (Table 20)

Table 20. Role of the disseminated on adaptation

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	2	9	3	1	0
Horseed	2	2	2	1	1
Kulmis	4	2	0	2	1
Bulo sheikh	2	9	2	0	2
Total	10	22	7	4	4

Source : Author's survey field data 2014

4.5.2. Relocation

The frequency for relocation being very high is 9, high is 24, moderate 13, low is 6, and 0 is very low (Table 21)

Table 21. Role of the disseminated on Relocation

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	4	6	6	0	0
Horseed	0	4	1	3	0
Kulmis	3	6	2	2	0
Bulo sheikh	2	8	4	1	0
Total	9	24	13	6	0

Source : Author's survey field data 2014

4.5.3. Mitigation

The frequency for mitigation being very high is 15, high is 23, moderate 3, low is 2, and 8 is very low (Table 22)

Table 22. Role of the disseminated on Mitigation

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	4	11	0	1	1
Horseed	4	2	2	0	2
Kulmis	3	5	1	0	2
Bulo sheikh	4	5	0	1	3
Total	15	23	3	2	8

Source : Author's survey field data 2014

4.5.4. Planting trees

Information dissemination enabled the residents of the district plant trees. The response was indicated as follows; 15 very high, 23 high, 3 is moderate, 2 is low and 8 is very low(Table23)

Table 23. Role of the disseminated on Planting trees

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	4	11	0	1	1
Horseed	4	2	2	0	2
Kulmis	3	5	1	0	2
Bulo sheikh	4	5	0	1	3
Total	15	23	3	2	8

Source : Author's survey field data 2014

4.5.5. Reduction of greenhouse emissions

Information dissemination enables the residents and organizations to come up with strategies that reduce on greenhouse emissions. The study noted that 10 respondents believe that the role information dissemination in reducing greenhouse emissions is very high; 20 is high, 6 is moderate, 9 low, and 9 very low (Table 24).

Table 24. Role of the disseminated on Reduction of greenhouse emissions

Distracts	Very high	High	Moderate	Low	Very low
Hant Wadaaq	3	8	2	1	2
Horseed	2	2	2	3	2
Kulmis	1	8	0	1	2
Bulo Sheik	4	2	2	4	3
Total	10	20	6	9	9

Source : Author's survey field data 2014

4.5.6. Factors of food security

Information dissemination approaches impact on specific components of food security. For instance, information on the availability of food enables the farmers and the residents to grow more food or seek for alternative sources. In the study, it is indicated that the majority of the residents strongly disagree that information disseminated plays the role on food availability. They also disagree that the information is vital in food accessibility. This means that the residents believe that food availability is not dependents on the channels used in information dissemination.

4.5.7. Food availability

The study noted that 24 of the respondents strongly disagree that information dissemination leads to food availability, 8 disagree, 8 are not aware, 14 agree, 3 strongly agree (Table 25)

Table 25. Food availability

Distracts	Strongly disagree	disagree	Not aware	agree	Strongly agree
Hant Wadaaq	10	2	3	1	0
Horseed	3	2	4	0	2
Kulmis	6	1	1	6	1
Bulo sheikh	5	3	0	7	0
Total	24	8	8	14	3

Source : Author's survey field data 2014

4.5.8. Food accessibility

The study noted that 5 of the respondents strongly disagree that information dissemination leads to food accessibility, 27 disagree, 9 are not aware, 11 agree, 1 strongly agree (Table 26).

