EFFECT OF FARMER'S PARTICIPATION AND PERCEPTION OF NGO INTERVENTIONS ON HOUSEHOLD FOOD SECURITY IN KENYA

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DOCTOR OF PHILOSOPHY

(Development Studies)

JOMO KENYATTA UNIVERSITY

OF

AGRICULTURE AND TECHNOLOGY

2024

Effect of Farmer's Participation and Perception of NGO Interventions on Household Food Security in Kenya

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A Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy in Development Studies of the Jomo Kenyatta University of Agriculture and Technology

2024

DECLARATION

This thesis is my original work and has not been submitted for a degree in any other University

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This thesis has been submitted for examination with our approval as the University Supervisors

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DEDICATION

This never-ending conundrum of a process of pursuing a Ph.D is dedicated to my wife (Anne) and children (Nyambane, Brian and Kerubo) who have always been a source of my strength and encouragement. My children have literally grown through this process and hopefully learned to be patient and staying true to their goals. I give special thanks to my Dad (Mzee Christopher Onyancha) and my Mum (Hellena Nyanchoka) for always reminding me that learning is a life-long process.

ACKNOWLEDGMENT

I give thanks my Almighty Father in Heaven who is always abounding in Love and never gives up on me. I owe sincere and special gratitude to my mentors Prof. Florence Ondieki-Mwaura and Prof. Lawrence Njoroge for sharpening my thought process, tirelessly reading and critiquing my work and not giving up on me, even when I was completely disillusioned. Additionally, this process would have not been possible without farmers in Yatta Sub County who openly and enthusiastically shared their experiences and aspirations. They are indeed experts per excellence! I hope that this work will in one way or another strengthen their determination and resolve to improve their household food security. I recognize the support of Sylvester Ndeto and Pastor Cosmus Mwanzia from Ngangani, Yatta Sub County for opening doors for me in their community. I give special thanks to all NGOs working in Yatta Sub County and for their determination to resolve food security. Lastly, I thank a team of my friends who spared their valuable time to read through my work.

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ACRONYMS AND ABBREVIATIONS

AFFA	Agriculture Fisheries Authority Act
AGOA	Africa Growth and Opportunity Act
AGRA	Alliance for Green Revolution in Africa
ASALs	Arid and Semi-Arid Lands
CA	Conservation Agriculture
CAADP	Comprehensive Africa Agriculture and Development Program
CFS	Commission of Food Security
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Centre
CSO	Civil Society Organization
EBA	European Union's everything but Arms
EU	European Union
FAD	Food Availability Decline
FAO	Food and Agricultural Organization
FFS	Farmer Field School
GDP	Gross Domestic Product
GOK	Government of Kenya
HIV	Human Immune Virus

IAAH	International Alliance against Hunger
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPR	International Food Policy Research Institute
IMF	International Monetary Fund
IRDP	Integrated Rural Development Program
KFSSG	Kenya Food Security Steering Group
LFA	Logical Framework Approach
MDGS	Millennium Development Goals
NAADS	National Agriculture Advisory Extension services.
NEPAD	New Partnership for Africa Development.
NGOs	Non-Governmental Organizations
PBR	Payment by Results
PME	Program Monitoring and Evaluation
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa
TORs	Terms of Reference
UK	United Kingdom

UN	United Nations
UNDP	United Nations Development Program
WFP	World Food Program
WFS	World Food Summit

DEFINITION OF OPERATIONAL TERMS

Conditions exerted by funding agencies In order to support farmers, NGOs received funding from other agencies. These funds were provided with conditions that were mirrored in the interventions undertaken by NGOs. Specifically, this study examined conditions such as duration of funding (with less than five years considered short) predetermined interventions usually promoted by funding agencies and standardized results outlined in funding tenders to explore whether they had a mediating effect on farmers' participation, perceptions and household food security.

Participation The term participation is used in this study to mean various efforts made by NGOs to give farmers a chance to make own independent decisions and choices regarding their needs identification, selection of interventions that are relevant to them, involvement in implementation, monitoring and gathering feedback. It allows farmers to make own decisions and be on the driver's seat and chart their future regarding household food security.

Farmer participation Farmers participation focuses on ways in which NGOs engage and involve farmers in assessing their needs, selecting interventions and formulating food security interventions. In this study, participation of farmers is measured by farmers' involvement in needs assessment, selection of interventions, implementation and monitoring of food security interventions.

Farmer perceptions Farmers often have and/or develop various worldviews, beliefs and attitudes that play a critical role on how they interact with NGOs and conceive interventions. These are either inherent or formed in the course of interacting with NGOs. This study focused on farmers' perceptions regarding effectiveness of interventions such as rainwater harvesting, drought tolerant crops, extension services, input supplies, horticultural production, soil fertility enhancement and livestock production commonly applied by NGOs. Effectiveness is measured on whether or not the intervention in the opinion of the farmers improves household food security in terms of income, food yields and reduction in reliance on relief. Effectiveness of interventions assesses farmers' views on technologies used, affordability, labour investment, food preferences, ownership and access.

Food Security This is defined as a situation in which members of a household, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and health life. This study looks at household food security from the angle of availability (food production, reduction in dependence on food relief) and access (enhancing household capacities to generate sufficient incomes to meet their food needs).

Household Food Security This study looks at household food security from the perceptive that a given household in their opinion have sufficient preferred food supply from own production that will take them from one season to another and/or

what they consider enough income that enables them to purchase preferred food. It also means that households because of either having sufficient income or food from own production are no longer dependent on outside food supplies such as relief aid.

NGOs interventions NGO interventions highlight the principal activities and actions undertaken by NGOs to promote household food security. In this study, NGOs interventions only include activities undertaken by NGOs to increase household food production and incomes such rainwater harvesting (i.e. dams, water pans, farm ponds, terracing), promotion of drought tolerant crops (maize, beans, sorghum, green grams, cowpeas, pigeon peas, millet), soil fertility enhancement (use of fertilizers and organic mature), input supplies (tools and seeds), livestock production, horticulture production and extension services in Yatta Sub-County aimed at securing household food security.

NGOs NGOs are variously defined depending on their history and origin. They are seen as non-profit, voluntary and civil society organizations that work as partners, catalyst and implementers of both humanitarian and development work. NGOs in this study include a diverse range of non-profit organizations that range from international, national, Faith-Based, Charities, trustees and Community-Based Organizations that are registered under various registration regimes such as trustees, under NGO Coordination Bureau and Companies Act (Cap 108) and are working with farmer groups to enhance food security in Yatta Sub County.

ABSTRACT

This study investigates the effect of farmers' participation and perceptions of NGO interventions on household food security in Yatta Sub County in Machakos County, Kenya. Recurrent household food insecurity in Kenya affects approximately ten million people annually, especially those living in arid and semi-arid areas like Yatta Sub County which face frequent droughts, water shortage, degraded soils and crop failure often related to effects of climate change. NGOs work with farmer groups to address household food security in Yatta Sub County through a myriad of interventions. This study sought to identify types of interventions undertaken by NGOs, investigate the extent to which farmers' participation in NGOs interventions affect household food security, as well as examine farmers' perceptions of NGO interventions and their effect on household food security. Simultaneously, the study investigates the extent to which conditions exerted by funding agencies mediate the association between farmers' participation and perception of NGOs interventions and household food security. The study was guided by Food Availability Decline Theory, Entitlement Approach, Participatory Approaches, Theory of Planned Behaviour and False-Paradigm model. The study employed a mixed method design that applied both quantitative and qualitative approaches. In this, 100 farmers' groups with a membership base of 3, 341 farmers who had worked with NGOs for more than three years were selected from an overall list of registered farmer groups. Israel (1983) formulae to sample finite population were applied to select 357 farmers from these groups. Qualitative data was collected from 33 key informants, 6 focus group discussions and 2 case studies. Logistic regression model was utilized to test the significance between farmers' participation in NGOs interventions and household food security as well as farmers' perceptions of NGOs interventions and household food security. Causal mediation analysis examined the effect of a mediating variable M (conditions of funding agencies) on the relationship between X (farmers' participation and farmers' perceptions) and Y (household food security). Qualitative data was analyzed to establish patterns and trends. The study concludes that both farmers' participation and perceptions of NGO interventions are predictors of household food security. Willingness of NGOs to involve farmers in needs identification, selection of interventions, monitoring, implementation, capacity development and power dynamics influenced farmers' participation. Farmers' perceptions were shaped by affordability of interventions, technologies applied, markets, labour requirement and envisioned success. Conditions exerted by funding agencies mediate the relationship between farmers' participation and perceptions of NGO interventions and household food security. The study recommends that farmers participation process be restructured to become inclusive, standardized and accountable. Further, NGOs should undertake periodic customer satisfaction reviews to integrate farmers' opinions, have clear exit strategies; re-define their household food security agenda and improve communication with farmers.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides an overview of food insecurity globally and the prevailing situation in Kenya. It highlights the contributions that have been made by NGOs to improve food security. It also presents the problems statement, objectives, hypotheses, justification and the scope of the study.

1.2 Background of the Study

Achieving food security is an enormous global challenge that is becoming increasingly elusive. Food and Agriculture Organization (FAO) posits that food security exists when people have sustainable physical or economic access to enough, safe, nutritious, and socially acceptable food for a healthy and productive life (FAO, 1996). Hwalla, Laban and Bahn. (2016) demonstrated that food security underscores dimensions such as food availability, access, utilization and stability that are meant to ensure that households always have a stable access to sufficient food in adequate supply to meet their nutritional standards. Food availability denotes sufficiency in supply through production, imports, relief aid and stocks, while access is realized through acquisition of enough incomes to purchase nutritious food products. Similarly, utilization demonstrates how the body utilizes nutrients found in the food resulting from preparation, variation in diets, caloric intake and food safety. Food stability ensures food availability; access and utilization remain constant and are not subjected to any intermittent disruptions. However, World Bank (1986) has asserted that lack of food security that may be either chronic or seasonal, experienced at a household, regional, or national level is becoming a common phenomenon worldwide.

1.2.1 Global Perspectives of Food Security

It is predicted that lack of food security is likely to become intense as global population is poised to grow to 9 billion people by 2050 (Godfray et al., 2010; Bailey,

2012; Wang, 2022). This is likely to spiral competition over land, water, energy and put pressure on the environment as food demand increases by more than 70%. Wang (2022) suggests that sustainable provision of food to over 9 billion people will require innovative planning regionally and within specific countries and must adhere to environmental carrying capacity due to unequal natural resource distribution globally. Lizumi, et al. (2013) further predicted that food markets will increasingly be volatile resulting from production variability, seasonal price increases and emerging climate changes that will uncharacteristically affect countries that are dependent on food imports. FAO (2015a) estimates that there were 795 million undernourished people in the world and more than 780 million of these reside in less developed countries, particularly Africa and South Asia. In 2020 alone, an upward of 720 and 811 million people globally were food insecure a growth of 118 million in contrast with 2019 (FAO et al., 2021). Additionally, among 768 million undernourished people, majority (418 million) were in Asia and with Africa accounting for 282 million people respectively. FAO (2023) demonstrated that the above trend remained unchanged between 2021 and 2022 as between 691 and 783 million (an extra 122 million people compared to 2019) faced hunger with a projection of approximately 600 million people likely to be undernourished by 2030 further undermining achievement of goal 2 of sustainable development goals.

Delivering food security in a world that is confronted by population growth, rapid urbanization and climate change presents an enormous task. This has compelled the UN to prioritize ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture as a focus of goal number two of the 17 Sustainable Development Goals (SDGs) earmarked for 2030. However, emerging evidence from a review of status of global food security since 2017 reveal that factors such as conflicts, climate change, poor affordability of healthy diets, unstable economies, growing inequalities that are increasingly intensifying might reverse gains anticipated for 2030. These factors are underpinned by growing poverty, inequality, rapid urbanization without economic growth which are liky to rollback food security and nutrition achievements and weaken global food system (FAO, et.al 2021; FAO, 2023)

1.2.2 Regional Perspective of Food Security

Africa has the largest proportion of the world's vulnerable population exposed to food insecurity. In 2014/2015 alone, 153 million people in Sub-Saharan Africa were suffering from severe food insecurity and more than 23.3% were undernourished (FAO, 2015a; FAO, 2015b). FAO (2023) maintains that Africa is still home to 38% (282 million people) facing hunger. In recent years, food production in Africa is considerably affected by El Niño and La Niña phenomena associated with climate change. This is manifested in recurrent droughts and floods that have significantly contributed to crop failure (FAO, 2015b, UNDP, 2012). Other factors causing food insecurity in Africa range from inadequate extension services; poor soils; dysfunctional markets; poverty; limited access to credit; HIV/AIDS; effect of growing population; conflicts and political instability to low economic growth (Folaranmi, 2012; Hall et al., 2017; FAO, 2013; Markelova & Mwangi, 2010; Masuku & Sithole 2009).

1.2.3 National Perceptive of Food Security Situation in Kenya

In Kenya, lack of food security remains a major challenge to national development despite numerous efforts to address it since attainment of political independence in 1963 Government of Kenya (GOK), 2010; GOK, 2011). This is in spite of the fact that Kenya is designated as a low middle-income country with a medium human development index (UNDP, 2016). Sachs et al. (2019) reveals that Kenya scores poorly in 10 out of 17 Sustainable Development Goals, particularly goal 2 on zero hunger. Sachs demonstrates that in spite of being on tract on child wasting and obesity prevalence, the country generally lags behind in child stunting and undernourishment. FEWSNET (2013) reveals that approximately 10 million people face chronic food insecurity annually, while 2 to 4 million are in dire need of emergency relief food. Further, 31% of households in Kenya do not have enough food to eat and lack money to purchase it, while 30% of children are undernourished annually (GOK, 2011; Kenya Demographic Health Survey (KDHS), 2014; Kimiywe, 2015).

FAO et al. (2019) demonstrated that there has been an increasing trend of undernourishment among Kenyan population ranging from 22.3% in 2013 (constituting 10 million people) to 29.4% (estimated 14.7 million people) in 2017. Similarly, obesity has grown from 13.2% to 25.5% in the same period. The full impact of COVID 19 that was reported in Kenya in March of 2020 on disruption of food systems and more so Kenya's food security remains to be explored. Nevertheless, Nechifor et al. (2021) examining medium term macroeconomic impact of COVID 19 on the economy of Kenya, particularly investigating the success of actions to lessen effects on food security and to accelerate recovery of the economy concluded that lockdowns might have slowed achievements realized in food security previously. Trends of recovery are largely different across households with those in rural areas and the ones with stunting children recording poor macronutrient and caloric intake.

Food production in Kenya is anchored in the agricultural sector, which contributes to 30% of the GDP while providing 61.1% of employment (KNBS, 2017). However, it is only allocated 5.1% of the national budget. General growth rate in agriculture recorded 4.4% in 2016 compared to the previous 7.2% (FAO, 2015a; KNBS, 2017) indicating a declining trend. For instance, in 2018, the national government only allocated 2.8% of its overall budget to Agriculture (ReSAKKS, 2020). Owino (2019) asserts that it is assumed that Counties, which have taken up agriculture as a delegated function since implementation of devolved system of governance started in 2010, will top up this budget. World Bank (2020) has shown that Kenya still lags behind in investing 10% of her budget to agriculture (which is the cornerstone of catalyzing food security) in accordance to Malabo, CAADAP and Africa Vision 2063 targets.

USAID (2018) revealed that food production in Kenya is constrained because it is mainly relying 98% on rain-fed. Yet, 84% of Kenya's landmass is arid and semi-arid and only receives an average of 400mm of rainfall annually. On one hand, this leads to over-production, decline in prices and waste during rainy season. On the other, lean season is characterized by food insecurity and price hikes. Further, global

climate change manifested in recurrent droughts, flash floods, pests, desert locust infestation and diseases have contributed to crop failure in Kenya. FAO (2020) opines that temperatures in Kenya have increased to 1.5^0 C warmer in contrast with 1990 rates and within 1980 and 2012, Kenya experienced 13 years of widespread droughts, which translates to one-year drought in every 3 years. Kogo et al. (2021) predicts that combined temperature and precipitation variations associated with climate change will influence planting patterns and crop yields, thus a need for key stakeholders to undertake adaptation measures to safeguard food security

Food production in Kenya is also affected by fragile markets; low use of organic manure and inorganic fertilizers; post-harvest losses and use of poor quality seeds (GOK, 2011; GOK, 2010). Nyandiko, Wakhungu and Otengi (2015) demonstrates that although maize is undoubtedly the most popular staple food, its production has continued to fluctuate because of land fragmentation, poor agronomic practices, pests such as stem borer and climate change. This calls for development of improved varieties of maize that can utilize less water among other interventions. Figure 1 shows maize production in Kenya in the recent years.

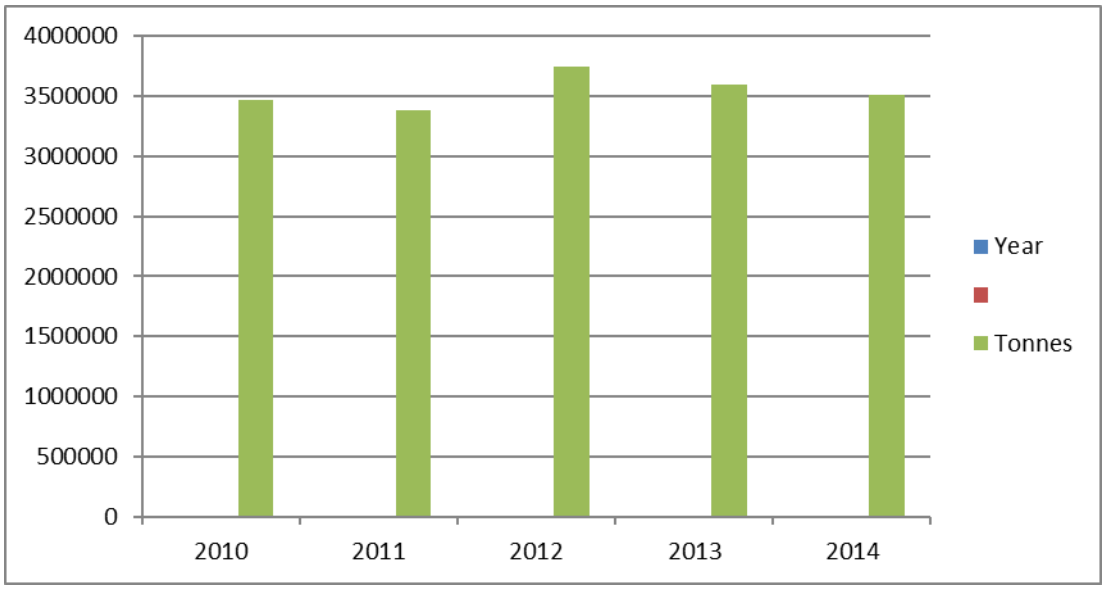

Figure 1.1: Maize Production in Kenya (2010-2014)

Source: Adapted from FAOSTAT, 2017

Mumo et al. (2018) reveal that further analysis of Meteorological Department 1979-2012 data to examine the interactions between maize yields and climate changes concluded that maize harvests were reducing at 0.07 tons per hectare due to constrained rains and rise in temperatures. The above demonstrates that Kenya maize production – which plays a key role in the country's food security, is on a declining trajectory.