Table 26. Food accessibility

Distracts	Strongly disagree	Disagree	Not aware	Agree	Strongly agree
Hant Wadaaq	4	9	1	2	0
Horseed	0	5	2	3	0
Kulmis	1	6	2	4	0
Bulo sheikh	0	7	4	2	1
Total	5	27	9	11	1

Source : Author's survey field data 2014

4.5.9. Food safety

Food safety is also critical in food security. The researcher observed that 13 of the respondents strongly disagree that information dissemination helps in food safety, 13 disagree, 13 are not aware, 9 agree, 2 strongly agree (Table 27)

Table 27.Food safety

Distracts	Strongly disagree	Disagree	Not aware	Agree	Strongly agree
Hant Wadaaq	4	6	4	1	1
Horseed	2	2	2	5	0
Kulmis	4	1	3	1	1
Bulo sheikh	3	4	4	2	0
Total	13	13	13	9	2

Source : Author's survey field data 2014

4.6.0. Food reliability

Table 28 below indicates the response of the residents on food reliability. The table indicates that 20 of the respondents strongly disagree that information dissemination leads to food reliability, 15 disagree, 6 are not aware, 5 agree, 3 strongly agree (Table 28)

Table 28.Food reliability

Distracts	Strongly disagree	Disagree	Not aware	Agree	Strongly agree
Hant Wadaaq	5	9	1	1	0
Horseed	1	3	0	3	2
Kulmis	5	1	1	1	1
Bulo sheikh	9	2	4	0	0
Total	20	15	6	5	3

Source : Author's survey field data 2014

4.6.1. Food affordability

The response of the residents on food affordability was presented in the table 29 below. The table indicates that 20 of the respondents strongly disagree that information dissemination helps in food affordability, 15 disagree, 7 are not aware, 12 agree, 2 strongly agree (Table 29)

Table 29. Food affordability

Distracts	Strongly disagree	Disagree	Not aware	Agree	Strongly agree
Hant Wadaaq	11	3	1	0	1
Horseed	2	2	1	6	1
Kulmis	6	3	3	2	0
Bulo sheikh	1	7	2	4	0
Total	20	15	7	12	2

Source : Author's survey field data 2014

4.6.2. Awareness of food security

The researcher sought to establish whether the residents had awareness on food security. The response indicated that 25 strongly disagree, 9 disagree, 6 are not aware, 5 agree, and 3 strongly agree (Table 30)

Table 30. Awareness of Food security

Distracts	Strongly disagree	Disagree	Not aware	Agree	Strongly agree
Hant Wadaaq	10	4	1	1	0
Horseed	4	1	2	1	1
Kulmis	3	1	3	3	0
Bulo sheikh	8	3	0	0	2
Total	25	9	6	5	3

Source : Author's survey field data 2014

4.6.3. Analysis of the results

Analysis of the results looked at the occupation of the respondents, information dissemination approaches, role of information dissemination on climate change and food security. Analysis sought to establish the connection between the data and the objectives of the study. The analysis narrowed down to the specific items that answer or expound on what the research question demanded. The analysis was done by finding the mean, standard deviation, significance, t-value, and degree of freedom of the domains of the variables.

4.6.4. Occupation of the respondents

Occupation of the respondents was vital to the research because it tells the level of knowledge of the respondents about the subject of the study. In the current situation,

39.6% of the respondents are self-employed and the civil servants are 1.86%. Farmers are 18.8. This means that few of the residents of the district can directly implement the issues related with climate change and foods security. Furthermore, as indicated in the objectivity of the organizations in the district, they fall below average in meeting the objectives. The overall objectivity of the organizations is at 46.67% (Table 4). The researcher noted that 33.9 % of the respondents may be working in the NGOs, but their effect on climate change and food security is not significant (Table 31).

4.6.5. Role of the disseminated information on factors of climate change

The district receives information on climate change. This is used to achieve a number of objectives: Reduction of greenhouse emissions =3.64, planting trees is one of the mitigation measures whose information utility is3.69, relocation = 3.69 and adaptation measures are at 2.70 (Table 33).