Perennial lack of food security has compromised government efforts to fulfill its constitutional mandate of enabling citizens enjoy the right to be free from hunger and access to adequate food in acceptable quality and quantity as articulated Article 43 (1) c in the Bill of Rights in the constitution (GOK, 2010a). Lack of food security is common and widespread amongst people living in rural areas, urban slums and in the country's arid and semi-arid lands (ASALs). Food insecurity has been further aggravated by unprecedented increase in food prices resulting from inflation, weather conditions, shifts in local production in the recent years (KNBS, 2017) as shown in figure 2 below

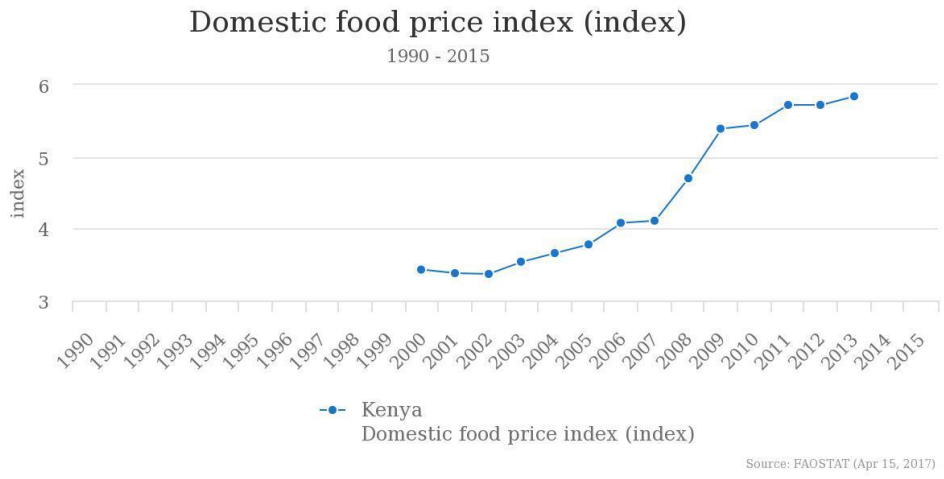

Figure 1.2: Domestic Food Price Index

Ngare and Derek (2021) looking at the correlation between fuel prices and food prices in Kenya determined by granger causality test concluded that prices of diesel affects prices of perishable commodities such as potatoes and cabbages by approximately 7.9% and 13.9%. However, the same effect was not recorded for

maize and beans further demonstrating that diverse crops were impacted differently. The study recommends a review of tax regimes on fuel to cushion the vulnerable households.

Yatta Sub County that is located within Machakos County falls under the lower eastern part of Kenya that is characterized by a semi-arid climate. Studies have demonstrated that food insecurity in this Sub County has continued to deteriorate due to recurrent prolonged droughts, poverty, low adoption of agriculture technologies, frequent crop failure and water shortages (Mburu et al., 2015; Kithu, 2012). It is estimated that over 63.5% of households in Yatta face perennial severe food insecurity and have to depend on relief food (Kithu, 2012). Agesa et al. (2019) study looking at effects of climate change on crop production in Yatta Sub Country has demonstrated that there is paucity of information regarding adaptation measures undertaken by farmers, as well as on effects of climate change. However, awareness on climate change was high among farmers and farmers across the spectrum knew various adaptation measures to be applied. Nevertheless, limited financial capacities prevented them from applying different adaptation strategies. This meant that production of crops was on a downward trend resulting in food insecurity. The above studies demonstrate that food insecurity has remained unabated in Yatta Sub-County despite efforts undertaken by the government, private sector and several NGOs to improve food production and incomes.

1.2.4 NGOs Contribution to Food Security

Globally, NGOs have played a significant role in addressing food security mainly through relief food since the end of the Second World War. More recently, NGOs have focused on building resilient agriculture systems to boost food production. Generally, there has been a phenomenal growth in NGOs globally since 1980s attributable to 'New Policy Agenda' driven by neoliberal ideologies. NGOs were seen as effective conduits of development and emergence aid compared to the state because they are presumed to be grass-root oriented, participatory in nature, contribute to sustainable development, flexible, innovative, and cost-effective (Makoba, 2002; Ulleberg, 2009; Hershey, 2013; Reimann, 2005). NGOs together

with other civil society members play a critical role in discussion around global food security governance systems at different levels, including consultations with G8/G20 to push for policy commitments (Hans, 2013).

NGOs have deployed a range of interventions to address household food security. These fall within the spectrum of increasing production and sometimes focusing on off-farm activities aimed at improving household incomes, thus enhancing their capacity to access food. On the food production front, NGOs enhance farmers' capacity building through extensions services, improved agronomic practices (seed multiplication, use of drought tolerant seeds, soil fertility enhancement), water harvesting and irrigation (Biekpe et al., 2013; Cain, 2014; Yosef et al., 2015). Further, NGOs are lauded for providing relief food to alleviate and address short-term depletion of food supply often caused by humanitarian crisis, floods and prolonged droughts (Shaw, 2007). Other diversified off-farm activities are implemented by NGOs to provide further safety nets for households. These include credit to initiate businesses, cash transfers, revitalizing market networks and support for other livelihoods such as livestock husbandry (Nyariki & Wiggins, 1997)

In Kenya, NGOs growth has been enormous and associated with enactment of NGO Coordination Act No. 19 of 1990, which opened the political space (Hershey, 2013; Kameri-Mbote, 2000; Manji, 2002). NGO bureau (2023) estimates that there are 12,162 NGOs registered in Kenya and contributing 175.91 billion Kenya shillings to national development. The government has urged NGOs in Kenya to harmonize their activities with national development strategies for coherence. In Yatta Sub Country, there are approximately 12 NGOs working in the food security sector. NGOs in Kenya participate in funding resilient food production practices such as rainwater harvesting, drought tolerant crop promotion, soil fertility enhancement, and supporting appropriate agronomic technologies. They also support building of farmers' capacities in food production through extension services; increasing access to credit and inputs; advocating for land rights and security of tenure particularly for women as well as revitalizing markets and early warning systems (Biekpe et al.,

2013; Ahmed et al., 2013). In spite of these, food insecurity has generally remained elusive in Kenya and specifically in Yatta Sub County.

In recent years, NGOs globally have also come under intense scrutiny to show impact in order to legitimize their existence (Rooy, 2004; Pearson, 2011; Anderson, 2004; Asonga, 2015; Banks & Hulme, 2012; Ferguson, 1990; Brown, 2012). This has seen funding agencies introduce a litany of conditions to ensure that there is value for money. This has forced NGOs who usually depend on funding agencies for their functions and operation to lose their neutrality and independence (Tandon, 2001; Rauh, 2010). Gradually, funding agencies are having more influence and say in formulation of NGO policies, agenda, program focus, choice of interventions and ways of programming. These includes compelling NGOs to use result based management tools, logical frameworks, embrace predetermined program results, projects, policies, as well as decision on duration of implementation of interventions. Usually, these approaches according to studies only encourage upward accountability and better management of programs (Wallace, et al., 2006; Edward & Hulme, 1996). Agyemang et al. (2017) study in Ghana among fieldworkers revealed that upward accountability was viewed as displaying control from the outside. There was need among fieldworkers to amplify their voice in development of upward accountability tools to safeguard the interests of their beneficiaries. Evidence to determine the extent to which conditions exerted by funding agencies on NGOs affect food security outcomes are scanty, particularly in Yatta Sub-County.

1.2.5 Farmers Participation and Household Food Security

Development practitioners have been promoting participatory development largely to provide opportunities and a voice to those that will benefit from development initiatives following its emergency in the 1970s and 1980s in a push to enable beneficiaries be involved in decision making regarding their future (Chambers, 1983; Lud, 2023). Participation in development attracts diverse definitions. From a social movement perspective, it is seen as a mobilization process aimed at eliminating different forms of injustices. While institutional perspective sees it as an inclusion tool (World Bank, 1994). Abiddin et al. (2022) asserts that NGOs are at the forefront

of promoting participation because of their transformative ideologies with a focus on social justice, creating lasting impact, influencing systemic change and a push towards sustainable community development.

It is increasingly becoming clear that participation of farmers in the design, implementation and monitoring phases is critical in food security programming (Wabwoba & Wakhungu, 2013). Conversely, Levine and Chastre (2004) argue that NGOs often face criticism in the manner in which they analyse underlying needs and engage farmers in their food security interventions. According to Kumar (2002), NGOs generally advocate for participation in development. However, little is known on how this is applied in different phases of food security programming and what influence it has on household food security. There is growing body of evidence to demonstrate that participation of farmers if well-structured has a likelihood of improving food security. For instance, studies in both Madagascar (Kangmennaang et al., 2017) and Ghana (Beyuo & Anyidoho, 2021) have concluded that participatory planning and impact assessments make it easy to tailor programs to meet the needs of farmers. Beyuo and Anyidoho (2021) revealed that the robustness of participation approaches in implementing food security interventions in Ghana had a positive impact on farmers' food security. Other studies (Kangmennaang et al., 2017; Doustmohammadian et al., 2022) have opined that food security interventions that embrace participatory approaches, especially in agro-ecology, soil improvement, gardening, nutrition of mothers, vegetable programs among others and those that promoted farmer to farmer exchange of knowledge and community involvement recorded improved food security particularly in access, utilization and availability.

Farmers' participation in combination with other factors have been found to contribute to household food security. For instance, Cele and Mudhara (2021) study in Kwazulu-Natal, South Africa assessed the impact of market participation and collective action among other socioeconomic parameters on household food security among 243 households and concluded that market participation together with gender, number of cattle owned, group membership, credit access and farm incomes increased the prospect of household food security. In Kenya, Mwangi et al. (2020)

sought to determine if a farmer's participation in wheat, beef or dairy agro-food value chain was a contributing factor of their food security. This study utilized Household Food Insecurity Access Scale (HFIAS) among 175 households involved in the above value chains. Mwangi et al. (2021) established that there were variations in food security among different categories of households. For example, those that engaged in dairy and wheat value chains exhibited better food security indicators compared to those were involved in beef value chain. Differences in food security among households were attributed to incomes, household energy, transport assets and social capital. The above studies demonstrate that meaningful farmers' participation can result in positive food security outcomes.

1.2.6 Perception of Farmers on NGO Interventions

During design, implementation and monitoring of NGO food security interventions, farmers often develop various perceptions (Ybabe, 2014). These regards the benefits of interventions, their contextualization and effectiveness. Studies have also demonstrated that perceptions of farmers contribute to their food security. For example, Mandaharisoa (2022) study in Madagascar assessed perceptions of communities of Atsimo Atsinanana region against 14 food and nutrition security interventions using 12 gender specific workshops involving 80 project participants. This study established that interventions contributing to food self-sufficiency as well as incomes were the most preferred by the farmers. However, location of the farmer and gender determined the types of interventions farmers preferred. For instance, women had a higher affinity towards diet related activities while farmers living in the coastal region were likely to choose market-oriented interventions.

Similarly, perceptions of farmers towards food security interventions have been found to determine adoption rate. For example, Moutouama et al. (2022) study in Northern Benin examined the perceptions of smallholder farmers regarding both climate change and climate smart agriculture in an effort to establish what determined adoption of 31 climate smart agriculture practices. This study revealed that although most farmers were aware of the impact of climate change, they did not view climate smart agriculture practices as a mitigating intervention. There was little

awareness of the different climate smart agriculture practices implemented in the area. As a result, fewer farmers adopted the practice. Uptake of the climate smart agriculture was related to both ethnic group and education. Also, Belay et al. (2023) study in Southern Ethiopia to establish whether climate-smart agriculture improves household income and food security among smallholder farmers revealed that climate smart agriculture contributed to more incomes and food security among adopters in contrast with non-adopters. This study stressed the need to increasing knowledge and awareness among farmers on climate change to increase prospects of adoption of climate smart practices. The above studies demonstrate that understanding farmers' perceptions on food security interventions and addressing them can increase their adoption capacity. This will in turn lead to household food security.

1.3 Statement of the Problem

Despite prioritizing ending hunger in the Bill of Rights in Article 43 (1) c of the 2010 constitution (GOK 2010b), Kenya still faces intricate web of challenges that limit the country from achieving food security. These range from poverty increase, poor nutrition, gender disparities, vulnerability to climate change accompanied by erratic rainfall and extreme weather events, poor infrastructure (roads, irrigation, storage facilities), inadequate access to markets, increasing population, low investment in agriculture, limited access to credit for farmers to modernize food production, localized conflicts and competition over resources (especially grazing and water) to global food crisis fueled by conflicts and soaring food prices (Gebre & Fikado, 2023; Kogo et al., 2021; Kosgei & Agwata, 2021). Consequently, recurrent food insecurity has become a common phenomenon in Kenya as 10 million people face food shortages and between two and four million are in need of food relief annually (GOK, 2011, FEWSNET, 2013).

The above has been aggravated by the fact that a large proportion of Kenya's landmass constituting of 84% and supporting 30% of the population is either arid or semi-arid (GOK, 2010). Food insecurity remains endemic in these areas because of reliance on rain-fed production, which is greatly affected by unprecedented vagaries

of weather manifested in frequent prolonged droughts emerging from global climate change (Madegwa et al., 2016). Sach et al. (2019) has shown that child stunting affects 29% of children, especially in rural areas in Kenya. Climate change has continually challenged food systems and agricultural production

Other factors such as degraded soils, conflicts, dysfunctional markets and low uptake of dry-land technologies have contributed to lack of food security (Heady & Kennedy, 2012). Yatta Sub-county located within the southern lowlands of Machakos County is one of the areas where lack of food remains a challenge due to cyclical and recurrent drought. This area receives erratic rainfall averaging 500mm per annum, faces recurrent crop failure, land degradation, experiences water shortages and has absolute poverty level of 66% (Mburu et al., 2015; Liavega et al., 2014). As a result, over 63.5% of households in this Sub County face severe food insecurity (Kithu, 2012).

NGOs globally and in Kenya have played a role to address household food security through a myriad of activities both on farm and off farm in collaboration with governments, communities and stakeholders. These NGOs embrace participatory development which they claim increases sustainability of these activities (Mulwa, 2010; Mariano et al., 2012). In Yatta Sub County, over 12 NGOs addresses food security. However, it is not known if farmers' participation in NGOs interventions is a determinant of their household food security. Studies have also demonstrated that perceptions of farmers on various food security interventions play a critical role in increasing receptiveness and adoption capacity of farmers (Moutouama et al., 2022; Mandaharisoa, 2022). Information on the different perceptions exhibited by farmers regarding NGO interventions (whether positive or negative) in Yatta remain scanty. Similarly, it is not clear what shapes these perceptions and how these informs the kind of interventions farmers will prefer. Also, it not known whether or not farmers' perceptions are a predictor of household food security. Although these NGOs work with a myriad of farmer groups representing households in the area, they are funded by different entities that exert certain conditions on them. It is yet to be established

whether these conditions mediate the association of farmers' participation and perceptions of NGO interventions and household food.

1.4 General Objective

The general objective of the study is to assess farmers' participation and perceptions of NGO interventions and their effect on their household food security.

1.4.1 Specific Objectives

1. To characterize types of interventions undertaken by NGOs in Yatta Sub County to influence household food security.
2. To determine the extent to which farmers' participation in NGOs interventions affect household food security in Yatta Sub County.
3. To investigate farmers' perceptions of NGOs interventions and their effect on household food security
4. To explore the extent to which conditions exerted by funding agencies on NGOs mediate the association between farmers' participation and perception of NGOs interventions and household food security

1.4.2 Hypotheses

H_{01}: Farmers' participation in NGOs interventions is not positively associated with household food security.

H_{02}: Farmers' perceptions of NGOs interventions are not positively associated with household food security.

H_{03}: Conditions exerted by funding agencies on NGOs do not mediate the association between farmers' participation in NGOs interventions and household food security

H_{04}: Conditions exerted by funding agencies on NGOs do not significantly mediate the association between farmers' perceptions on NGO interventions and household food security.

1.5 Significance of the Study

This study provides valuable lessons on the interaction between farmers and NGOs aimed at affecting household food security. Such lessons will contribute to the understanding of why lack of food security has continued unabated in Kenya despite involvement of many actors including NGOs. Globally and indeed in Kenya, NGOs have for a long time participated in the sector of food security and become a key partner of the government. The study improves understanding on whether NGOs in spite of their massive investment in food security are making any inroads in improving household food security. Further, the study unravels how farmer participate in executing various NGO food security interventions and whether this has a bearing on their household food security. Consequently, the findings will enable NGOs to re-examine their role, contribution and impact in order to bolster future learning and programming. This study recognizes that farmers usually have diverse perceptions on NGO interventions. The study contributes to an understanding on how various perceptions held by farmers on NGO interventions impact household food security.

In programming food security interventions, NGOs have benefited from a myriad of funding agencies that sometimes exert pressure on them to realize certain deliverables. This study contributes to the understanding on whether such conditions have any effect on household food security. Ultimately, the study generates a body of knowledge that benefits NGOs, the counties, national government, policy makers and the academic community to address food security in the country, as well as provides a premise that informs policy formulation.

1.6 Scope

The study interviewed farmers who had worked with NGOs for more than 3 years because such a period was reasonable for interventions to have an impact and for their effectiveness to be assessed. The study interviewed farmers enlisted in farmer groups because NGOs preferably gear their interventions through these groups to bolster cross-learning and easy delivery of services. The study focused on NGO

interventions aligned to food production and increasing of incomes. These included rainwater harvesting, drought tolerant crops promotion (maize, beans, green grams, sorghum, millet and cowpeas), soil fertility enhancement, horticultural production, extension services, input supplies, livestock production and off-farm activities (table banking and connecting farmers to lending facilities).

This study was limited to Yatta Sub County of Machakos County in Kenya. Whereas, the larger *Ukambani* counties consisting Kitui, Makueni and Machakos have experienced perennial and persistent food insecurity over the years, only Yatta Sub-County within Machakos County was singled out for this study to represent the rest. This is because Yatta has experienced longer and more intensive NGO interventions in food security compared to other counties in the same geographical and ecological area. Similarly, the potential for interventions such as water harvesting and irrigation were recognized during the colonial times in Yatta Sub County. This led to the construction of the Yatta canal and other water infrastructures which have been rehabilitated by NGOs. It is envisioned that the findings and recommendations emerging from this study can apply to other *Ukambani* counties and those located in arid and semi-arid areas which typically share similar cultural, economic, ecological zones, climate-related challenges and implement comparable NGO interventions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter begins with a theoretical review and conceptual framework and provides an empirical review relevant to the objectives of the study. The second section provides a critique of reviewed literature and highlights research gaps.

2.2 Theoretical Review and Conceptual Framework

The study will adopt Food Availability Decline theory (FAD), entitlement approach, participatory approaches, theory of planned behaviour and false paradigm theory as discussed below.

2.2.1 Food Availability Decline Theory (FAD)

This theory originates from classical economics associated with Adam Smith and Thomas Robert Malthus. Malthus (1798) developed food supply verses population growth paradigm in which he postulated that population grew geometrically compared to food production which increased arithmetically (at given points). As a result, he asserted that population growth will outstrip food production – a situation that will lead to famine and starvation. Malthus argued that when population growth exceeds food production, the situation will result to famine. To avert this, Malthus advocated for moral restraint characterized by delay in marriages. This school of thought influenced earlier analysis of famine, which in most cases was linked food availability decline. Food Availability Decline (FAD) theory posits that people face food insecurity because of inadequate supply of food caused by reduction per capital of food production, usually caused by conflicts, natural disasters, pests, among other factors that influence changes in food supply (Serracino, 2010; Lin & Yang, 2000; Vestal, 1991).

It emphasizes the need to increase food availability at a local level and argues that disruption of production caused by crop failures often arising from natural calamities largely lead to spikes in food prices and sale of assets. Increases in food prices have consequences on the intake of calories. Seclan (2001) examining neo Multhusian and techno-ecological factors that determine food security in lesser-industrialized societies in the periods between 1970 and 1990 reveals that over-urbanization and population growth still pose a challenge to food availability. Seclan concludes that adaptive strategies such as land-use intensification, improving market access, and use of fertilizer technologies counterbalance negative effects. This theory is relevant to this study as it helps capture insights into food production and supply as one of the critical strategies still deployed by NGOs to improve household food security. This theory informs objective one of this study in identifying interventions aligned to increasing food supply such as promotion of drought tolerant crops to counter-balance effect of climate change, rain water harvesting, soil fertility enhancement, horticultural production, extension services to increase food production. These interventions aimed at increasing food availability remain relevant in addressing household food security in Yatta Sub County.

2.2.2 Entitlement Approach

Nobel laureate, Amartya Sen as a critique to food availability approach proposed the Entitlement Approach. It is based on Sen's work on the causes of famines in Bengal (India) and Ethiopia. Sen asserted that entitlement approach is built on a set of alternative bundles that a person in society can command. These will result from the entirety of their rights and opportunities that they have (Sen, 1984). In actual sense, entitlements are goods and services acquired which are usually converted to endowment. These can take different forms that will include production based entitlement which leads to capacity to grow food, trade based entitlement that enables one purchase food, own labour that allows one to work for the food, as well as inheritance transfer entitlement that implies being given food by others.

Sen argued that failure in food supply does not necessarily cause hunger and starvation as postulated by Food Decline Theory. Conversely, famines are common

in situations where national or local food stocks are plentiful. He opined that famine results from lack of entitlement which is reflected in bundles of commodities one individual commands arising from his/her endowment. This manifests itself in land, animals, labour and skills. Sen (1981) argued that a person's 'entitlement' is grounded in their resource bundles that can be converted through production and trade into either food or commodities that can improve access to food. According to Sen, people starve if their entitlement does not include enough food in their commodity bundle due to labour loss, land alienation or exchange of entitlement. These factors emerge from shocks arising from price increases in food commodities, decline in wages and unemployment.

However, Sen's approach has been critiqued on its failure to recognize four important elements: mortality that is caused by diseases rather than starvation, extra-legal entitlement transfers, starvation by choice and ambiguities in specification of entitlement (Devereux, 2001). Devereux argues that sometimes people prefer to starve to safeguard future livelihoods. These is expressed as a coping strategy to avoid asset depletion. Similarly, ownership of resources is determined by different legal systems as pertains to individual, private and communal. Additionally, other factors such as civil wars, conflicts, drought, political processes that deny people rights to food compromise entitlements. Qudrat (2006) points that Sen's critique of FAD is limited. This is because forces of supply and demand are behind commodity prices. Similarly, the assertion of exchange entitlement runs contrary to capitalisms principles that operate on voluntary exchange legal frameworks. Capitalism economic system unlike Marxism worsens inequalities and is exploitative. Other factors such as corruption, nature of property and social relationship seen in different societies affects entitlement. Food is also a basic necessity on the same level with health care.

However, despite its pitfalls, the entitlement approach is relevant to this study in providing valuable insight in analyzing household food security from individual entitlement perspective. It clearly demonstrated that people's control over resources play a role on the food security. This theory informed objective one of this study and

helped to explain why NGOs apply a combination of interventions to address household food security both on farm and off farm. These interventions that include both on farm and off farm are aimed that increasing people's capacities to cope and enhance their resilience towards food insecurity.

2.2.3 Participatory Approaches

Participatory approaches have emerged as alternative development response to hitherto top down paradigms espoused in 1950s, 1960s and partly in 1970s (World Bank, 1994; Blackbun & Holland, 1998; Chambers, 1992). Participatory approaches emerged as a family of models promoting putting people at the centre of development in order to enhance sustainable development (Kumar, 2002). Robert Chambers was the proponent of participatory development that is aimed at drawing the poor and marginalized to the centre of development processes by enabling them to participate in decision making, analysing their situations and charting their future through a family of approaches such as participatory rural appraisal.

This study utilizes Chambers (1983) concept of "putting the last first" and his 1997 thesis of "putting the first last". In putting the last first, Chambers argues that the poor are trapped in poverty and it is the outsiders, usually elites and professionals who can liberate them. Ironically, professionals are overshadowed with biases manifested in limited rural visits, lack of listening to the realities of the powerless (poor farmers, women and households located in far-flung rural areas) as compared to rural elites, adopters of technologies and male. In respect with this, Chambers advocates for inclusion of the poor by being pro-poor and intentional through practices such as listening to them, empowering them to analyse their situation, as well as engaging them in order to understand their realities and dynamics.

In his thesis of "putting the first last" Chambers (1997) challenges the professionals from different disciplines and locations to re-examine their attitudes and practices towards the poor. These attitudes which emerge from training, shared values, gender, standardization and measurement underline numerous failures and errors characterizing development. The poor and vulnerable have conspired to conceal such

failures and errors by either remaining silent or showing things in a positive light in an effort to safeguard continued donor funding. Chambers calls on professionals in development to reverse their roles by embracing participatory rural appraisal tools to empower the poor, address power imbalances, triangulate information and enable the poor reveal their own local realities and insights. Similar sentiments have been expressed by a study analysing Kenya's poverty eradication trajectory, which has demonstrated that 1950 development paradigms conceptualized within the economic framework such as trickle down approach, basic needs approach and others have failed to address poverty (Bahemuka et al., 1998). These approaches largely ignored non-economic factors in spite of the fact that poverty is multi-dimensional in nature. The above study supported participatory development and advocated for positioning people at the centre of development in order to empower them, create better accountability and unanimity in goal selection.

Participatory processes as proposed by Robert Chambers (1983) can immensely contribute to giving targeted participants the power to analyze their needs from the perceptive of their local realities and increase ownership of interventions. However, participation can also be marred by various factors. For example, development practitioners are not innocent facilitators, but in many ways will shape participatory processes because of intrinsic power dynamics expressed in their tools, agendas and application of tokenistic gesture to meet donor demands. Despite these pitfalls, participatory approaches were valuable in informing objective two of this study by analyzing whether or not farmers' participation in NGO interventions affected household food security. This approach also unraveled the understanding of farmers' participation in NGO interventions and how different factors came to play.

2.2.4 Theory of Planned Behaviour (TPB)

This study utilized the Theory of Planned Behaviour to examine objective three on farmers' perceptions of NGOs interventions and their effectiveness on household food security. The Theory of Planned Behaviour emerges from socio- psychology analysis that examines and predicts human behaviour through intention (Ajzen, 1991). Ajzen developed the theory in 1985 as part of predicting human intentions in

up taking given behaviours. This theory emerged from the theory of reasoned action (Ajzen & Fishbein, 1980) to address shortcomings in explaining behaviours where individuals have incomplete volitional control.

The important element of the theory is the person's intention to undertake certain behaviour. Intentions determine motivation and willingness to accomplish the behaviour. The theory stipulates that an intention reflected as precursor for actual behaviour is largely a result of attitude (extent to which an individual exhibits favourable or unfavourable assessment of a behaviour at hand), subjective norm (perceived social pressure to undertake or not undertake a certain behaviour) and perceived behavioural control (ease or challenges of undertaking a behaviour that is informed by experience and projected hindrances) (Daxini et al., 2019; Ajzen, 1991). The more positive the attitude and subjective norm regarding a behaviour, as well as the bigger the perceived behaviour control, the more the likelihood of an individual to accomplish the behaviour at hand (Ajzen, 1991). All the above three predictors can work either individually or concurrently. This theory proposes that behaviour is a result of underlying information or beliefs pertinent to the behaviour that drive people's actions and intentions (Ajzen, 1991)

Theory of planned behaviour has been utilized by studies to understand and predict farmers' perceptions and behaviour. For instance, studies in Malawi to determine farmers' attitudes toward tree planting utilized theory of planned behaviour as conceptual framework to analyse positive attitudes, subjective norms and perceived behaviour control (Meijer et al., 2015). Other studies (Schroeder, et al., 2015; Razaei et al., 2019) have applied TPB to assess farmers' acceptance and perception of agri-environment schemes in England, as well as in understanding Iranian farmers' intention to use personal protection equipment during application of pesticides. The social pressure to join the schemes in England was engineered by family members of farmers as compared to other farmers or advisors (Schroeder et al., 2015). This theory contributed to the understanding of Iranian farmers' intention to use personal protection equipment during usage of pesticides by analysing parameters such as attitude, subjective norms and perceived behavioural control

which together positively influenced intentions (Rezaei et al., 2019). However, one of the shortfalls of this theory is that it assumes that individuals have power to make decisions and plays down different power dynamics that influence behaviours and perceptions.

The theory of planned behaviour was relevant to this study in capturing and predicting how different attitudes and practices both negative and positive inform farmers perceptions towards NGO interventions and how these interacts with household food security. This theory informs NGOs to design tailor-made interventions that will achieve high level acceptable among farmers. The theory provides insights in how farmers assess effectiveness of interventions in an effort to identify those strategies that are found to be relevant for scaling and multiplication to realize better household food security indicators.

2.2.5 False- Paradigm Model

The False- Paradigm Model is ingrained within the framework of international-dependence model that gained credence in 1970s particularly among intellectuals of developing countries (Todaro & Smith, 2010). The model asserts that developing countries are constrained by institutional, political and economic hurdles and entangled in a dependence and dominance relationship with developed countries. This dependence is reflected on the reliance on developed countries for decision-making, formulation of political and economic systems, provision of technologies and attitudes that stimulate development. The False-Paradigm Model opines that underdevelopment results from defective and unsuitable advice from well-meaning, but prejudiced, ethnocentric and uninformed experts from development agencies and donors who develop complex interventions that lead to unresponsive policies and outcomes.

Given lack of understanding of the local context and dynamics, these interventions and policies reinforce the status quo (Todaro & Smith, 2010). Secondly, the model argues that experts in the frontline of development have acquired biased training, internalized developed-country-based knowledge and concepts with little

comprehension of the local context, and have unintentionally become propagators of this knowledge. Goulet (1971) similarly argued that developed countries have contributed to the anti-development experienced in less developed countries. According to Goulet, development in general is equated with abundance and money over other factors such as religion and family.

The ability to provide financial and technical support has elevated developed countries to a pedestal of superiority and ethnocentrism leading to giving conditions for aid. Unfortunately, elites from third world countries feel inferior, degrade their own values and instead adopt and replicate the western principles. Further, Moyo (2009) builds on false-paradigm model by arguing that aid has not been effective in spite of being tied to conditions such as procurement and use of foreign expertise even when local knowledge is appropriate. As a result, the culture of aid has led to dependence, corruption and rent seeking. This model is relevant to this study in providing valuable information and analysis on the culture on dependence among NGOs on donors funding, agenda and strategies and how this affect household food security. The model further explains how attitudes and practices among NGO staff are shaped and how this has perpetuated dependence on donors. The model challenges NGOs to redefine their food security agenda and streamline food security interventions together with other actors. This approach in valuable in explain objective four of this study.

2.3 Conceptual Framework

In this study, farmers' participation and perceptions of NGO interventions are the independent variables and household food security is the dependent variable. Conditions of funding agencies is a mediating variable. Figure 3.1 models the relationship between these diverse variables and how they were measured in this study. The first independent variables: farmers' participation in NGO interventions was measured by assessing farmers' participation in various phases using indicators such needs identification, selection of interventions, implementation and monitoring. It was hypothesized that farmers' participation on NGO interventions has a significant relationship with household food security. The second independent

variable is farmers' perceptions of NGOs intervention. This variable was measured using indicators such as effectiveness of interventions and NGOs understanding of the local context through a Likert Scale. It is hypothesized that farmers' perceptions of NGO interventions were directly associated with household food security.

Conditions exerted by funding agencies is a mediating variable in this study. This mediating variable is measured by indicators such as duration of funding (<5=short), standardized results, predetermined interventions. It is hypothesized that conditions exerted by funding agencies mediate the association between farmers' participation and perception of NGOs interventions and household food security. Lastly, household food security was measured using indicators such as food production, incomes and relief. The study sought to find out whether total food produced, incomes earned were sufficient to meet household food needs (yes or no). Further, the study assessed whether or not farmers' implementing NGOs interventions still relied on relief food (yes or no).

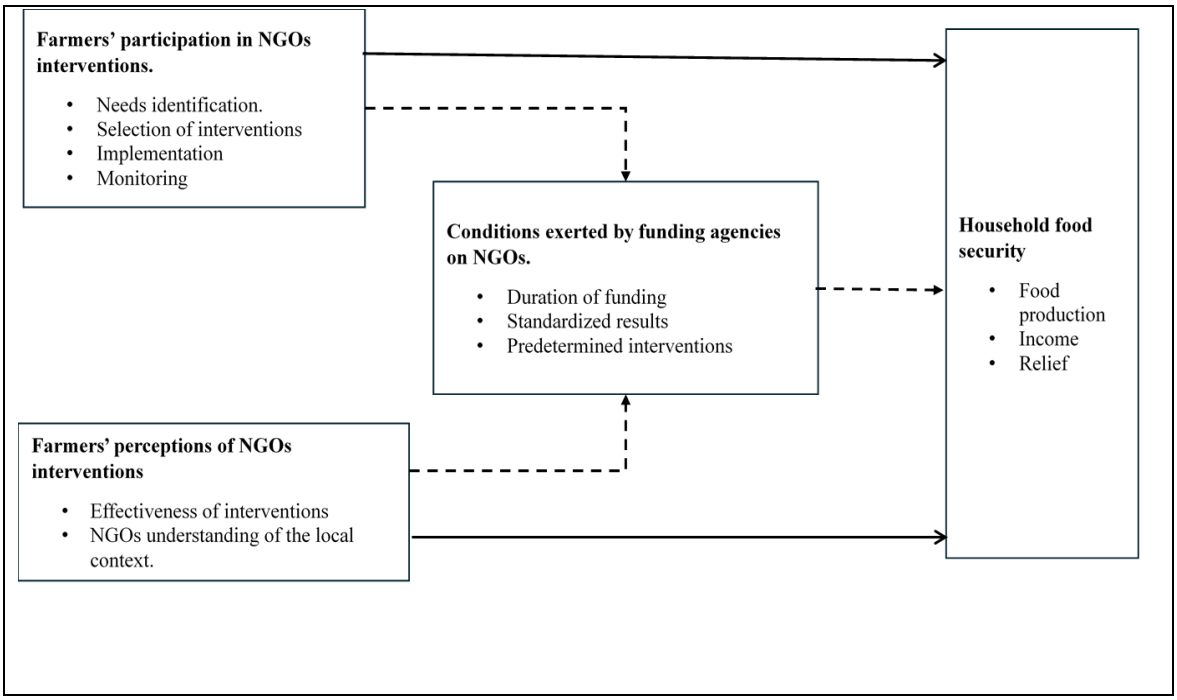

Figure 2.1: Conceptual Framework

2.4 Empirical Review

2.4.1 NGOs Interventions and Household Food Security

NGOs have played a significant role in the food security over the years. This is partly credited to NGOs inclusion on a consultative capacity in the UN since 1945 under the Article 71 of the UN charter that saw the creation of UN economic and Social Council (Ecosoc). This role was further strengthened by the enactment of the Universal Declaration of Human rights charter of 1948 and the International Code of Conduct on Human Rights to food (Lewis, 2007). Since then, NGOs have been involved in advocacy for right to food, as well as, fighting for the rights of small-scale farmers (Patel, 2009, Windfuhr & Jons'en, 2005; Beddington & Mitlin, 2007).

On the realm of relief, NGOs such as CARE (Cooperative for Assistance Everywhere) became predominant in provision of relief during the reconstruction of Europe after the Second World War and later expanded to other countries. Similarly, World Food Program (WFP) was formed in 1960 to spearhead relief globally (Shaw, 2007; Philips, 1981). However, other studies have argued that food relief which is as an intervention largely preferred by NGOs to improve household food security in the medium term increases dependence, distorts local markets, undermines food production, and is often abused and sometimes fuels conflicts (Siyoum et al., 2012; Harvey & Lind, 2005; Gentilini, 2007; Oxfam, 2005; The Economist, 2010).

On the food production side, NGOs such as Rockefeller and Ford Foundation played a central role in supporting the green revolution in 1940 mainly in Asia and Latin America. The green revolution was spearheaded by Norman Borlaug and characterized by infusion of new technologies, use of synthetic fertilizers, development of new wheat and rice seed varieties, use of agro-chemicals and irrigation (Subramanyachary, 2012; Patel, 2012). Successful development of wheat and rice varieties in Mexico and Asia encouraged FAO, Rockefeller, Ford Foundation, UNDP and World Bank to establish institutions such International Maize and Wheat Improvement Centre (CIMMYT) in 1960, International Rice Research Institute in Philippines, International Fund for Agriculture Development

(IFAD) and Consultative Group on International Agricultural Research (CGIAR) in 1970s. These institutions were to share, replicate and transfer innovations around the globe. Conversely, the green revolution has been critiqued for focusing on commercially oriented crops (mainly wheat and rice); ignoring smallholder farmers; by-passing orphan crops such as millet, cassava and sorghum; creating unemployment due to mechanization; adopting technologies that were not pro-poor and causing environmental problems due to use of synthetic fertilizers, herbicides and irrigation (Subramanyachary, 2012; Patel, 2012). Ironically, green revolution barely benefited Africa. Frankema (2014) has opined that green revolution in Asia succeeded because of political momentum and supportive infrastructural development.

Africa's failure to adopt green revolution was due to corruption and poor political goodwill. Currently, Africa is making a second attempt at green revolution through the backing of Rockefeller, Bill and Melinda Gates Foundation, UN, FAO, NEPAD and World Bank as well as agri-chemical and biotech companies. This has led to formation of Alliance for Green Revolution Africa (AGRA) in 2006 that was chaired by the late former UN secretary Kofi Annan to revive Africa's agriculture and food security (Toenniessen et al., 2008). AGRA focuses on areas such as improved seed varieties, water management, crop preservation, soil enrichment, markets and agricultural policies. AGRA has been critiqued for its policies, introduction of genetically modified crops and other technologies which are perceived to target fewer farmers (usually commercial farmers) and not being pro-poor apart from disrupting local knowledge systems and being a front for multi-national companies (Dawson, et al, 2016). Ryan et al. (2020) opines that NGOs have been in the forefront for campaigning against GMO and have been criticized for misinformation that has prevented commercialization of the technologies in many countries.

Given recurring disasters arising from climate change and on-going protracted crisis, especially in Africa, NGOs since 2011 have started to focus on resilience programming in order to enhance capacities among vulnerable communities to cope and respond to future stressors and shocks associated with household food insecurity.