Table 31. Role of the disseminated information on factors of climate change

Activities	Use of the disseminated information on climate change					Mean
	Very high	High	Moderate	Low	Very low	
Adaptation	10	22	7	4	4	3.64
Relocation	9	24	13	6	0	3.69
Planting trees (mitigation)	15	23	3	2	8	3.69
Reduction of the greenhouse emissions	10	20	6	9	9	3.02

Source : Author's survey field data 2014

4.6.6. Role of information dissemination approaches on Factors of food security

The majority of the respondents indicated a strong disagreement on the availability of food. = 2.37, Food accessibility is at 2.55, reliability of food supply = 2.22, food safety = 2.10, affordability = 2.30 and awareness about food security = 2.00 (Table 34)

Table 32. Role of information dissemination

	Factors of food security					Mean
	Strongly disagree	disagree	Not aware	agree	Strongly agree	
Availability	24	8	8	14	3	2.37
Accessibility	5	27	9	11	1	2.55
Food safety	13	13	13	9	2	2.22
Reliable supply	20	15	6	5	3	2.10
Affordability	20	15	7	12	2	2.30
Awareness of food security	25	9	6	5	3	2.00

Source : Author's survey field data 2014

4.6.7. Factors of food security

The ideal food security situation is rated 5. The factors of food security include: availability (2.37), accessibility (2.55), food safety (2.22), reliability (2.10), affordability (2.30) and awareness (2.00) as shown in the figure below.

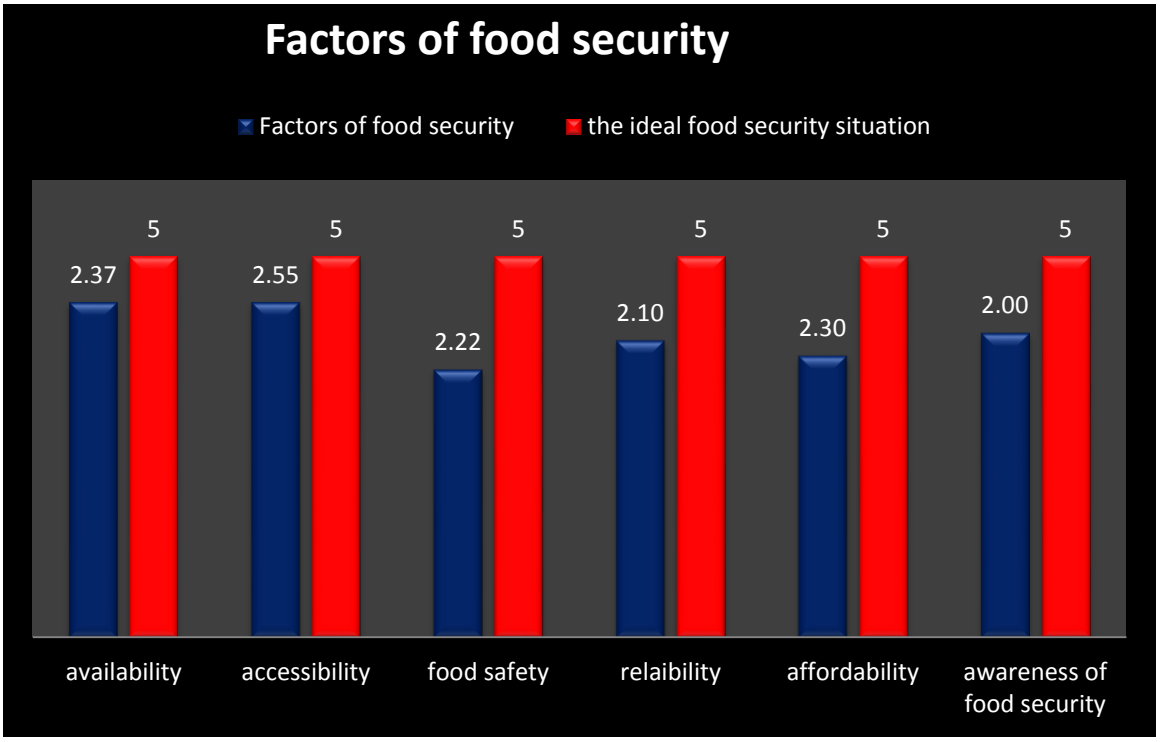


Figure 3. Role of information on Factors of food security

Source : Author's survey field data 2014

4.6.8. Two – Way between subjects ANOVA

Information disseminated could have a role on climate change independently, food security independently, or role on climate change and food security jointly. In this case, food security and climate change are the main factors. To invoke the Two-way ANOVA tests on the effect information dissemination on climate change, effect of information dissemination methods on climate change, and effect of information dissemination on climate change and food security as joint factors, the study considered the following parameters.