These involves addressing structural causes of vulnerability by analyzing problems across sectors, strengthening cooperation among actors and supporting disaster risk management through enhancing capacities of communities to protect key livelihoods (IFPRI, 2004). In this regard, NGOs embraces a combination of food production and modification of livelihoods approaches. These include provision of farm tools and inputs (fertilizers, chemicals and seeds); conservation agriculture; extension services; irrigation and post-harvest storage. Further, they also integrate livestock husbandry, micro finance, income generating activities, market access, as well as, safety nets for the poor and vulnerable (cash and food transfers, public works employment, input subsidies, crop and livestock insurance, school feeding and supplementary feeding) (Chitongo, 2013; Feder et al., 2011; Nyariki & Wiggins, 1997; Mkomagi, 2013). However, it is not known how these diverse interventions contribute to household food security.

In order to improve food production, NGOs especially working in arid and semi- arid areas focus on diverse water management strategies. These include rainwater harvesting to open opportunities for creating irrigation outlets such as drip irrigation; use of in-situ and ex-situ methods aimed at prevention of runoff; regulating flow of runoff through terracing, contour farming and building of water ponds and ground water re-charge (Cain, 2014; Yosef et al., 2015) However, there is paucity of data to demonstrate how these interventions have improved household food security. Additionally, NGOs have also worked with different stakeholders (including ICRISAT, CIAT, and CIMMYT) in arid and semi-arid areas in Africa to develop and promote early maturing and drought tolerant seed varieties of maize, sorghum, pearl millet, chickpea and pigeon pea. CIMMYT pioneered the drought tolerant maize for Africa mainly composed of ZM309, ZM523 and ZM521 varieties in collaboration with NGOs including Concern Universal, World Vision International, Self Help International, among others (Kassie et al., 2013). However, studies have demonstrated that uptake of such varieties among farmers is dependent on considerations such as their capacity to mature early, disease resistance, availability of improved seeds, information, the cost of seeds, perceptions about their tolerance to drought, farm size, processing capacity, markets and labour demands (Mwadalu &

Mwangi, 2013; Fisher et al., 2015). Although NGOs in semi-arid areas of Yatta have been promoting growing of drought tolerant and early maturing crops, little empirical data is available to demonstrate the success of these interventions.

2.4.2 Participation of Farmers in NGOs Food Security Interventions

It is widely accepted that participation of beneficiaries in development underpins success of programs (Kumar, 2002; Mulwa, 2010). As such, a range of literature extensively articulates the positive effects of participation following efforts to seek for alternative development paradigm to replace top-down approaches (Mohan & Stokke, 2000; Campbell & Vainio-Mattila, 2003; World Bank, 1994; Blackburn & Holland, 1998; Tandon, 2001). Participatory development emerged in 1970s and was widely applied as from 1980s and later embraced by governments, NGOs and international agencies, particularly in 1990s (Oakley, 1995).

Over time, participation has become a cliché in development albeit applied and interpreted variously given the context and the type of organization (World Bank, 1986; Fals Borda, 1988; Uphoff, 1992; Cernea, 1991; Oakley, 1995; Ndou, 2012) Participation as applied by different organizations operates within seven levels that range from passive, information giving, consultative, material incentives, functional participation, interactive participation to active self- mobilization (Pretty, et al., 1995). The ultimate goal of participation is to enable beneficiaries take control over their decision-making and resources.

NGOs working in food security sector have been in the forefront of advocating for participation of farmers. Conversely, lack of participation among farmer group members in Kenya has been identified as a factor contributing to unsustainable community food security projects (Wabwoba & Wakhungu, 2013). Mutegi et al. (2019) study in Kenya has established that sustainability of donor funded projects is achieved through community involvement. Similarly, Assefa (2024) study in Ethiopia on unraveling what influences farmers to participate in campaign-based watershed management program revealed that factors such as location, as well as awareness, commitment from the government and motivation among farmers played

a critical role in inspiring farmers participation. This is consistent with Borompem et al. (2023) study in Ghana which demonstrated that factors such as age, sex, household size, perceived relevance and improved marketability influenced farmers' participation in cassava addition practices promoted by NGOs.

Studies in Namibia using the typology of seven level participation (Pretty et al., 1995) revealed that two thirds of farmers were not participating in food security programs pioneered by NGOs (Kumba, 2003). This study confirmed that commercial farmers performed better in self-mobilization and control over decision-making while communal farmers were only involved in information sharing and were not partakers of decision-making. This is in spite of agriculture professionals asserting that farmers sufficiently participated in agricultural programs. This implies that there are differences in the way different categories of farmers participate in NGO-led food security programs.

Wang et al. (2022) has found that the level of awareness among farmers grows when they participate in different interventions in China. For instance, Wang et al. (2022) reported that smallholder farmers and those with low income who participated in e-commerce tremendously increased their level of awareness on green production. This concur with a study in Nigeria which revealed that cowpea market participation among farm households demonstrated a positive improvement in household food security and increased household income by 0.7% and expenditure on food by 1.6% with sell of cowpea by a unit of 10 (Manda et al., 2020).

Different factors determine how farmers react to NGOs food security programs. Studies in Sierra Leone, South Africa, and Uganda (Ngegba et al., 2016; Botlhoko & Oladele, 2013; Martey et al., 2014; Sseguya et al., 2013) have attributed poor farmer participation to diverse factors. These include poor communication between NGOs and farmers; poor input supply; unmet promises; negative attitudes of NGOs' staff; poor funding; NGOs lack of familiarity; competition among NGOs; dishonest NGO staff; misallocation of resources to the local elites and limited funding. Additionally, factors such as household size, gender, incomes of households, age of household head, effectiveness of rural development programs, participation in a group,

closeness to health and trading facilities, land size, access to credit, sex of farmer, education, contact with extension worker influenced farmers' participation in food security interventions (Etwire et al., 2013; Yila & Resurreccion, 2013). In Tanzania, several factors constrained smallholder farmers from cultivating cassava although it was proven to increase food security. These included social perception, knowledge limitation, markets and processing (Reincke et al., 2018). In spite of the above studies, little is known regarding factors influencing participation of farmers' in NGO interventions in Yatta Sub County. Participation of farmers sometimes is limited by NGOs attitudes and lack of farmers' capacity. A study in Uganda (Musamakweri, 2007) concluded that although experts and extension workers needed to change their attitudes, similarly, farmers lacked analytical and planning skills. Farmers needed to learn to articulate their issues, negotiate, dialogue and to make decisions on what to learn. The above studies imply that different factors influence farmer participation in food security interventions.

2.4.3 Farmers Perceptions of NGO Interventions

The success of food security interventions is dependent on the receptiveness of targeted farmers. Farmers have been known to be often critical of NGOs interventions, if they do not recognize clear benefits. Studies (Ybabe, 2014; Meijer et al., 2015) have revealed that knowledge, attitudes and perceptions of smallholder farmers determine whether they adopt agricultural innovations. These studies identified characteristics such as gender, age, marital status, incomes, assets, networks, location, nature and type of technology, communication regarding markets, input delivery as factors influencing adoption of technology. A study in Philippines (Mariano, et al., 2012) demonstrated that factors influencing farmers' adoption of new rice technologies ranged from resources in possession of farmers (incomes, land), type of technology (whether it is labour-saving), size of farm, access to affordable credit to presence of extension services. In Tanzania, perceptions of farmers have been found to determine low scalability, adoption of agriculture technologies associated with application of small-irrigation, use of fertilizer and

improved seeds (Jha et al., 2020). These perceptions are shaped by awareness, poor technical support and lack of markets

A study in Philippines by Pangilinan and Bagunu (2015) demonstrated that farmers accepted introduction of genetically modified food as long as it contributed to food security, improved yields, involved low production costs as compared to other factors such as nutritional value. This relates to a study in Malawi looking at the dynamics of maize production together with yield and area dynamics, as well as farmers' perceptions (Nyirenda et al., 2021). Nyirenda et al. (2021) study demonstrated that although farmers planted 17 hybrids and 2 local varieties of maize seeds, their preferences were determined by affordability, yields, taste of flour after milling, resistance to pest and disease in the field and in their store. In spite of being low yielding, some farmers still grew local varieties because of its good taste, smell among other considerations. This underlines the need to incorporate farmers' perceptions in designing food security interventions.

Rahman et al. (2022) has established that farmers' perceptions affect climate change adaptation and impacted household food security. For example, (Rahman et al., 2022) study in Bangladesh assessing farmers' perceptions on climate change, their adaptation determinants and impact on household security revealed that farmers used adaptation strategies based on their knowledge of climate change, land size, farming experience, location of household and incomes. Further, Voung (2012) has asserted that not listening to farmers and lack of paying attention to their concerns as regards selection of beneficiaries, duration of project implementation, exclusion of the most vulnerable, quality and timeliness of seed distribution can have a negative implication on adoption of technology. In spite of this, there is still lack of empirical data to demonstrate how different farmers' perceptions and characteristics determine adoption of NGO-led food security interventions in Yatta Sub County.

Some food security interventions have staggered in achieving outcomes because farmers' perceptions are not in tandem with those proposed of NGOs. A study (Tschopp et al., 2010) in Ethiopian highlands revealed that farmers believed that land degradation was caused by other factors such as drought, overpopulation and water

scarcity and not overstocking and overgrazing as proposed by NGOs. Consequently, they supported increasing access to water sources, better breeds and communal farming contrary to NGOs proposal to destock. Other studies in Zambia, and Malawi (Nyanga et al., 2012; Chitongo, 2013; Ngwira et. al., 2013) regarding, promotion of conservation agriculture (CA) as a way to reduce soil disturbance, soil cover and crop rotations and address climate by NGOs failed because farmers attributed climate change to supernatural causes. Additionally, conservation agriculture was perceived to be good only for the wealth farmers who would afford draught power and had bigger size of land because it was considered to be labour-intensive. As a result, food production reduced when farmers were applying CA. However, farmers appreciated nutrition gardens with technologies such as drip kits and treadle pump because they were efficient in utilization of water and less labour intensive. The above studies re-emphasize the importance of understanding farmers' perceptions regarding specific interventions in order for them to be successfully implemented by NGOs.

Farmers' perceptions, especially on climate change have been shown to have implications on food security and agriculture. In Nigeria, Oti et al. (2021) asserted that climate change knowledge is understood by majority of the farmers' and described as changes in weather conditions which impact cropping patterns, soil fertility, delayed and early cessations of rains. The main source of this information is mass media, especially radio, friends and relatives. This awareness shapes their perceptions and readiness to apply effective climate change adaptations. In Himalayan region (Nepal), Shrestha et al. (2022) has noted that farmers' perceptions on changes in rainfall patterns, water availability, temperatures, explained their understanding of occurrences of floods, landslides and drought. These changes have affected rice and wheat production. This has propelled farmers to adopt diverse adaptation and coping strategies such as uptake of hybrid paddy species, planting of sugarcane in flood-prone areas, construction of bio-dykes, intercropping among others. Perceptions on awareness of climate change among farmers in Botswana drove them to apply a myriad of response interventions such as planting drought tolerant crops, use of supplementary feeds and diversification of crops (Bosekeng et

al., 2020). Understanding farmers' needs will go a long way in helping policy makers to design tailor-make strategies.

Not taking into consideration perceptions of farmers can lead to exclusion of some farmers by NGO-led interventions. A study in Bangladesh examining farmers' perception of integrated soil fertility and nutrient management to enhance sustainable crop production found that majority of landless and marginalized farmers exhibited a lower attitude towards the method. They considered the approach to be labour-intensive, yielding less impact and a wastage of both time and money (Farouque & Takeya, 2007). These perceptions influenced their refusal to adopt the method. Commercial farmers espoused these services compared to communal farmers. Additionally, Adedayo & Oluronke (2014) study in Nigeria examining farmers' perceptions and adoption of agroforestry practices found that some farmers felt that agroforestry is too scientific to adopt while others perceived this as improving farm productivity. These perceptions were informed by education and land ownership. The above studies imply that different cadres of farmers have diverse perceptions. This underscores the importance of developing tailor-made interventions for different categories of farmers.

2.4.4 Conditions of Funding Agencies

NGOs activities are dependent on funding agencies. These include governments, bilateral and multilateral donors, religious organizations, foundations, other largely northern-based NGOs and the private sector through corporate social responsibility (McGann & Johnstone, 2006; Jalali, 2008). Whereas financial support is paramount to NGOs' success in combating food insecurity as well as survival of this sector, this support is based on conditions that impact the projects undertaken by NGOs (McGann & Johnstone, 2006; Rauh, 2010). Admittedly, continual dependence on funding agencies has a profound impact on NGOs performance, accountability and legitimacy (Edwards & Hulme, 1996). However, there is little understanding on how the types and levels of influence exerted by funding agencies affect household food security, specifically when interacting with other variables such as farmers' participation and perceptions of NGO interventions.

Studies have noted that foreign aid is riddled with varying agendas (Stokke, 2016; Lancaster, 2007). The above studies argue that aid is given to fund government executive objectives; support geopolitical strategic concerns; as a public relations exercise aimed at presenting an image of a generous country; to appease domestic commercial interests; to satisfy moral and humanitarian factors and to facilitate regime change, among others. NGOs specifically have benefited from aid following a perception that they were better positioned to provide basic services. Others studies (Ingram, 2014; UNDP, 2014) have also indicated that the current aid focus is on increasing trade in order to enable the poor benefit in the global trade. Studies in India indicate that NGOs struggle to maintain commitment and goals in the face of receiving bigger fund because of external agenda and bureaucracies (Mount, 2021). Similarly, small organizations face insurmountable challenges in accessing funding because of inflexible rigid criteria applied by donors that are not in tandem with the local realities (Karmani & Reandi, 2023).

Additionally, aid is meant to combat corruption, improve gender equality, eliminate HIV/AIDS, food insecurity, confront global climate change, encourage good governance and boost partnership between governments, civil society organizations (CSOs) and private sector through public private partnership (PPP). Petrikova (2015) has argued that different facilities of development aid targeted at food security have varying impact. Bilateral and agricultural aid usually accompanied with conditions of governance registers insignificant impact as compared to grants and socio-economic aid. This begs the question on whether or not different conditions for aid do influence its intended outcomes.

According to Mfunwa (2006), both donors and aid receivers are under pressure to demonstrate that aid works. In response, donors have introduced a litany of conditions. Some of these include a shift from projects to programs; tying aid to poverty plans formulated with input from donors; a push to embrace technical support from funding agencies; promotion of improved governance, accountability and rights-based approach. Similarly, NGOs are forced to shift from mere service delivery to advocacy and utilization of standardized management blueprints

(Wallace, 2000). This implies that NGOs have to tune their programs to be in tandem with donor requirements as opposed to formulating them to fit the local contexts and needs. Ferguson (1990) studies in Lesotho demonstrated that taking political choices as technical, embracing external solutions with little cognizance of local situation and contexts and not enlisting the local knowledge is tantamount to 'de-politicizing development'. This attitude accounted for failure of many development programs in Lesotho. Evidence to show how NGOs food security programs are affected by funding agencies conditions in Yatta is unavailable.

Donors have embraced result-based funding. This is slowly becoming an approach that scales up aid and focuses more on demonstrable evidence of change (Pearson, 2011). Some of the terms used by funding agencies to describe result-based programming include "evidence-based", "theories of change", "tangible results" and "value for money". These terms assume that change is measurable and verifiable and that other knowledge has limited significance (Eyben, 2013). Notably, funding agencies including those supporting NGOs in the food security sector are churning out blueprints, procedures and policies that are aimed at controlling and predicting change. If the policies and guidelines fail, then they are blamed on recipients who are deemed as either unwilling to implement them or lack capacity (Wallace et al., 2006). Debates on effectiveness on accountability measures such as logical frameworks, financial reporting put in place by funding agencies remain inconclusive (Clerkin & Quinn, 2019)

Agyemang (2017) opines that NGOs perceive a focus on upward accountability exhibited by funding agencies as calculated to achieve external control. However, they have mastered ways of working around this for the benefit of their target groups. Several blueprints churned by funding agencies discourage experimentation, innovation and risk-taking (Eyben, 2013). Also, these formats are usually rooted in external cultural norms and do not reflect the local context. The above studies testify that funding agencies are consistently imposing conditions for funding flowing to NGOs. The extent to which these conditions have affected household food security remains largely unexplored. In Kenya, NGOs face similar funding challenges that the

negatively affect their sustainability. Studies (Mmatsi, 2020; Ondiege et al., 2021) propose that NGOs should diversify resources mobilization sources and embrace local corporates and other philanthropists. Diversification of funding will free them from dependency on donor funding and lead to sustainability of the programs.

2.5 Critique of Reviewed Literature

Literature on the role of NGOs in food security reveals that there is still lack of empirical data to demonstrate how farmers' participation and their perceptions of NGO-led interventions influence household food security. The literature reviewed strongly indicates that NGOs have been in the forefront of programming food security globally especially food relief, since World War II and more recently shifting towards resilience building to enable vulnerable households safeguard and sustain their livelihoods. However, there is a dearth of data to demonstrate how these initiatives have influenced household food security. The NGOs do not work on their own to address food security, but rather work with government and private sector. There is dearth of data to indicate how different actors coordinate their roles. NGOs in different countries and regions are implementing a myriad of activities to enhance food security. These include water harvesting, soil enrichment, conservation agriculture, and promotion of drought tolerant and early maturing crops, among others. Despite these efforts, food insecurity is unrelenting in most parts of the world, especially in Kenya. Ironically, the literature does not clearly demonstrate the factors responsible for the failure of NGO-led interventions to achieve household food security despite their increase in scale and magnitude.

Overall, the literature shows that NGOs recognize the importance of farmers' participation. Conversely, participation seems to be applied and conceptualized differently by NGOs. In practice, farmers on one hand face inherent challenges that hinder them from participating. On the other hand, the NGOs lack skills on how to incorporate farmers in formulation of interventions. Although a wide range of factors that pre-determine farmers' participation in NGOs interventions have been illuminated by the literature, there are still gaps to demonstrate how different approaches followed by NGOs have impacted household food security. It is not clear

from literature whether farmers understand their rights as regards participation, what influences farmers to participate and what are their levels of participation. Ultimately, participation is aimed to enhance sustainability of programs, but it is not clear how NGOs have enabled farmers to achieve this.

Similarly, the literature indicates that perception of farmers determine to a large extent adoption of interventions promoted by NGOs in different contexts. It is not clear from the literature whether or not adoption rates predict household food security. It is not known how NGO power dynamics play a role in shaping farmer's perceptions. Simultaneously, a diverse range of factors underlies perceptions held by farmers. However, there is still lack of information on how NGOs either integrate farmers' perceptions in formulation food security interventions or in-build these perceptions in programming. Lastly, the literature reveals that there is a critical role played by funding agencies in the sustenance of NGOs activities. The literature reveals that funding agencies are repeatedly imposing conditions for aid given to NGOs for a variety of reasons. This sometimes influences the work of NGOs programming food security. However, there is still dearth in data to determine how conditions imposed by funding agencies impact NGOs food security outcomes.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a description of methodology used in this study. The chapter is organized into sections starting with a description of the study area, study design, population, sampling technique and sample size. The chapter also presents instruments that were utilized for data collection, as well as processes undertaken to analyze both quantitative and qualitative data. The study adopted random sampling which enables each unit of analysis to have an equal chance of being selected (Kombo & Tromp, 2006; Kothari, 2012; Nachmias & Nachmias, 1996).

3.2 Study Area

The study was carried out in Yatta Sub County of Machakos County, which is a semi-arid area that experiences frequent food insecurity and water shortages. Yatta Sub County lies within 1.50 ^{0} S and 37.25 ^{0} E with a population of 147,579 people (KNBS, 2009) in an area of 1,057.30 Square kilometres. It constitutes five administrative wards namely Ndalani, Matuu, Kithimani, Ikombe and Katangi. Landon (as cited in Liavega et al., 2014) classifies Yatta Sub County as agro-climatic zone IV that is semi-arid with average temperatures ranging from 17^{0} c during the night to 24^{0} c in the day. The area receives a bimodal rainfall of averagely 400mm with long rains recorded in March to May and short rains in October to December. A mixture of Ferric Luvisols, Rhodic Ferralsols, Alfisols, Ultisols and Lithisols (FAO, 2006) which are severely eroded characterizes the soils in the area. The main economic activities include a mixture of subsistence farming and animal rearing, as well as small businesses.

3.3 Research Design

The study utilized mixed method design that integrated both quantitative and qualitative research methods. Specifically, the study used convergent parallel mixed

method in which both qualitative and quantitative research methods were merged to provide a deeper understanding of the study phenomenon (Creswell, 2014). In order to overcome shortcomings of either method (Creswell, 2014), this study utilized each method separately in the beginning. Initially, qualitative study was undertaken through exploratory sequential design as espoused by DeVellis (1991) to explore events and processes. This involved interviewing selected key informants on topics relevant to the study. Data arising from qualitative study was analysed to inform restructuring of other qualitative guides, as well as concretizing the constructs that were measured in quantitative study.

3.3.1 Case Study

Qualitative method also utilized case study to develop an in-depth analysis of a phenomenon under study using a variety of data sources in order to increase its understanding (Yin, 2003). Yin (2003) has demonstrated that case study is valuable in providing answers on "how" and "why", examining differences and similarities between cases, drawing patterns and building explanations. Case study builds on the rationale that truth is relative and anchored in one's perspective (Baxter & Jack, 2008). Consequently, this design enables people to tell their story in order to reveal views of their reality. Specifically, this study utilized multiple case study, which allows for collection of data from diverse cases for comparing and contrasting. This has been lauded for being robust because it enables the researcher to undertake cross-case comparisons and triangulate findings from multiple case studies (Yin, 2003).

3.3.2 Cross-Sectional

In quantitative method, the study adopted cross-sectional method using a survey. This has been lauded for making comparisons of diverse number of variables at a single point in time and provides information to explain cause and effect relationship in a given moment. This survey enables a researcher to collect data that investigates associations between properties and dispositions (Nachmias & Nachmias, 1996).

3.4 Population of the Study

The target population was 3,341 farmers registered in 100 farmer groups under the Ministry of Gender, Youth, and Social Welfare and recognized by the Ministry of Agriculture. These farmers have worked with NGOs in Yatta Sub County of Machakos County in various food security interventions for more than 3 years. The 3-year cut-off was important to afford a farmer sufficient experience and interaction with NGOs which mostly implemented 3 year programs. These groups were distributed in different wards. The groups were led by a lead farmer and were fully registered. The groups undertook different food security activities in collaboration with NGOs.

3.5 Sampling Frame

The sampling frame was generated from a list of 100 farmer groups constituting of 3,341 farmers. Efforts were made to ensure that farmers interviewed did not belong to more than one group through enlisting lead farmers to double-check. These groups had worked with NGOs for more than three-years. The three-year cut-off was important because it provides sufficient time to measure effect of NGO interventions on household food security. This list was derived from the registered farmer groups with the assistance of Yatta Sub County Agricultural Officers, NGOs and lead farmers that had been trained by NGOs. The lead farmers were responsible for the operations and management of each group

3.6 Pilot Study

Initially, a pilot study of 36 farmers representing five wards of Yatta Sub County was undertaken to test the suitability of the questionnaire. This led to the revision of the questionnaire to make it concrete and understandable by the farmers. The choice of the sample size for this pilot concurred with Connelly (2008) assertion that the pilot sample size should be 10% of projected sample. Isaac and Michael (1995) have also noted that a sample of 10 to 30 respondents is appropriate. The villages and groups

where farmers were involved in the pilot were not sampled in the main study. The respondents in the pilot were not included in the final study.

3.7 Sample and Sampling Technique

Using a formula developed by Israel (1983), a sample size of 357 was selected as demonstrated below.

$$n = \frac{N}{1+N(e)2}$$

$$N = \frac{3341}{1 + 3341(.05)^2}$$

= a sample size of ***357.04*** **= 357**

Where N= Population size of farmers working with NGOs interventions in five wards for more than three years.

Where e = level of precision at 5%

The sample size was based on P=.5 and a confidence level of 95%.

The above formula is appropriate for calculating sample sizes from finite population. The formula was suitable for selecting sample size for this study that was only interested with farmers that have worked with NGOs for more than three years. This sample was proportionally divided among all 100-farmer groups selected as shown in appendix I1. The study employed stratified random sampling in which all the five wards in Yatta Sub County were stratified. In each stratum, a list of farmer groups that had worked with NGOs for more than three years was identified and categorized according to their membership base, the number of years worked with NGOs and the types of activities that they had undertaken with NGOs (Appendix II). A proportionate sample size per each stratum is provided in Table 3.1 below.

Table 3.1: Sample Size

Name of stratum (Ward)	Number of farmer groups working with NGOs more than three years	Total members of farmers	Proportionate Sample size
Katangi	26	837	90
Ikombe	18	1008	108
Kithimani	8	247	26
Matuu	15	376	40
Ndalani	33	873	93
Total	100	3,341	357

3.8 Data Collection Instruments

3.8.1 Survey Questionnaire

This study utilized a set of survey questionnaire that collected data from farmers in response to the study objectives. The questionnaire was semi-structured with closed and open- ended questions (see appendix I). The study adopted face-to-face interviews in which the interviewer asked the respondent questions designed to provide answers relevant to the research objectives. The questionnaire was divided into sections that captured data based on the objectives of the study. A five point Likert scale was used to measure the perceptions of farmers regarding effectiveness of NGOs food security interventions.

3.8.2 Focus Group Discussions

Six focus group discussions (FGDs) were held. Of these, five were undertaken among selected farmers in five wards with each involving an average minimum of 12 farmers constituting of men and women. Efforts were made to ensure diversity among FGDs based on gender, location, types of interventions undertaken, among others. Sampled farmers who took part in the survey were not recruited to the focus group discussion. Similarly, one focus group discussion involving 13 members from NGOs working in the area was also conducted. A moderator who utilized an interview schedules (see appendix three and five) and a rapporteur that recorded the

responses guided each focus group. The focus group discussions provided an opportunity to collect qualitative information that gave insights into the topics under study.

3.8.3 Key Informant Interviews (KIIs)

Key informants were selected from people with expert knowledge on the issues under study. These were purposively sampled given their expert is specific areas. These involved 33 experts that included eight Program Staff of NGOs working in the study area, seven County Government Officials working under the Ministry of Agriculture, Livestock and Fisheries, Ministry of Water, ward administration, as well as six local administrators (Deputy County Commissioner, Chiefs and their Assistants). Additionally, 12 lead farmers were interviewed. These experts provided insights and a range of opinions on the topics under study. Key informant interviews were conducted using an interview guide (see appendix III).

3.8.4 In-Depth Interviews

In-depth interviews were used to interview two case studies consisting of two farmers (a male and a female) that had extensively engaged with NGOs in the area for more than three years. These cases were chosen given their experience with implementing different NGO interventions. However, these two cases were not among those sampled for the survey. These two farmers exhibited varied positive and negative experiences in working with NGOs. This allowed for comparison, triangulation and contrasting. An in-depth interview schedule (see appendix VI) was used to investigate and capture various aspects of their experiences relevant to the objectives of the study.

3.9 Data Processing and Analysis

3.9.1 Quantitative Data

The analysis of quantitative data was undertaken through the following steps: Data was cleaned, categorized, coded, edited using Statistical Package for Social Sciences

(SPSS) version 21 for timely analysis. Descriptive statistics that included frequency distributions mean scores, standard deviation, and coefficients of variation (CVs) were tabulated. For Likert scale questions, reliability test was undertaken using Cronbach alpha tests. Hogan, Benjamin & Brezinksi (2000) have noted that the Cronbach alpha is preferably utilized for reliability coefficients. This measure was developed by Lee Cronbach in 1951 and determines whether multiple question Likert scale surveys are reliable (Gliem & Gliem, 2003). The rule of thumb according to George and Mallery (2003) stipulates that alpha scores of more than 0.7 are considered acceptable, while those above 0.9 are the best. Pearson correlation coefficient (R) was used to measure the nature and strength of the relationship between variables.

Multicollinearity was used to ensure that independent variables are not highly correlated. Multicollinearity misleadingly bloats the standard errors. Thus, it makes some variables statistically insignificant while they should be held significant (Martz, 2013). Tolerance of a respective independent variable is calculated from $1 - R^2$. A tolerance with a value close to 1 means there is little multicollinearity, whereas a value close to 0 suggests that multicollinearity may be a threat (Belsley et al., 2005). The reciprocal of the tolerance is known as Variance Inflation Factor (VIF). Equally, the VIF measures multicollinearity in the model in such a way that if no two independent variables are correlated, then all the VIF values will be 1, thus indicating lack of multicollinearity among factors. But if VIF value for one of the variables is around or greater than 5, then there is multicollinearity associated with that variable (Martz, 2013). Table 3.2 below presents the test results for multicollinearity, using both the VIF and tolerance.

Table 3.2: Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	(Constant)		
	Need identification	0.767	1.303
	Selection of interventions	0.885	1.130
	Implementation	0.580	1.724
	Monitoring	0.546	1.833
	Effectiveness	0.891	1.122
	NGO	0.991	1.009
	Local Context		
	Duration of funding	0.673	1.487
	Standard results	0.569	1.758
	Standard interventions	0.711	1.406

As shown in Table 3.2 above, VIF values are less than 5. Thus, it was concluded that there was no presence of multicollinearity in this study. The VIF shows how much the variance of the coefficient estimate is being inflated by multicollinearity. Factor analysis was utilized to collapse multiple variables to fewer variables using principal component analysis. Kaiser-Meyer Olkin to measure sampling adequacy and Bartlett's test of sphericity were applied (see appendix VII).

A logistic regression model was used to address the second and third objectives, as well as the overall objective. The logit model is suitable in cases where we have a binary dependent variable. The Ordinary Least Squares model (OLS) is unsuitable when the dependent variable is dummy for three reasons (see Greene, 2018). First, the probability is likely to exceed the boundaries of 0 and 1 which is unrealistic. Second, OLS residuals are heteroskedastic. Thirdly, the residuals are not normally distributed since they only take two options, 1 or 0. The study calculated the

Nagelkerke R Square (R^2) to determine the portion of household food security accounted by variables in the study. The regression equation is presented as follows:

$$Pr\,Pr\,(X_i) = \Lambda(\alpha_0 + \alpha_1 X_1 + a_2 X_2 + a_3 X_3 + \alpha_4 X_4 + a_5 X_5 + \alpha_6 X_6 + a_7 X_7 + a_8 X_8 + a_9 X_9 + \varepsilon_i)$$

…… *Equation 1*

Where:

Y_i – Household food security indicator: Whether food produced and income earned is sufficient in providing household food needs (1) or not (0) and whether household receives relief food (1) or not (0).

X_1 – Problem and needs identification (as measured by needs assessment using methodologies such as PRA, asset based community development, group discussions and others, prioritization of needs and proposal formulation).

X_2- Selection of interventions (as measured by farmers' involvement in decision making on identifying types of interventions through methodologies such as PRA, group discussions, validation workshops, among others).

X_3 – Implementation measured in whether or not farmers are directly executing NGO interventions.

X_4 - Monitoring (measured by farmers' involvement in governance structures such as project management committees, village project committees and engagement in evaluation, reports verification and reporting teams).

X_5 – Effectiveness of interventions (as measured by a Likert Scale).

X_6 – NGO understanding of the local context (as measured by a Likert Scale).

X_7 – Duration of funding (as measured by the number of years ascribed to a project in which less than 5 years is considered short, while more than 5 years long).

X_8 – Standardized results (as measured by whether or not current results were prescribed by NGO/funding agency).

X_9 – Standardized interventions (as measured by whether or not interventions were predetermined by NGO/funding agency).

ε_i – Error term.

α_0 is a constant while $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8$ and α_9 are regression coefficients for covariates to be estimated. Λ denotes the logistic distribution function.

Causal mediation analysis was applied in the fourth objective to test the effect of independent variables (x) on mediating variables (M) and assess the link between the effects of mediators on outcome (y). Causal mediation analysis helps explain associations between x and y and how a third intermediary variable is related to the observed association. Pearl (2014) posits that this methodology unravels causal pathways that account for observed x and y relationship. In this case, participation of farmers in NGOs interventions measured by variables $X_{1...}X_4$ as well as perceptions of farmers on NGO interventions measured by variables X_5....X_6 interacted with mediating variables X_7…X_9 representing conditions of funding agencies. This is modeled as follows:

$$Pr\,Pr\,(X_i) = \Lambda(\alpha_0 + \alpha_1 X_1 + a_2 X_2 + a_3 X_3 + \alpha_4 X_4 + a_5 X_5 + \alpha_6 X_6 M + \alpha_7 X_7 M + a_8 X_8 M + a_9 X_9 M + \varepsilon_i$$

…

…… *Equation 2*

Where:

Y_i – Household food security indicator: Whether food produced and income earned is sufficient in providing household food needs (1) or not (0) and whether household receives relief food (1) or not (0).

$X_1 \ldots . X_4$ - Participation of farmers in NGO interventions

$X_5 \ldots X_6$ - Perception of farmers of NGO interventions

M- Conditions of funding agencies which is interacted with X_6, X_7 ... and X_9

ε_i – Error term

α_0 is a constant while $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8$ and α_9 are regression coefficients for covariates to be estimated. Λ denotes the logistic distribution function.

3.10 Qualitative Data Analysis

Qualitative study is anchored on the fact that there are two paradigms to study social contexts: deductive verses inductive (Flick, 2018). Deductive aligns with quantitative data that is more concerned with differentiating cause and effect, as well as quantifying phenomena with exactness. Inductive relevant to qualitative studies maintains that reality is perceived differently by individuals and hence the need to use a myriad of approaches to capture varied perspective (Bernard, 2006; Flick, 2018; Creswell, 2014). In order to comprehensively analyze qualitative data, this study adopted framework analysis that is systematic and appropriate for thematic

semi-structured interviews or research with specific questions and limited time-frame (Gale et al., 2013).

This analysis involved various stages. Firstly, efforts were made to familiarize with the data through reading, summarizing, and making memos using coloring, as well as cut and paste processes. Secondly, the data was organized through numbering and coding into categories, while anonymising sensitive information by using pseudo names without losing original names. Thirdly, the emerging themes were identified and further re-coded and linked in order to elicit patterns and trends. The data was also triangulated by analyzing data from more than one source to get a variety of insight in order to test reliability and validity. This was summarized per category into charts (a spreadsheet matrix). Finally, the data was interpreted by noting similarities and differences in opinions and patterns to build a sequence of events.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents the findings of the study undertaken in Yatta Sub County of Machakos County among 357 farmers representing 100 farmer groups that have worked with NGOs for more than three years. The findings answer the four research objectives of this study which were: (1) To identify types of interventions undertaken by NGOs in Yatta Sub County to influence household food security; (2) To explore the extent to which farmers' participation in NGOs interventions affect household food security in Yatta Sub County; (3) To determine farmers' perceptions of NGO interventions and their effect on household food security; (4) To investigate the extent to which conditions exerted by funding agencies mediate the association between farmers' participation and perceptions of NGO interventions and household food security.

The first section provides a demographic and descriptive summary of farmers' characteristics. These pertains to information on farmers' distribution in the study area, gender, age, education, income levels, decision making levels, labour, number of years of working with NGOs and their sources of livelihood. The second section presents data regarding household food security in Yatta Sub County, particularly relating to food production, consumption and marketing within the two main seasons: short and long rains. The section further highlights sources of farmers' incomes arising from NGO activities and examines its sufficiency in meeting household food needs. Simultaneously, the section present results to demonstrate whether farmers who have benefited from NGOs interventions still rely on relief food. The last section addresses the four key objectives of the study by relying on both descriptive and inferential statistics and present results of three null hypotheses. These include logistic regression analysis to determine whether farmers' participation, their perceptions of NGOs interventions are significantly associated with household food security. Causal mediation is also used to find out whether

conditions of funding agencies mediate the relationship between farmers' participation and perception of NGO interventions and household food security. This section also provides a summary of findings and emerging key conclusions

4.2 Response Rate

A questionnaire was administered among 357 farmers in Yatta Sub County who had worked with NGOs for more than three years. All the 357 farmers responded to the questionnaire. This represented a response rate of 100%. This response rate was achieved because all the farmers in each of the 100 groups sampled were registered. These farmers were known and supervised by a lead farmer. The study utilized the lead farmers to identify, contact, make appointments and follow-up of all the farmers sampled. Mugenda (2003) asserts that a response rate of 50% or more meets the threshold of analysis and publishing. A response rate of more than 70% is considered outstanding.

4.3 Demographic Characteristics of Farmers

The survey sampled farmers from all the five wards of Yatta Sub County in proportionate to the number of farmer groups working with NGOs. As shown in Table 4.1 below, majority (30.3%) of farmers were from Ikombe ward, Ndalani (26.1%) and Katangi (25.2%). These wards had the highest concentration of farmer groups that had worked with NGOs for more than three years compared to those in Matuu and Kithimani.

Table 4.1: Distribution of Farmers per Ward

	Frequency	Percent
Ikombe	108	30.3
Katangi	90	25.2
Kithimani	26	7.3
Matuu	40	11.2
Ndalani	93	26.1
Total	357	100

Table 4.2 below presents farmers socio-economic characteristics that included gender, age, education and incomes. In terms of gender distribution, the majority of the farmers (77.6%) were women, while 22.4% were men. These findings demonstrate that women constituted the largest proportion of members of farmer groups working with NGOs. The majority of the farmers in this study were within the age groups 41 to 50 (30.3%) and 61 to 70 (25.5%) years. The mean age of the farmers interviewed was 52 years, while the average number of household members was six people. These results imply that the average farmer in Yatta Sub County benefiting from NGOs food security interventions is above 50 years. The youthful farmers in this study were under-represented, particularly those under 30 years. These findings were further supported by key informant interviews. For example, a county officer within the Ministry of Water and Irrigation noted that:

> *"The youths in Yatta Sub-County are not fully engaged on the water interventions. They leave such activities to their parents".*

A local administrator also echoed similar sentiments:

> *"NGOs are mainly reaching the old people above 60 years. The young people who should be driving agriculture have no land of their own. This poses a big challenge for them to be involved. The youth are more involved in boda boda (motorcycle transport) business than agriculture".*

It has been established that efforts aimed at infusing information and communication technologies (ICTs) into agriculture is likely to attract youth participation in farming. A diverse range of digital tools and platforms such as '*Mkulima* Young Champions' that aims at sharing information, technologies and markets inspires youth to engage in farming (Irungu, et al., 2015).