4.6.9. Main effect1: information dissemination on climate change

Levels of the main effect: Adaptation mitigation measures, relocation, and reduction of greenhouse emissions. Adaptation measures (mean = 3.64), relocation and migration because of climate change (mean = 3.69) mitigation measures such as planting of trees (mean = 3.69), and reduction of greenhouse emissions (mean = 3.02) (Table 33).

Table 33. Main effect1: information dissemination on climate change

Activities	Mean	Standard deviation
Adaptation	3.64	2.949
Relocation	3.69	3.019
Planting trees (mitigation)	3.69	3.050
Reduction of the greenhouse emissions	3.02	2.459
Average mean of main effect 1	3.18	2.870

Source : Author's survey field data 2014

4.7.0. Main effect 2: information dissemination on food security

Levels of the main effect are indicated as, food availability (mean2.37 , std dev1.916); accessibility (mean 2.55, std dev 2.075); food safety (mean 2.22 , std dev 1.740); reliability of food supply (mean 2.10 , std dev 1.705), affordability (mean 2.30, std dev 1.851);

Awareness of food security (mean 2.00, std dev 1.601). The mean of the main factor of the role of information dissemination on food security is (mean 2.257, , std dev1.815) (Table 34)

Table 34. Main effect 2: information dissemination on food security

	Mean	Standard deviation
Availability	2.37	1.916
Accessibility	2.55	2.075
Food safety	2.22	1.740
Reliable supply	2.10	1.705
Affordability	2.30	1.851
Awareness of food security	2.00	1.601
Mean of the main factor (M_B)	2.257	1.815

Source : Author's survey field data 2014

4.7.1. Main effect 1. Climate change

Given M_A = 3.18 (Table 13), M_B = 3.99 (Table 14), n_A is the number of respondents in main effect1 and main effect2 = 60, and Grand mean (M_G) of the two main factors =3.59. M_G = 3.59 (The mean of M_A and M_B). The t- value was 35.548 and p-value was <0.000 with a degree of freedom of 46. The upper interval was 9. 3 and the lower interval was 8.3 (Table 37)

4.7.2. Main effect2: food security

Given M_A = 3.18 (Table 13), M_B = 3.99 (Table 14), n_A is the number of respondents in main effect1 and main effect2 = 60, and M_G = 3.59 (The mean of M_A and M_B). The t-value was 35.759; p-value was < 0.000 with 46 degrees of freedom. The upper interval is 0.86, and the lower interval is 0.77 (Table 37)

4.7.3. Joint effect: information dissemination on food security and climate change

Given M_A = 3.18 (Table 13), M_B = 3.99 (Table 14), n_A is the number of respondents in main effect1 and main effect2 = 60, and M_G = 3.59 (The mean of M_A and M_B). T value = -0.428 degree of freedom = 12, p- value< 0.001, upper interval 15.43 and lower interval was -22.97 (Table 37).

Table 35: Test of the variables

	Test Value					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Climate change	35.548	46	0.000	8.865	8.38	9.36
Food security	35.759	46	0.000	0.815	0.77	0.86
Joint effects of information dissemination on food security and climate change	-0.428	12	0.001	-3.76923	-22.9711	15.4326

Source : Author's survey field data 2014

CHAPTER 5

DISCUSSION, CONCLUSION, AND RECOMMENDATION

The analysis led to the conclusions and recommendations on the role of information dissemination approaches in climate change and food security. The study outlines the findings of the study and the insight on the appropriate information dissemination approaches. This was done by establishing the context of Jowhar District and linking it to the global conceptualizations of food security and climate change.

The study indicated that 6% (4) of the respondents have primary school education, 31% (19) have secondary school education, 18% (11) have college education, 30% (18) have university education, 10% (6) of the respondents have masters' degree, none of the respondents have doctorate education, and 3.3% (2) considered their education as not applicable.

Factors of food security of the study included accessibility (Mean= 2.55), availability (mean= 2.37), food safety (mean= 2.22) reliability of food supply (mean = 2.10), affordability of the food stuff (mean = 2.30), and awareness of food security (Mean = 2.00).

The major information dissemination channels in the district are radio (mean = 4.06), TV (mean = 3.77), mobile phone (Mean = 3.82), scholarly meetings (Mean = 1.53), internet (Mean = 2.61), books (Mean = 2.68), newspapers (Mean = 2.7), magazines (mean= 1.5), workshops (mean= 2), conferences (Mean = 1.89), seminar (mean= 2.39).

The study considered the role of information dissemination on climate change basing on the following components; Adaptation measures (mean = 2.70), relocation and

migration because of climate change (mean = 3.69) mitigation measures such as planting of trees (mean = 3.09), and reduction of greenhouse emissions (mean = 3.24).

5.1. Discussion

The response rate in the study was 75%. This indicates that the sample was receptive to providing the required information. The information was in-depth to cover the core objective of the study. The first objective sought to establish the approaches used in information dissemination in Jowhar District of Somalia. The respondents were literate and therefore they could read the questionnaires and provide appropriate responses. They could also relate the components of the subject of study: information dissemination, climate change, and food security (Sarrat, 2010).

The study found that information dissemination through the radio was very high (4.06), followed by the mobile phone (3.82) and the television (3.77). Other forms of delivering information on climate change and food security included, internet = 2.61, books = 2.68, newspapers = 2.7, magazines = 1.5, workshops = 2, conferences = 1.89, seminar = 2.39, scholarly for a = 1.53. Information via scholarly fora and magazines was the least. This is in tandem with the response that the information is given for general awareness. This is viewed in terms of the public education. Books, seminars, scholarly gatherings, and symposiums on climate change and food security are insignificant in the district. The respondents preferred the use of radio for communication. There is a positive trend in the adoption of the internet and mobile phones in information dissemination as compared to the traditional means of communication such as books. The problem in this approach is lack of in-depth

understanding of the concepts and the methods of dealings with climate change and food security (Senior *et al*, 2013).

The second objective was to establish the role of information dissemination on food security and climate change. The study noted that information dissemination approaches had a significant effect on food security and climate change. It was also observed that climate change affects food security. Therefore having information on food security may not be enough unless Jowhar also establishes plans of dealing with climate change. On the other hand, information on climate change alone will not guarantee food security. A joint approach was that the residents of the district are informed of the climate change and food security must be considered. Moss (2009) holds the view that information on climate change must be tailored towards the factors of food security and the related economic factors. Institutions must develop an information framework that enhances general and technical knowhow of effects of climate change from the food security components. The study observed that Jowhar did not use systems of communicating the technical information to the residents and means of getting information from the residents. Information from the radio and television is less interactive as compared to scholarly conferences, workshops, and seminars. The residents also do not study about food security and climate change. This was indicated by the low number of people who use books as source of information on the subject. Communication approaches must look at the public education and the professional and specific information methods that target institutions (Senior *et al*., 2013).

Information dissemination that leads to adaptation methods on climate change is moderate (mean =2.7). information that is geared towards migration (mean = 3.69) mitigation measures such as planting trees (3.09), and reduction of greenhouse emission (mean = 3.24) is considered as high.

According to Mukhebi (2009), information on food security ought to consider vital components such as accessibility, safety, reliability, affordability, and awareness about food security. In this light, there is food insecurity if the food is available but harmful to the human health or the food is too expensive. The response in the study observed a strong disagreement on the availability of food and the knowledge about food security. This agreed with the view that food aid (mean = 3. 26) was a critical source of foodstuff in the district (Mukhebi, 2009).