The finding also revealed that the majority of the farmers (44.3%) had primary level education compared to 19.3% with secondary education. Only 2.8% dropped out of school before finishing either primary or secondary. Further, more than 50% of the farmers earn between Kenya Shillings (Kshs) 6,000 to 10,000 monthly incomes

compared to 26.3% of those with an income below Kshs 5,000. Only 14.3% earn an income of between Kshs 11,000 and 15,000, while a mere 2.8% have incomes over 20,000 Kshs (Table 4.2). These findings imply that more than half of the farmers in Yatta Sub County have an income below Kshs 10,000. However, farmers are likely to under-report their incomes due to poor record keeping, sensitivity and privacy.

Table 4.2: Distribution of Respondents by Gender, Age, Education and Income Levels

Gender	%	Age	%	Education	%	Incomes	%
Female	77.6%	<= 30	2.8	drop out	19.6	Below 5,000	26.3
Male	22.4%	31 – 40	12.9	Primary	44.3	6,000-10,000	52.7
		41 – 50	30.3	Secondary	19.3	11,000-15,000	14.3
		51 – 60	21.3	Tertiary College	8.4	16,000-20,000	3.9
		61 – 70	25.5	A-Levels	0.6	Above 20,000	2.8
		71 – 80	6.2	University	0.6		
		81+	1.1	Total	92.7		
			100.0	Missing	7.3		
Total	100%	357	100%		100.0		100%

4.3.1 Household Characteristics

According to Table 4.3, wives constituted the majority of household members (59.9%) that worked with NGOs compared to husbands (18.5%). This confirmed that women were the majority of the members in farmer groups. In terms of decision-making, the study found that 36.4% of husbands made decisions regarding farming as compared to 33.9% of the wives. Only 28% of the farmers made joint decisions. In provision of farm labour, 31.4% of the farmers indicated that both husband and wife were involved. Wives contributed to 24.9% of the labour force compared to 17.4% of the husbands. This study suggests that both men and women contribute to household labour force. However, women still contribute the largest proportion of household labour force in Yatta Sub County compared to men. This finding concurs

with studies in Sub-Saharan Africa that reveal that women account for over 50% of labour force in the agricultural sector (FAO, 2011). The study further demonstrated that 60.5% of farmers in Yatta Sub County had worked with NGOs between 3 and 5 years compared to 19.9% who recorded 6 to 10 years. Fewer farmers had worked beyond 10 years (Table 4.3). The above findings demonstrate that women compared to men formed the majority of the members of farmers groups, contributed to household decision making and provided labour. These findings are consistent with a study in Ethiopia, which demonstrates that women extensively contribute to farming, yet their efforts remain unvalued (Gella & Tadele, 2015).

Table 4.3: Distribution of Respondents per Household, Work with NGOs, Decision Making etc

Household members	**%**	**Decision making**	**%**	**Labour provision**	**%**	**Years of working**	**%**
Husband	18.5	Husband	36.4	Husband	17.4	3 - 5	60.5
Wife	59.9	Wife	33.9	Wife	24.9	6 – 10	19.9
Both	4.8	Both	28.0	Both	31.4	11 – 15	8.1
Children	0.3	Children and parents	1.4	Children, wife and father	16.2	16+	9.2
Total	83.5	Grand parent	0.3	wife and Hired labour	5.3	Total	97.8
Missing	16.5			Husband and hired labour	0.8	Missing	2.2
				Hired labour	0.8		
				Wife and Children	2.8		
				Children	0.3		
Total	100		100	Total	100.0		100

4.3.2 Farmers Sources of Livelihood

The findings demonstrate that farmers deploy a myriad of activities to eke a livelihood as shown in Table 4.4. The highest reported is farming of diverse crops (93%), livestock production, particularly keeping of goats, cattle and chicken

(79.6%), involvement in casual employment (34.5%), while formal employment accounts for a mere 7.6%. The findings indicate that most farmers in Yatta Sub County depend on multiple sources of incomes with agriculture and livestock production being the predominant. These findings concur with a study (Wankuru et al., 2019) that has demonstrated that agriculture contributes to 31.4% of poverty reduction in rural Kenya and is the main source of income for poor and non-poor households. This study is also consistent with (Agesa et al., 2019) who found that 82% of farmers' income in Yatta is derived from farming.

Table 4.4: Sources of Livelihood for Farmers

	Yes		No	
Main sources of livelihood	**Frequency**	**Percent**	**Frequency**	**Percent**
Farming various crops	332	93.0	25	7.0
Livestock production (goats, cattle, chicken)	284	79.6	73	20.4
Formal employment	27	7.6	330	92.4
Casual Employment	123	34.5	234	65.5
Business(grocery sales)	77	21.6	280	78.4
Art and craft (basketry, carvings)	74	20.7	283	79.3
Remittances	75	21.0	282	79.0
Others specify-saloon, tree nursery	8	2.2	349	97.8

4.4 Household Food Security in Yatta Sub County

In this study, household food security was treated as dependent variable. Efforts were made to establish the farmers' perspective regarding the status of their household food security in the light of implementing NGOs interventions. Household food security was measured based on whether or not food produced and incomes earned were sufficient to provide household food needs. Similarly, household food security

was evaluated based on whether or not households depended on relief food irrespective of being involved in NGO food security interventions. Reliance on relief is an indicator of household food stress. Yatta Sub County face frequent seasonal food insecurity, manifested in shortage of water, regular crop failure and dependence on relief food (Mburu et al., 2015). Yatta Sub County like other arid and semi-arid areas is dependent on rain-fed agriculture usually received in two main seasons: long rains (March to May) and short rains (October to December). This study analyzed food production, consumption and selling of different crops in these two main rain seasons in Yatta Sub County during 2019 October to December and 2020 between March and May.

Household food security was evaluated by measuring the average quantity of food produced in kilograms per household; amount consumed; amounts of foods that were considered to be sufficient in meeting household food needs in a given season and those crops that were sold in the two respective seasons: long and short. As demonstrated in Table 4.5, most households produced more maize, pigeon peas, beans and cowpeas among other crops during the long rains season. Similarly, maize, pigeon peas, cowpeas and beans were predominantly consumed. A large proportion of households (73.9%) noted that maize sufficiently met their household food needs. Beans (57.8%) and cowpeas (55, 5%) followed this. These findings suggest that households were generally food sufficient during long rains season. Further, fruits, maize, vegetables, pigeon peas and beans were the most sold crops in kilograms during this season.

Table 4.5: Statistics of Long Rain Season (March-May) by Household Food Needs

Long season Crops	Quantity produced (Kg)	Quantity consumed (kg)	Sufficient F (%)	Quantity sold (Kg)
Maize N=355	602.90	351.55	261 (73.9)	304.50
Beans , N=310	205.78	87.46	117 (57.8)	117.83
Sorghum, N=56	100.87	85.95	41 (11.5)	33.61
Green grams N=288	146.40	81.02	139 (38.9)	97.13
Pigeon peas N=262	285.63	136.54	155 (43.4)	199.13
Cow peas N=331	172.46	116.45	198 (55.5)	79.00
Millet N=5	79.40	38.25	2(.5)	61.0
Vegetables N=25	238.68	65.57	16(3.9)	218.38
Fruit N=52	387.71	87.33	45(11.0)	335.60

In the short rain season (October to December), maize, beans cowpeas and green grams are the main crops produced albeit in low quantities by most farmers compared to long rain season (Table 4.5). Additionally, vegetables are produced by fewer farmers but in more kilograms. During this season, maize, beans, cowpeas and green grams are predominantly consumed. Ironically, there is a significant decrease in the number of households considering different crops to be sufficient in meeting their household food needs as compared to the long rain season. These include 41.8 % for maize, 31% for green grams and 27.2% for cowpeas (Table 4.6). Though grown by fewer farmers, vegetables and fruits represent crops that were sold in large quantities, compared to maize. The above findings demonstrate that households in Yatta are likely to experience food stress during the short rain season.

Table 4.6: Short-Season (October-December) Crops Produced, Consumed and Sold

Crops	Quantity produced (Kg)	Quantity consumed (kg)	Sufficient F (%)	Quantity sold (Kg)
Maize N=344	335.72	114.68	141 (41.8	71.93
Beans , N=291	169.52	51.86	74 (26.6)	27.65
Sorghum, N=33	73.43	65.61	19 (5.3)	21.25
Green grams N=179	81.38	52.75	53 (31.0)	33.29
Pigeon peas N=21	70.24	65.00	9 (2.5)	26.00
Cow peas N=286	127.70	50.23	97 (27.2)	28.20
Millet N=5	45	45	2(.5)	0
Vegetables N=25	232.71	36	7 (1.7)	232.71
Fruit N=45	151.85	42.86	19 (4.6)	119.78

The comparisons in the two seasons above indicate that farmers predominantly produce maize, beans, cowpeas and pigeon peas in all seasons. Similarly, maize, beans, cow peas and pigeon peas are the most consumed foods in the two seasons. Maize is still considered as a cash crop as it is traded in all the seasons. Erenstein et al. (2021) asserts that maize since its introduction over 9000 years ago has become significantly important in the agri-food systems globally and is one of most important cereal grown and traded, hence merits research and development. Most households report that they have sufficient foods during the long rain season to meet their households' food needs in quantities compared to the short rain season. In the focus group discussions, farmers were asked to identify specific indicators they used to evaluate whether or not their households were food secure. They confirmed that maize, beans, cowpeas, pigeon peas and green grams constituted key crops that contributed to their household food security. Similarly, they considered households that were able to grow their own food in sufficient quantities to an extent of retaining a reserve for the next season, as well as those that were not dependent on relief food,

kept some livestock and were accessing incomes from other sources as food secure. However, it is important to note that effects of climate change are altering rainfall patterns and seasons.

Similarly, this study sought to find out if farmers' incomes had increased because of their involvement in NGO food security interventions. As shown in Table 4.9, majority of the farmers (83.6%) confirmed that their household incomes have increased because of sales of surplus food and other interventions initiated by NGOs they had worked with. More than a half (59.9%) of the farmers confirmed that the food they produced together with incomes earned from other interventions was sufficient to provide their household food needs. Consequently, there was a likelihood that a combination of incomes and farm produce was having a positive influence on household food security for those farmers engaged with NGOs. This was supported by farmers' focus group discussion which asserted that implementation of both on farm and off farm interventions increased both their household food supplies, especially in the long-rain season, augmented and diversified their income sources. Farmers engaged in multiple interventions to enhance their household food sufficieny. This gave them enhanced capacity to feed their families. A local administrator in Katangi Ward supported these sentiments by stating that:

> *"I have seen that NGOs encourage and support farmers to undertake small businesses and to be part of village savings such as table banking. I have also noted that farmers are combining these activities together with growing crops and keeping livestock especially goats and chicken. This means that even when the season is bad and crops fail, they can still sell a goat or a chicken, borrow from a village saving scheme they belong to or rely on their businesses. As long as the farmers have access to money, own some livestock, can produce and reserve some food, they are not going to starve"*

Table 4.7: Farmers Increased Income from NGOs Interventions

	N	%
Household income increased because of sales of surplus food and other interventions initiated by NGOs.	295	83.6%
Food produced and income earned from other interventions is sufficient in providing household food needs.	212	59.9%

Additionally, farmers were asked to assess whether NGOs food security interventions have contributed to their household food security. As shown in Table 4.8, (85.7%) of the farmers responded positively compared to (13.7%) who felt that interventions had not contributed to their household food security. This implies that most farmers in one way or another felt that NGOs are contributing to their household food security. Chegini et al. (2021) found that household welfare is significantly and directly associated with household food security. It is however noted that lack of baseline data among farmers in Yatta to highlight the situation before NGO interventions made it difficult for this study to compare trends in food yields and incomes.

Table 4.8: Contribution of NGOs Interventions to Household Food Security

		Frequency	Percent
Valid	Yes	306	85.7
	No	49	13.7
	Total	355	99.4
Missing	System	2	.6
Total		357	100.0

Further, this study sought to find out whether farmers who were benefiting from NGO interventions were still dependent on relief for their household food needs. According to Table 4.9, below an overwhelming majority of the farmers (over 90%) did not receive any relief food in any of the seasons within October to December

2019 and March to May 2020 seasons. This remarkable decrease in the number of households depending on food relief suggests that most households engaged with NGOs are able to feed themselves in all the seasons.

Table 4.9: Farmers Receiving Relief Food

	Yes		**No**	
	Count	**%**	**Count**	**%**
Long rains March –May	4	1.1%	349	98.9%
Short rains October-December	13	3.7%	339	96.3%

The above findings were consistent with farmers focus group discussions in Ikombe Ward in which farmers noted that households were moving away from depending on relief food. These farmers confirmed that many households previously relied on relief food either provided by the government or NGOs before they started engaging in NGO interventions to enhance their household food security. Farmers in these focus group discussions further asserted that NGOs have come up with transformative ideas known locally as *Operation Mwolyo* (OMO), which translates, to 'operation eliminate hunger and stop depending on relief'. Such NGOs have inspired farmers to work hard on their farms and implement rainwater harvesting, growing of drought tolerant crops, improve soil fertility and enhance linkages to markets in order to become food secure. One farmer in Ikombe Ward focus group discussion summed this as follows:

> *"If I depend on relief food, I cannot satisfy my family's food needs. Relief food is usually given in small portions that cannot satisfy my family. Moreover, it makes me look like a beggar. I have realized that I have enough resources within my farm to produce enough food for my family. Why will I go to queue for relief when I can invest that time to grow my own food? If I have water, I have everything I need to be food secure"*

The above findings suggest that farmers in Yatta were producing food within two main season: long rains and short rains. Maize beans and cowpeas were the predominant crops produced, consumed and sold. Households were relatively food sufficient in the long season compared to the short rain season. In general, household incomes for those farmers involved in NGO interventions were increasing. Finally, most farmers were no longer dependent on relief food. This implies that many households involved in NGO interventions are relatively food sufficient. However, it was difficult for the study to make concrete comparisons of before and after situations due to lack of baseline data.

4.5 To identify Types of Interventions Undertaken by NGOs in Yatta Sub County to Influence Household Food Security

The first objective of this study sought to identify the types of interventions undertaken by NGOS in Yatta Sub County to influence household food security. The findings demonstrate that interventions undertaken by NGOs ranged from rainwater harvesting, soil fertility enhancement, drought tolerant crops, extension services, provision of inputs, off-farm activities to livestock production. As shown in Table 4.10, the common interventions applied by the farmers in rainwater harvesting were terracing (90.5%), construction of water pans (65.8%), making of zai pits (61.3%), sub-surface dams (sand dams) (38.1%) and earth dams (28.9%). The findings suggest that NGOs introduced and deployed a multiplicity of interventions concurrently to harvest rainwater among farmers. These findings were corroborated by farmers and NGO focus group discussions from all the surveyed areas who reported that a variety of rainwater harvesting both communal (sand dams, earth dams) and on farm (farm ponds, water pans, terracing and zai pits) were undertaken by farmers to mitigate drought and increase conservation of water for food production and household use. One farmer from Ikombe Ward reported that:

> *"The NGO that I have worked with has supported us in constructing sand dams along Kinyongo seasonal river. We are using the water harvested from these dams to undertake small-scale irrigation to grow vegetables. Similarly, the NGO has supported us to make terraces on our farms to harvest run-off*

water and control soil erosion. The NGO has given us tools and sometimes motivated us through food for work to construct water pans on our farms to harvest runoff water. In our community, most people have these individual water pans'

Table 4.10: Interventions for Harvesting Rainwater Undertaken by Farmers

Rain water harvesting	Frequency	Percent
Earth dams (silanga sya matinga)	103	28.9
Subsurface/sand dams (koo)	136	38.1
Water pans (silanga sya moko)	235	65.8
Farm ponds	31	8.7
Boreholes	55	15.4
Roof catchment (water tanks)	87	24.2
Terracing	323	90.5
Zai pits	219	61.3
Fishponds	13	3.6

According to Table 4.11, farmers implemented interventions in soil fertility enhancement which included use and making of compost manure (87.7%), terracing to control soil erosion (81.5%), mulching (52.9%), use of synthetic fertilizers (DAP) (41.7%), as well as practicing agroforestry (18.2%). Farmers in focus group discussions confirmed that terracing, use of compost manure and agroforestry were commonly introduced by NGOs to improve the health of the soils in Yatta Sub County. This was consistent with findings from NGOs focus group discussions in which it was established that for a long time, NGOs have promoted terracing to conserve both soil erosion and runoff water among farmers. NGO respondents also confirmed that they encouraged farmers to make compost manure from their livestock and use it to add nutrients to the soil to increase production. It was also reported that mulching is promoted as part of a package for conservation agriculture together with zero tillage.

Table 4.11: Interventions for Enhancing Soil Fertility Practiced by Farmers

Soil fertility enhancement		
	Frequency	**Percent**
Mulching	189	52.9
Use and making compost manure	313	87.7
Use of synthetic fertilizers(DAP)	149	41.7
Terracing to control soil erosion	291	81.5
Planting of nitrogen fixing trees (agro forestry)	65	18.2
Zero tillage	37	10.4
Others	10	2.8

Further, the study established as indicated in Table 4.12 that the farmers planted different varieties of drought tolerant crops. These included green grams (93%), cowpeas (92.4%), maize (*Katumani* and pioneer varieties) (86%), pigeon peas (78.2%), beans (75.9%) and sorghum (70%). Both key informants and focus groups discussions reported that NGOs were keen on promoting different drought tolerant crops in Yatta. Green grams, cowpeas, maize, pigeon peas, beans and sorghum were the most prominent crops promoted according to the NGO focus group discussion. However, farmers planted green grams and cowpeas because they are early maturing and can survive with little moisture in the soil. These made it possible for these crops to provide household nutrition and incomes. NGO focus group discussion further asserted that NGOs have for a long time been trying to persuade farmers to plant drought tolerant and earlier maturing crops such as green grams, cowpeas, beans, pigeon peas, sorghum and millet as opposed to maize. However, farmers have insisted on planting maize.