5.2. Conclusion

The first conclusion is based on the first objective: on information dissemination approaches. The study concludes that radio, TV, and mobile phones are the major channels of communication in Jowhar district. However, the information disseminated is general and may not have significant impact on mitigation measures, adaptation, and reduction of the greenhouse emissions. According to Maxwell *et al*. (2012), this is the reason for the cases of food insecurity and famine in the region.

The next conclusion is based on the second objective: role of information on climate change and food security. From the information that p value < 0.001 for the effects on

food security and climate change, it is concluded that the role of information dissemination on food security and climate change is significant. It is also concluded that climate change affects food security. This shows that information disseminated on food security affects the resident's views on climate change. Similarly, the information disseminated on climate change affects food security.

The conclusion based on the third objective, institutional factors is that the organizations and the institutions that provide information on climate change and food security did not meet their objectives. This includes providing information for general knowledge and strategic for mitigation, adaptation, and management of food security situation.

5.3. Recommendation

The study recommends the adoption of approaches that provide more specific information about climate change and food security. It is noted that the information disseminated focused on general knowledge about food security and climate change. This is also affirmed by the means that most residents get information on the subject: radio, TV, and mobile phone. For effective and professional objectives, workshops, seminars, and scholarly forums discussing the details of food security and climate change will provide long-term solution to the situation. Given that Jowhar has been accessing information on climate change and food security yet famine is still prevalent, the study makes two recommendations on this particular issue. First is to change the content and the psychosocial means of communication. For instance, the study established that the content was for general information. The second recommendation

is to change the means and the communication approaches. Most respondents indicated that they relied on radios, TV, and mobile phones for information on climate change and food security. The study recommends the use of seminars, workshops, conferences, and scholarly meetings targeting farmers and relevant professionals.

The study also recommends a tactical approach that deals with the immediate issues such as provision of drought tolerant crops to farmers, employment of agricultural extension officers, an increase of the public education on climate change and food security. The strategic approaches will target the long terms roles of information dissemination. This will involve targeting the educated people of the district through seminars, workshops, and scholarly meetings. Use of the newspapers, and magazines should also be encouraged. This will provide wide scope of readership and the information may be tailored from general to specific.

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APPENDICES

APPENDIX I. QUESTIONNAIRE

Section A: Bio Data

Please fill out the following particulars:

Generic Questions

1. What is your level of Education?

Primary ☐

Secondary ☐

College ☐

University ☐

Graduate ☐

Doctorate ☐

Not applicable ☐

2. What is your occupation?

Teacher ☐

Farmer ☐

Employed in NGO ☐

Civil servant ☐

Self employed ☐

Other (please specify)**.....**

3. For how long have you been in the occupation?

A. 0 – 2 years ☐

B. 3 – 5 years ☐

C. More than 5 years ☐

4. If you work in an NGO or State Corporation, state its main objective

……

……

6. Do you think the organization lives up to its objectives?

A. Yes ☐

B. No ☐

C. Not sure ☐

SECTION B: INFORMATION DISSEMINATION STRATEGIES

1. Information dissemination is critical in the knowledge about food security and climate change. What is your level of dependence on the following media channels for information; likert-scale options have been assigned values 1 to 5 (1 for strongly disagree, 2 for disagree, 3 for not aware, 4 for agree and 5 for strongly agree). Tick where appropriate.

		Very high	High	Moderate	Low	Very low
1.	TV	☐	☐	☐	☐	☐
2.	Radio	☐	☐	☐	☐	☐
3.	Mobile Phone	☐	☐	☐	☐	☐
4.	Internet	☐	☐	☐	☐	☐
5.	Books	☐	☐	☐	☐	☐
6.	News papers	☐	☐	☐	☐	☐
7.	magazines	☐	☐	☐	☐	☐
8.	Workshops	☐	☐	☐	☐	☐
6.	Conferences	☐	☐	☐	☐	☐
7.	Seminar	☐	☐	☐	☐	☐
8.	Scholarly fora	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

2. What is the Likelihood that the information on climate change and food security will be used for the following reasons

		Very high	High	Moderate	Low	Very low
1.	General Awareness	☐	☐	☐	☐	☐
2.	Understanding	☐	☐	☐	☐	☐
3.	Take action	☐	☐	☐	☐	☐
4.	For entertainment	☐	☐	☐	☐	☐
5.	The information has no purpose	☐	☐	☐	☐	☐

3. What can you say about media channels in the Jowhar district?

_____

_____

_____

SECTION C: CLIMATE CHANGE

1. Climate change affects may aspects of human life. How do you rate its effect on the following aspects? The extent of the effect is represented by the following likert scale options (1 for very high, 2 for high, 3 for moderate, 4 for low and 5 for very low). Tick where appropriate.

		Very high	High	Moderate	Low	Very low
1.	Agriculture	☐	☐	☐	☐	☐
2.	Weather seasons and patterns	☐	☐	☐	☐	☐
3.	Amount of rainfall	☐	☐	☐	☐	☐
4.	Livestock	☐	☐	☐	☐	☐
5.	Vegetation	☐	☐	☐	☐	☐
6.	Livestock	☐	☐	☐	☐	☐

2. Information on climate change is used in any ways. How do you rate its use in the following ways? The extent of the utility is represented by the following likert scale options (1 for very high, 2 for high, 3 for moderate, 4 for low and 5 for very low). Tick where appropriate.

		Very high	High	Moderate	Low	Very low
1.	Develop new breeds to suite the new climate (adaptation)	☐	☐	☐	☐	☐
2.	People have migrated to other regions	☐	☐	☐	☐	☐
3.	Planting trees (mitigation)	☐	☐	☐	☐	☐
4.	Reduced carbon emissions (mitigation)	☐	☐	☐	☐	☐

3. How often do you hear about climate change in the media channels in the Jowhar District?

More than twice a day ☐

Once a day ☐

Once a week ☐

Twice a week ☐

Fortnightly ☐

Monthly ☐

Never heard about climate change ☐

4. How else do you think information on climate change has been used in the Jowhar District?

_____

_____

5. What is your general view about climate change?

_____

_____

_____

SECTION D: FOOD SECURITY

1. How do you consider the following aspects about food in the Jowhar District; the likert-scale options have been assigned values 1 to 5 (1 for strongly disagree, 2 for disagree, 3 for not aware, 4 for agree and 5 for strongly agree). Tick where appropriate.

		Strongly Disagree	**Disagree**	**Not Aware**	**Agree**	**Strongly Agree**
1.	Food is available	☐	☐	☐	☐	☐
2.	Food is Accessible	☐	☐	☐	☐	☐
3.	Food is in good conditions for use	☐	☐	☐	☐	☐
4.	There is continuous supply of food in the region	☐	☐	☐	☐	☐
5.	The cost of food is manageable	☐	☐	☐	☐	☐
6.	People know about food security	☐	☐	☐	☐	☐
7.						

2. How often do you hear about food security in the media channels in the Jowhar District?

More than twice a day ☐

Once a day ☐

Once a week ☐

Twice a week ☐

Fortnightly ☐

Monthly ☐

Never heard about climate change ☐

3. Which food stuffs are imported to Jowhar District?

   …….

   …….

   …….

   ……..

4. Which food stuffs are exported from Jowhar District?

   ……

   ……

   …….

   ……

5. How do you consider the following to be the source of food in Jowhar District; the likert-scale options have been assigned values 1 to 5 (1 for strongly disagree, 2 for disagree, 3 for not aware, 4 for agree and 5 for strongly agree). Tick where appropriate.