Table 4.12: Drought Tolerant Crops Planted by Farmers

Growing drought tolerant crops		
	Frequency	**Percent**
Maize (*katumani*, pioneer)	307	86.0
Beans (*mboso*)	271	75.9
Cowpeas (*nthooko*)	330	92.4
Pigeon peas (*nzoo*)	279	78.2
Millet (*wimbi*)	41	11.5
Sorghum (*muvya*)	250	70.0
Green grams (*ndengu/voyo*)	332	93.0
Dolichos (*nzavi*)	56	15.7
Soybeans	22	6.2
Pumpkins, watermelon, cassavas	22	6.2

The farmers also mentioned that NGOs support different extension services as shown in Table 4.13. Among these, farmers benefited from training in new farming methods (97.8%), follow-up trainings (54.3%), post-harvest training (53.5%), advice on animal feeding and treatment (51.3%) and exchange visits (35.7%). These findings were corroborated with farmer focus groups discussions in which it was confirmed that farmers have received a range of trainings from NGOs in growing drought tolerant crops, use of pesticides, crop rotation, agroforestry, post-harvest technologies that are collectively aimed at improving household food security. These practices are applied by farmers. NGO focus group discussions also confirmed that extension service is one of the key support activities given by NGOs, usually through county extension officers and directly through NGO technical staff. These involve agronomic training, post-harvesting technologies, value chain development and market connection. One key NGO respondent noted:

> *"NGOs deploy different approaches to address household food security. These involve promoting extension services that enable farmers to grow sufficient crops, manage post-harvest losses which are predominant and add value to their produce in order to compete favourably in the market"*

Table 4.13: Extension Services

Extension services supported by NGOS and practiced by farmers		
	Frequency	**Percent**
Training in new farming methods	349	97.8
Follow up of training	194	54.3
Post harvesting training and follow up	191	53.5
Processing of agriculture products	18	5.0
Connecting producers with buyers/markets	66	18.5
Support running and management of cooperatives for farmers	3	.8
Supporting farmers undertaking seed bulking	4	1.1
Advice on animal feeding and treatment	183	51.3
Provision of artificial insemination	38	10.6
Exchange visits with other farmers/agricultural shows	124	34.7
Farming together in one land	5	1.4

Additionally, farmers revealed that NGOs provide different inputs with majority (88.8%) receiving improved seed varieties, farming tools (53.5%) and synthetic fertilizer at 36.7% as represented in Table 4.14. However, focus group discussion with farmers noted that sometimes NGOs never consulted farmers on the type of seeds and tools they needed. In most times, the quantity of the seeds given did not match their size of land. Nonetheless, some farmers in the focus group discussions were emphatic that these handouts from NGOs were making them dependent on NGOs and should gradually be phased out. NGOs focus group discussion confirmed that they occasionally provide tools and seeds in order to motivate farmers to adopt drought tolerant crops and new technologies. They expect the farmers to continue purchasing these inputs eventually on their own.

A lead farmer from Ndalani Ward supported the above sentiments by asserting that:

Provision of farm inputs by NGOs to the farmers can create dependence. Some farmers delay planting because they are waiting for NGOs to provide seeds. It makes them not to plant in good time. It will be good for the NGOs to increase farmers' awareness and capacity on what inputs are needed and where they can source them. This will enable farmers to access these inputs after NGOs exit.

Table 4.14: Farm Inputs Utilized by Farmers

Provision of inputs		
	Frequency	**Percent**
Synthetic fertilizer	131	36.7
Improved varieties of seeds (maize, beans, millet, sorghum, cowpeas, green grams)	317	88.8
Farming tools(hoes, spades, machetes)	191	53.5
Hiring of farm tools/machinery (*kukomboa*)	36	10.1
Ploughs, pumps ,scales, wheelbarrows, pesticides	46	12.9

The study also revealed that farmers utilized off-farm interventions provided by NGOs. These included table banking (87.4%), livestock production (44.5%) and connection to financial and lending services (42.3%) as represented in Table 4.15. These findings were confirmed by key informant interviews and focus groups discussions, which together asserted that NGOs were involving farmers in various village level saving and loans associations (VSLAs) that entail trainings in financial literacy, savings and starting of micro enterprises to increase household incomes. Livestock production, especially keeping of goats and chicken were adopted by the farmers as providing alternative income sources for households apart from crop farming. One NGO key respondent noted:

> *"NGOs want to diversify economic activities in order to provide farmers with a cocktail of options. If crops fail, as they certainly do in most seasons, then they can revert to off-farm activities. At the end of the day, NGOs are*

increasing access to incomes for farmers. This is why table banking is important for farmers to save and borrow in times of scarcity. It is also crucial for some farmers with entrepreneurial skills to start small businesses to increase their income streams and hence their household food security".

Table 4.15: Off-Farm Activities Implemented by Farmers

Off- farm activities/small business		
	Frequency	**Percent**
Table banking/merry go round	312	87.4
Connection to financial and lending services	151	42.3
Formal employment	9	2.5
Casual employment	52	14.6
Apiculture	11	3.1
Livestock production	159	44.5
Volunteer, side jobs	23	6.4

In horticultural production, farmers grew vegetables (kale, spinach, onions, cabbages, tomatoes, French Beans and capsicum) through micro irrigation (77.9%), fruits (mangoes, oranges, papaya, banana, passion, grapes) both for market and household consumption (58.8%) as shown in Table 4.16. Key informants, farmers and NGOs focus group discussions validated these findings. It was confirmed that farmers who have access to water such as those living along Athi River, closer to Yatta canal and those that have harvested water through water pans and farm ponds were supported to engage in a variety of horticultural farming to enhance their household incomes. Horticultural farming provided incomes to farmers for the period that they had access to water. Farmers' focus group discussion in Ikombe, Ndalani, Matuu, Kithimani and Katangi were categorical that promotion of horticulture farming, especially growing of fruits (mangoes, papaya) and vegetables is highly appreciated as it provides alternative incomes and enhanced household nutritional status.

Table 4.16: Farmers Utilization of Horticultural Crops

Horticultural production		
	Frequency	**percent**
Growing vegetables through irrigation (Kale, Spinach, Onions, Tomatoes, French Beans, cabbages)	278	77.9
Growing fruits through irrigation (Mangoes, Oranges, Papaya, Bananas, Grapes Passion for market and household consumption	210	58.8
Capsicum, Chillies	11	3.1

Additionally, farmers utilized livestock production practices such as poultry farming (92.2%), control of animal diseases (58%) and goat keeping for milk and meat (52.9%) as indicated in Table 4.16 below. Key informants and focus group discussions confirmed that Yatta climate supports livestock farming. Chicken were the most preferred by the farmers because of a warm climate experienced in Yatta Sub County that tend to limit common diseases affecting poultry. Farmers also desired goats because they provide household nutrition, quick incomes and can withstand climate shocks. These animals enable farmers to develop resilience to shocks and stressors brought about by prolonged droughts and crop failure.

Table 4.17: Utilization of Livestock Production Practices among Farmers

Livestock production		
	Frequency	**Percent**
Improving breeds of cattle through artificial insemination	46	12.9
Improving animal feeding (growing pasture, silage, hay, artificial feeds)	131	36.7
Animal disease control	207	58.0
Improved goat keeping for milk and meat	189	52.9
Dairy farming for household consumption and markets	103	28.9
Poultry (chicken) farming	329	92.2
Apiculture (bee keeping)	52	14.6

Notably, NGOs promoted a variety of diversified interventions to address household food security in Yatta Sub County. These ranged from rainwater harvesting, soil fertility enhancement, provision of inputs, horticulture and livestock production to other off-farm livelihoods. A cocktail of the most prominent interventions applied by farmers included terracing, water pans, zai pits, compositing, growing of crops such as green grams, cowpeas, maize, training, post-harvesting, provision of seeds, table banking, poultry and growing of vegetable and fruits. A study (Mutune & Nunow, 2018) has noted that semi-arid areas in developing countries have continued to depend on rain-fed agriculture that is constantly exacerbated by advent of climate change and poor governance. The above study asserts that despite efforts by both the government and NGOs, food insecurity persist in semi-arid regions of Kenya. Communities in these areas have perceived themselves as resource poor, yet they are naturally endowed and only need transformational models to unlock their potential. Mutune and Nunow (2018) further argues that the process of reclaiming and replenishing the environment in these areas demands implementation of realistic practices, inclusive community participation, undertaking broad decisive actions at global, national, region and at household levels and enacting supportive legislations.

4.6 To Examine the Extent to Which Farmers' Participation in NGOs Interventions Affect Household Food Security in Yatta Sub County

The second objective sought to examine the extent to which farmers' participation in NGOs interventions affect household food security in Yatta Sub County. NGOs have given prominence to participation of target population in development as a way of giving people a chance to have a voice in decision-making processes regarding interventions benefiting them (Kumar, 2002; World Bank, 1986). Lack of participation of farmers in food security programmes has been identified as hindering sustainability of such interventions in Kenya (Wabwoba & Wakhungu, 2013). Usually, NGOs working in food security undertake participation of farmers in different ways. These include involving farmers in identification of needs, selection of interventions, implementation of interventions on their farms, as well as monitoring of interventions via project committees.

Therefore, in this study, farmers' participation was assessed on the level of problem and needs identification, selection of interventions, implementation and monitoring. In problem identification, the study sought to find out whether farmers were involved in reflecting on their needs. In selection of interventions, the study evaluated whether farmers were engaged in choosing their preferred interventions. In implementation, the study sought to find out whether farmers were involved in executing interventions. In monitoring, the study sought to find out whether the farmers were involved in assessing progress, providing feedback and reporting. These results are presented below.

4.6.1 Farmers Participation in Problem and Needs Identification

This study established that a large proportion of farmers (73.1%) were involved by the NGOs they worked with in identifying their household food security priority needs as compared to 26.9% who were not (Figure 4.1).

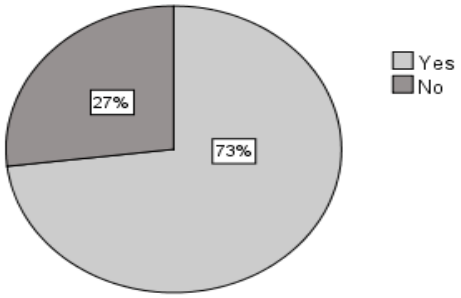

Figure 4.1: Farmers Participation in Problems and Needs Justification

Nonetheless, the farmers revealed differences in the ways they participated in identification of their priority food security needs. As shown in Figure 4.2, the most prevalent form of participation was involvement of farmers' in joint meetings with NGOs (59%), compared to 23% in which a more formalized needs assessment was undertaken. The rest of the farmers noted that they identified selected leaders in their communities who represented them in negotiating and discussing needs with respective NGOs. These findings suggest that NGOs primarily engaged farmers through joint consultative meetings to identify food security needs in contrast with undertaking formalized needs assessment processes. These findings were also

corroborated with focus group discussions in which farmers noted that NGOs held meetings with them to inform them on the interventions they wanted to implement instead of asking them what they wanted. One farmer in Matuu Ward captured this by noting that:

> *'Some NGOs came with flyers to these consultative meetings and focused on pre-determined interventions that they have implemented in other areas. They distributed these flyers to farmers irrespective of the fact that majority of us were unable to read. They promised to support us implement the interventions that were on the flyers. We wished that NGOs would first ask us about our needs and priorities. This would have made us feel that our ideas are also valued"*

The farmers also noted that there was no uniformity in the manner in which NGOs assessed farmers' needs. Every NGO used a methodology that was convenient to them. One key informant noted that:

> *"NGOs fail to get good information from farmers because they are engaged with many technical jargons. Although, NGOs have good intentions when undertaking either formalized needs assessments or community meetings, they are unable to deal with gatekeepers who take over such meetings or processes. It is important for NGOs to build relationship with communities first in order to capture more information from people who are usually not outspoken. This relationship building cannot be done in one-off encounters with communities in a meeting. This should be an exercise that requires a lot patience and time. In big groups, people do not talk lest they are labeled as less knowledgeable especially if they contradict gatekeepers. It is possible that NGOs have missed to capture what farmers need because they are always in a hurry. Good participation is a process that takes time to create rapport, trust and uses different methods to triangulate information. It is a process that continues even when projects begin in order to double-check and adapt to any emerging information and knowledge"*

The above findings suggest that in general NGOs took initiatives to enable farmers to participate in their needs assessment. However, the process was riddled with challenges. On one hand, NGOs hurried the process and did not take time to triangulate information. On the other, NGOs did not recognize and moderate power imbalances between the ordinary farmer and community gatekeepers. This resulted in dampening the voice of the average farmer.

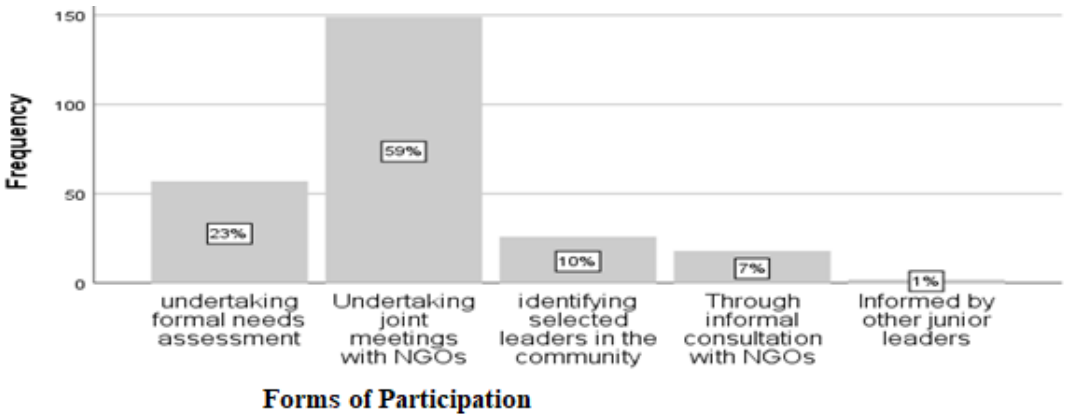

Figure 4.2: Forms of Farmer' Participation in Needs Analysis

4.6.2 Identification of Food Security Interventions

Farmers were further questioned on whether they were involved by NGOs in identifying key food security interventions to be implemented. Majority of the farmers (73.9%) confirmed that they were involved compared to 25.8% who were not according to Table 4.18.

Table 4.18: Farmers Participation in Identification of Food Security Interventions

N=357	Frequency	Percent	Valid Percent
Yes	264	73.9	74.2
No	92	25.8	25.8
Total	356	99.7	100.0
Missing	1	0.3	
Total	357	100.0	

Further analysis as shown in Table 4.19 below indicated that of those that confirmed involvement, 51% of them asserted that NGOs requested them to prioritize interventions to be implemented. Further, 13.4% jointly discussed with NGOs their prioritized interventions and included them in the community action plans, while 13.2% selected from a list of interventions proposed by NGOs. Only a paltry of 3.6% of the farmers indicated that NGOs listened and reviewed interventions based on input from them.

Table 4.19: Prioritization of Farmers' Types of Food Security Interventions

If yes, how were you involved		
	Frequency	**Percent**
Asked by NGOs to prioritize the types of interventions to be implemented	182	51.0
Discussed with NGOS and identified priority interventions in the community action plans	48	13.4
Choose from a list of interventions proposed by NGOS	47	13.2
NGOS supported interventions that were already being implemented by the farmers	27	7.6
NGOS listened and reviewed/changed interventions based on input from farmers	13	3.6
Farmers and NGOS reached a consensus regarding the types of interventions to be implemented in advance by sharing their local knowledge	8	2.2
Others	8	2.2

The above findings imply that there is some level of engagement between farmers and NGOs in selecting the types of interventions to be implemented. However, some NGOs provided a menu of pre-packaged interventions for farmers to choose from.

Fewer farmers were given opportunity to choose interventions that they were already implementing. In addition, fewer NGOs took input and views from farmers to change interventions. Farmers in focus group discussions revealed that indeed majority of the NGOs discussed with farmers and prioritized interventions. They later involved them in exchange visits with farmers from other areas to increase their levels of understanding on the proposed interventions. Conversely, a few NGOs came with predetermined interventions and spend time training farmers on how to implement them without understanding the local context, particularly as regards to the soil types in the respective areas. Additionally, farmers noted that some NGOs did not take time to understand their pre-conceived notions regarding certain interventions. For example, sorghum was conceived by many farmers to be susceptible to bird invasion and lacked markets. However, NGOs prioritized this as one of key drought tolerant food crop as compared to maize.

One of the farmers in the focus group discussion noted that noted:

> *"Maize is the staple food in Kenya and hence has a larger market compared to sorghum. If the NGOs continue to insist on sorghum without first providing the markets, it will never work. Farmers want to see the value of their investment"*

Similarly, one of County Administrator noted that:

> *"Farmers need a lot of NGO training for them to shift their mind-set from planting maize which does not do well in Yatta compared to other crops. Nevertheless, there is need for NGOs to demonstrate that these crops also have markets. This will motivate farmers because they will understand that they can sell these crops in order to purchase their preferred maize"*

Further, focus groups discussions among farmers in Katangi and Ikombe wards noted that some interventions such use of technologies like credit card to access inputs (seeds and fertilizers) introduced by one NGO failed. This happened because there

was neither training nor good mechanisms put in place to support this. This also led to exclusion of many farmers, especially those that were not able to read and write.

4.6.3 Proposal Development Processes

The study asked farmers whether they were involved in proposal development. The findings consistently demonstrated that farmers rarely participated in formulation of food security proposals for programs that they implemented. For example, only 14% were involved in writing proposals compared to 86% non-participants as show in Figure 4.3.

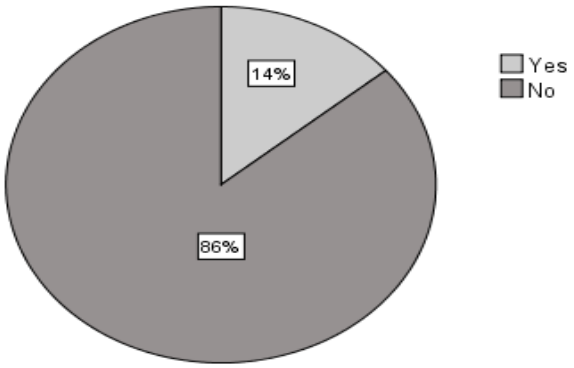

Figure 4.3: Participation of Farmers in Development of Food Security Proposals

Farmers confirmed through focus group discussions that they rarely participated in the proposal development processes because they would not comprehend the technical jargon involved. This role was left to NGOs staff and sometimes lead farmers with better literacy skills to provide input on behalf of others. However, farmers in all the wards expressed their dissatisfaction with NGOs preference to exclusively relying on literate farmers, especially lead farmers to provide input to proposals. They felt that these proposals might be altered to serve the whims of the elite in the community. Instead, the farmers asserted that NGOs should find a way of presenting and sharing the contents of the proposals with all of them for verification, validation and to bolster transparency before handing them over to donors. In

general, the farmers noted that were not usually aware on how projects budgets were formulated and allocated. This was rarely discussed by NGOs.

4.6.4 Farmers Participation in Implementation of Food Security Interventions

In the area of implementation as shown in Table 4.20, majority of the farmers (59.7%) were involved in implementation and execution of intervention compared to 38.9% that were not.

Table 4.20: Farmers Participation in Implementation of Food Security Interventions

N=357	Frequency	Percent
Yes	213	59.7
No	139	38.9
Total	352	98.6
Missing	5	1.4
Total	357	100.0

Among those implementing interventions, 36.4% executed these on their own farms compared to 23.2 who did this either on a group or demonstration farm (Table 4.21).

Table 4.21: Types of Implementation Adopted by Farmers

N=357	Frequency	Percent
Directly executing interventions on my farm	130	36.4
Executing the interventions on group farm/demonstration farm	83	23.2
Total	213	59.7
Missing	144	40.3
Total	357	100.0

These findings imply that farmers participated in implementing interventions either on their own farms, group or demonstration farms. NGO focus group discussion confirmed that they trained farmers on demonstrations farms and then urged them to

replicate what they had learned on their farms. In addition, in some incidences, farmers' groups worked on each other's farms to undertake innovations together in order to learn and support each other. In some cases, a lead farmer who had been trained by the NGOs used his or her farm to train other farmers. Later, the farmer replicated this on this or her own farm. The farmer focus group discussions also confirmed that they did not implement the entire package of interventions provided by NGOs, but only those that were amenable to their needs.