		Strongly Disagree	Disagree	Not Aware	Agree	Strongly Agree
8.	Subsistence farming	☐	☐	☐	☐	☐
9.	Mechanized farming	☐	☐	☐	☐	☐
10.	Live stock	☐	☐	☐	☐	☐
11.	Food Aid	☐	☐	☐	☐	☐
12.	Imports	☐	☐	☐	☐	☐
13.	Other regions of Somalia	☐	☐	☐	☐	☐
14.						

6. What is your general view about food security?

_____

_____

_____

INTERVIEW SCHEDULE

The interview structure is open ended and the response may be recorded and transcript or short notes can be taken during the interview. The schedule will seek response from NGO projects managers, Climate change experts, and Food security experts in the Jowhar District

1. Do you think your staff and colleagues have good knowledge on climate change and food security?

_____

_____

_____

2. How are the media channels effective in the Jowhar District

_____

_____

_____

3. Describe the situation of food security in Jowhar District

_____

_____

_____

4. What is the attitude of the people in Jowhar District towards information on climate change and food security?

_____

_____

_____

5. In your opinion, how has the information on climate change and food security helped the people of Jowhar District?

_____

_____

_____

6. What communication channels does your organization use on climate change, food security and the related subjects?

i. _____

ii. _____

iii. _____

iv. _____

v. _____

(Other descriptions)_____

_____

_____

Thank you for sparing your valuable time to complete this questionnaire. The information you provided will be treated with utmost confidentiality; only to be used for research purposes.

APPENDIX II. DOCUMENT ANALYSIS SHEET

The data sheet will collect information on the extent to which the entities in the Jowhar District deal with CLIMATE CHANGE OR FOOD SECURITY

		Location	**State the number of entities**	**State the number of entities dealing with**	**State the number of entities dealing with**	**Objectivity of the entity**
1.	NGOs	i. Horsed, ii. Hantiwadag, iii. Shekh Oyaye, iv. Kulmis,	i. ☐ ii. ☐ iii. ☐ iv. ☐ v.	☐	☐	Very High ☐ High ☐ Moderate ☐ Low ☐ Very low ☐
2.	Government	i. Horsed, ii. Hantiwadag, iii. Shekh Oyaye,	i. ☐ ii. ☐ iii. ☐	☐	☐	Very High ☐

	corporations	iv. Kulmis	iv. ☐			High ☐ Moderate ☐ Low ☐ Very low ☐
3.	Personal initiatives and foundations	i. Horsed, ii. Hantiwadag, iii. Shekh Oyaye, iv. Kulmis	i. ☐ ii. ☐ iii. ☐ iv. ☐	☐	☐	Very High ☐ High ☐ Moderate ☐ Low ☐ Very low ☐
4.	Others	i. Horsed, ii. Hantiwadag,	i. ☐ ii. ☐ iii. ☐	☐	☐	Very High ☐

		iii. Shekh Oyaye, iv. Kulmis	iv. ☐			High ☐ Moderate ☐ Low ☐ Very low ☐

APPENDIX III. Map of Somalia

APPENDIX III. Maps of the four regions in Jowhar district

APPENDIX IV: Table 2.4.4. Information dissemination channels

Information channel	Components	Target audience	Information dissemination aspects
Media	Print	The literate audience, information in text form and images	Awareness and partially understanding
	TV	Audio-visual content, mainly. Some parts and people of Jowhar district may not get the information	Awareness and partially understanding
	Internet Social media Organizational Websites Databases	Audiovisual, text, and images. Only possible to the few people who may access the internet	Awareness and partially understanding
	Mobile phone	Text and voice. The message is limited	Awareness and partially understanding
	Radio	Voice. The majority of the population	Awareness and partially understanding
Non-Media	Seminars	Professionals, leaders, scholars, Organizations, Governments.	Awareness, understanding , and action
	Conferences	Professionals, leaders, scholars, Organizations, Governments.	Awareness, understanding , and action
	Workshops	Professionals, leaders, scholars, Organizations, Governments	Awareness, understanding , and action
	Scholarly fora	Professionals, leaders, scholars, Organizations, Governments.	Awareness, understanding , and action

Figure 4. Information dissemination approaches