4.6.5 Farmers Participation in Monitoring Food Security Interventions

Further, in terms of monitoring food security interventions, the study demonstrated that 58.8% of the farmers participated in contrast with 40.3% who did not according to Table 4.22.

Table 4.22: Farmers Participation in Monitoring Food Security Interventions

Did you participate in monitoring interventions?	Frequency	Percent
Yes	210	58.8
No	144	40.3
Total	354	99.2
Missing	3	0.8
Total	357	100.0

As presented in Table 4.23, farmers participated in monitored interventions in a variety of ways (more than one way). For example, 33.1% monitored interventions as part of the project management committee, 24.6% participated in monthly and quarterly review meetings, and 20.7% gave feedback to their groups while 12.6% filled monitoring tools given by NGOs.

Table 4.23: Farmers Ways of Participating in Monitoring Food Security Interventions

If yes, how were you involved?		
	Frequency	**Percent**
Monitoring as a member of project management committee/village management committee.	118	33.1
By participating in monthly/quarterly monitoring review meetings.	88	24.6
Giving feedback to my group on progress.	74	20.7
Monitoring progress on my farm and maintaining up-to date records and sharing with farmer group.	19	5.3
Giving feedback to NGOS by filling monitoring tools developed by NGOS periodically.	45	12.6
Others -CBO meetings, individual farm visits by NGOs	20	5.6

The above findings suggest that farmers participated in varying levels in monitoring interventions through their elected representatives in project management committees, monthly reviews and filling monitoring tools. This was corroborated with focus group discussion in which farmers noted that they monitored their interventions through a variety of ways. These included through elected project management committees, monthly meetings and occasionally via stakeholder review meetings that brought together government extensions officers and NGO staff. However, farmers complained about the tools that they used in undertaking monitoring which were given by NGOs. One key lead farmer from Kithimani Ward noted that:

> *"Even if farmers are involved in monitoring through their elected project management committees, the tools and formats of monitoring were usually*

pre-determined by the respective NGOs without our input. Some of these tools were difficult to use by ordinary farmers who have little education"

It was also noted among farmers' focus group discussions that when it came to evaluation of food security interventions, NGOs usually used external expertise (consultants) to collect information and never shared the outcomes. Nevertheless, there are some NGOs who never came back to undertake an evaluation of interventions they had supported after expiry of their funding. This compromised learning and validation of findings. Farmers in the focus group discussions further expressed fear that stakeholder review of interventions although appreciated and timely, excluded some farmers who were not literate. In general, farmers feared to share their ideas in front of 'experts' that included government officers and NGO staff. The farmers maintained that this process would have been more effective if it started first with field visits, discussing with farmers in smaller groups and individually and then presenting the findings to a wider audience for validation. This will allow the farmers to bring out issues that they face on a day-to-day basis and mitigate power imbalances.

The above analysis reveals that different factors affected farmers' participation in NGO interventions. These included willingness of NGOs to engage farmers through either consultative meetings or needs assessment; attitude of NGOs, especially not being in a hurry and ensuring they triangulate information and NGO's understanding of context power dynamics, particularly when dealing with gate keepers and other stakeholders. Similarly, farmers' participation depended whether the types of interventions were amenable to the needs of farmers, level of inclusion of all the farmers and the organizational structure of farmer groups. Farmers groups with structures, systems and processes such as project management committees, reporting tools, progress reviews had better prospects of farmers' participation

4.6.6 Farmers assessment of the Adequacy of their Participation Processes in NGO Food Security Interventions

The farmers were asked to indicate whether they were involved adequately in all participatory processes by the NGOs they worked with. The findings reveal that more than half (56.3%) felt that they were involved adequately to a certain extent. About 20.2% confirmed that they were adequately involved, compared to 23.2% who had a contrary opinion (Table 4.24).

Table 4.24: Farmers Opinion on Adequacy of Participation Process

		Frequency	Percent
Valid	Yes	72	20.2
	No	83	23.2
	To a certain extent	201	56.3
	Total	356	99.7
Missing	System	1	0.3
Total		357	100.0

These findings confirm that farmers felt that they were to some extent involved in participation of NGOs food security interventions. However, they also asserted through the focus group discussions that the processes of participation among farmers can be improved. Farmers felt that NGOs were in a hurry to implement interventions because of short project duration that is usually pre-determined by their backdoor donors. Some NGOs also had already pre-determined interventions without sufficiently consulting the farmers. A director of one of the NGOs noted that:

> *"Majority of the NGOs do not involve farmers at the beginning of the interventions because they would have already secured a certain type of funding. This forces them to adhere to the proposal they already shared with backdoor funders. They come with pre-determined interventions and do not reveal the budgets for projects because farmers might not understand them. NGOs are pre-occupied to finish projects within timelines provided by their donors. This will make them implement projects in haphazard manner and to*

some extent ensure that farmers adhere to certain timelines. However, when they involve farmers, there is improved household food security"

As shown in Table 4.25, some of the factors that limited farmers' sufficient participation included short duration of projects to guarantee meaningful involvement (43.1%); lack of skills among farmers to negotiate for their preferred interventions with NGOs at 39.5%; NGOs either listened more to community elites (30.5%,) or were in a hurry to start projects without allocating time to analyze and understand farmers' priorities (28.9%). Additionally, farmers noted that NGOs were churning predetermined interventions and sometimes farmers feared to contradict them (28.3%) and were in a hurry to implement projects that meet donor demands (28.3%). These findings demonstrated that farmers had several reservations about the quality and extent of their participation in different levels of food security interventions.

These results were corroborated with farmers' focus group discussions that affirmed that although NGOs were making efforts to engage them, they still needed to address some underlying concerns that prevented adequate participation. Farmers noted that NGOs engaged more with community elites and concentrated in training a few literate farmers theoretically in hotels instead focusing on all farmers within farmer groups. Instead, farmers proposed that NGOs trainings and discussion should be undertaken on farm level in order to engage with more farmers. Similarly, NGOs had a poor mechanism of follow-up and targeting of farmers to determine the extent to which trainings had cascaded to the majority of the farmers. These processes ultimately led to exclusion of a large proportion of needy farmers. A key informant (extension officer) noted that:

"Those NGOs that take time to listen to farmers, mobilize stakeholders, involve farmers in analyzing their needs and priorities and have a long term vision and are grounded in the community have better results in enabling farmers to improve their household food security as compared to those that are in a hurry to implement short-term projects"

Table 4.25: Factors Hindering Participation of Farmers in NGO Food Security Interventions

If not, what are your reasons for inadequate engagement or involvement	Frequency	Percent
Negative attitude of the NGOs staff that are not listening to farmers	57	16.0
NGOs are in a hurry to start projects without allocating enough time to understand, analyze priorities and develop relationship with farmers	103	28.9
NGOs bureaucratic power structures that manifest in power differences and top down engagement with farmers	71	19.9
Provision of pre-determined interventions by NGOs and fear of farmers to contradict NGOs	101	28.3
Lack of skills among farmers to negotiate for their preferred interventions	141	39.5
Lack of appreciation of local skills and knowledge by NGOs focused on technical solutions	54	15.1
Hurried implementation of projects by NGOs in order to meet donor implementation schedules and requirement	101	28.3
NGOs only consult with government technical staff and assume they understand the needs of farmers	79	22.1
NGOs listen more to community elites/gate keepers than farmers	109	30.5
High staff turnover among NGOs to allow for effective consultation and follow up	82	23.0
NGOs project duration is too short to have meaningful engagement	154	43.1
NGOs have predetermined results they want to achieve hence offer little time for engagement with farmers	91	25.5
others-discrimination ,no markets ,reluctance by farmers to implement, no facilitation	13	3.6

4.6.7 Results of Multi-Case Studies of Two Farmers

Further analysis of participation in this study was undertaken through a multi-case study of two farmers: one with a positive experience and the other with a negative experience. These farmers constituted a female and a male to enable the study to

capture different perspective across gender. They were chosen from two different groups and locations based on discussions with lead farmers of various groups regarding experiences they had with NGOs whether positive or negative. The two cases were comparable because they more or less implemented similar activities with different NGOs in water harvesting, drought tolerant crops, soil fertility enhancement, extension services, farm input, fish ponds, horticultural production and off farm activities (table banking,) and livestock production This case study further elaborated on how different farmers conceived their level of participation in food security interventions promoted by NGOs.

Case Study Mary

Mary (not her real name) represented a farmer with a negative experience with NGOs. She was chosen by a lead farmer because of her expertise and long interaction with an NGO. Mary was a middle aged women working with a farmer group from Katangi ward. She had interacted with one NGO for over a period of 5 years. She was a member of a farmer group that grew fruits, constructed Zai pits, water pans, worked on farm ponds and water pans, kept chicken, planted drought tolerant crops, participated in horticultural production, received extension services and farm inputs. In terms of participation in formulation of interventions, she asserts that the NGO she worked with did not involve them at all in deciding which interventions they would implement. Mary noted that:

> *"NGOs called us for meetings and only used the occasions to inform us on what they will do. We were not given opportunity to question. Sometimes most farmers felt that it was a good opportunity to work with NGOs and we should not lose such a chance. This prevented us from questioning NGO interventions because they may have thought that we are not interested and would easily go to benefit another group. This means that we accepted what was offered to us because usually farm groups compete to attract NGOs to support them".*

According to Mary, the NGOs planned everything and then brought these to their farmer group to implement without giving them a choice. Since the farmers wanted to undertake interventions that address their status of food security, they did not question the process. Similarly, the farmers believed that NGO had the requisite expertise on what they were proposing and as such, farmers did not have capacity and mandate to contradict them. However, she affirmed that lack of good participation at the initiation of interventions also meant that once the NGOs left, some of the farmers reverted to their normal status. According to her, this is why most food security programs fail, as farmers do not feel part of the process. Mary asserts that:

> *"Farmers sometimes do things for the sake of impressing NGOs and once NGOs exit from the community, farmers resort to their old ways which they consider to be superior to those promoted by NGOs. This can be avoided if the NGOs would listen to farmers at the initiation of interventions"*

Mary explained that although NGOs do not engage farmers sufficiently during formulation of interventions, they involved farmers more during implementation since they have to use the farmers' plots of land to implement the interventions. NGOs in most cases chose to work with either group leaders or farmers who exhibited some level of success in their farming. This gave other farmers the feeling that NGOs personnel sometimes used them to benefit themselves, particularly during trainings and to show success of well-performing farmers to backdoor donors in order to maintain funding and safeguard their jobs. Mary asserts that:

> *"NGOs were keen to show their donors plots of successful farmers and ignored other farmers altogether, especially during visits by their donors. It would have been nice to showcase farmers that are not able to catch up in order to motivate and assist them"*

Mary felt that some NGOs do not deliver good content in trainings, yet they have been given funds to do this. They were in a hurry to either finish or sometimes did not have the content themselves as they left junior inexperienced staff to work in the

field while their most experienced staff were stationed in the headquarters (usually in Nairobi). Mary maintained that NGOs did not recognize the fact that farmers are equally knowledgeable on matters of agriculture since they have priori training by the government agricultural extension officers and have garnered a reservoir of experience. This knowledge should not be ignored. She strongly felt that farmers should be involved in the choosing the types of interventions the NGO intents to bring to the area based on their experiences and local knowledge.

Mary noted that at times farmers get discouraged due to disappointments from previous projects. For example, there was a project whereby the farmers were to construct fishponds and then be provided with the fingerlings. However, the NGO involved never delivered. These types of false promises, which are common among NGOs, discourage the farmers from participating in interventions. She pointed out that farmers sometimes feel that they are wasting their time instead of undertaking other profitable income generating activities. Nevertheless, she also noted that some farmers do not like new technologies and would rather carry on with their old-fashioned farming ways.

NGOs need to take time to address mind-sets of such farmers. She noted that farmers preferred individual projects as opposed to communal projects that were sometimes riddled with conflicts when resources have to be shared. NGOs did not take time to understand various community dynamics and did not invest energies in mitigating these risks. She gave examples of communal water pans and dams constructed on people's land. When NGOs left, the owner of the land either demanded compensation or stopped other people from using them. This would have been avoided if there were participation of everyone.

Mary noted that in spite of lack of participation, the farmers appreciated some interventions promoted by NGOs. For instance, Zai pits and making of terraces to conserve water thus increasing productivity especially for maize. Additionally, planting of drought tolerant crops such as green grams assures farmers of some harvest as compared to maize even when there is rain failure.

However, Mary notes that

> *"Some interventions are not meant for these areas. For example, NGOs promoted construction of fishponds and rearing of chicken that have proved to be cumbersome for the farmers given that there is lack of water and diseases are frequent. This means that such investments which involved a lot of money have been abandoned by the farmers"*

Mary maintained that for NGOs interventions on household food security to be successful, they must involve the farmers from the beginning of the projects to the end. Most of the NGOs do not monitor their projects to the very end. They leave this to the project committees who sometimes do not have capacity to monitor. There is need to listen to the input from farmers from time to time to improve food security interventions. It is also good to be clear and transparent about the exit strategy. Most NGOs leave farmers abruptly without good exit process and hand-over to either other NGOs or government departments. These NGOs never even come back to check how farmers are doing after their funding period ends.

Mary's case echoes the need for NGOs to meaningfully involve farmers in all processes by striking a rapport and creating an enabling environment free of fear and competition among farmers. Mary advocates NGOs to benefit from a reservoir of farmers' experiences and local knowledge to enrich interventions and weeding-off undesirable activities, as well as deepening understanding of the local community dynamics to inform NGOs' decision-making. Finally, Mary urges NGOs to rigorously monitor programs, learn from failed cases and put in place a good exit strategy.

Case Study Mark

Mark (not his real name) had a positive experience working with NGOs on food security interventions. He was purposively sampled from Ikombe Ward through the help from a lead farmer for his expertise, knowledge and experience of working with NGOs over a period of 10 years. He had interacted with more than one NGO but

worked longer with a local NGO. He was a middle aged man and belonged to a farmer group. His group implemented interventions that ranged from construction of sand dams, earth dams, Zai pits, terracing, planting of green grams, livestock production, horticultural production, planting drought tolerant crops to bee-keeping. He noted that the NGO they worked with first came and undertook capacity building on the interventions they intended to undertake in the area. They did not necessarily involve the farmers in choosing and prioritizing the interventions they wanted to bring to the area. Similarly, none involved the farmers in formulating project proposal and the farmers did not have a chance to know what was exactly contained in a proposal. However, the NGO involved them sufficiently especially in implementation and monitoring of the projects. The NGO had to use farmers' plots to implement their interventions. This motivated the farmers to be involved since the trainings were more practical and engaging. Mark noted:

> *"Many farmers were positive when we saw the results of the experiments in the farmers' plots. We were convinced that certain interventions would work in our setting. We were allowed to ask questions and try these on our farms alone. It took a longer process, but it paid dividends".*

The NGOs worked with the farmers through project committees composed of farmers in order to monitor the projects from the beginning to the end of the project. Most of the committees however become dormant after the NGO had exited and this caused some the projects to stop. However, those that continued encouraged other farmers to learn from them. Mark notes that:

> *"The NGOs allowed us to elect members of these committees from our villages. We internally agreed as farmers on who should represent us and how we would communicate. We developed by-laws and a constitution governing our group. This helped us to have a clear way of working with the NGO"*

According to Mark the NGOs usually have experts who are more knowledgeable on project interventions and hence they should come up with activities to be implemented. It would be difficult for farmers to formulate interventions because

they do not understand what is suitable. However, farmers were keen with what works. Farmers become more receptive when they saw the results of some of the interventions. He noted that farmers were more involved in monitoring and evaluating the projects to ensure that interventions do not fail. This was done through on-farm monitoring, organizing the farmers into groups and electing some farmers to be part of project management committees. He noted that once the farmers like specific interventions, they continue to implement them even when NGOs leave. For instance, construction of terraces on their farms is appreciated because of apparent benefits of conserving water and increasing productivity. Similarly, planting of drought tolerant crops such as green grams do well in the area even when the rains fail. Further, using manure on their farms to enhance food production is preferred because organic manure is locally available and is not costly. Additionally, construction of water pans on a household level provides water for consumption and for their livestock and enables farmers to avoid walking long distances to go look for water during the dry seasons. Mark asserted that farmers were more prone to participate in interventions that were seen to address immediate needs of farmers.

Mark also noted that participation in NGO interventions was pegged on increase in household incomes and availability of markets for products promoted by NGOs. The more the farmers realized that harvesting rainwater and using it for micro-irrigation would quickly enable them grow different crops and vegetables, they fully participated in the process. These vegetables are for household consumption and for the local market. However, Mark asserted that farmers stopped implementing some interventions. For instance, construction of sand dams is an expensive venture that cannot be undertaken without the support of NGOs. It should be a cost-sharing venture in which NGOs will provide materials such as cement, while farmers provide much-needed labour. Farmers have stopped implementing bee-keeping interventions because of lack of consistent markets.

4.6.8 Comparisons of the Two Case Studies

Both case studies demonstrated that NGOs promoted interventions such as zai pits, terracing, water pans, earth dams, drought tolerant crops, fruits and vegetables

among others. This corresponds with findings of objective one of this study. In Mary's case, farmers were not completely involved in the initial formulation of interventions. In essence, farmer felt insecure and disempowered to question the NGOs fearing that NGOs would go to a different group. This demonstrates power imbalance among ordinary farmers and NGOs and inherent competition among farmer groups for NGO resources. This implies that NGOs should pay attention to this factor and inbuilt mitigation measures. In contrast, NGOs in Mark's case started with building capacities of farmers to understand different interventions and allowed them time for the farmers to experiment and discover for themselves what works. This practical training, experiential and adaptive learning paid dividends. This suggests that participations of farmers are a process that needs patience and learning.

In both case, NGOs involved farmers more in implementation and monitoring of interventions. This is also consistent with findings in objective two in which there was no uniformity in the way NGOs implemented participation among different farmers. Some NGOs were in a hurry to implement interventions, as in the case of Mary and often-made promises they would not live to. This created mistrust among farmers who eventually reverted to their old ways. This created lack of ownership of interventions being implemented. While in Mark's case, the process was slow and characterized by experimentation. This bolsters confidence and let farmers to make informed choices on interventions that worked.

In both cases, perception of farmers was paramount in adoption of NGO interventions. In Mark's case, farmers became more receptive because they were given time to experiment and chose what practically worked. They were also engaged through their own project committee, which represented them and came up with clear rules of engagement. Electing local farmers to be part of the governance structure boosted ownership and good governance practices. This created also a sense of ownership and structure among them to engage with NGOs. In the case of Mary, NGOs did not take time to create structures among farmers. The process was top-down. Farmers mistrusted the expertise of NGOs because the technical staff who would have given better guidance were domiciled in NGOs headquarters. They never

even came back to check whether programs were working. The NGOs staff was biased towards farmers who were doing well. In general, the NGOs were not transparent in phasing in and out of projects. They did not take time to understand farmers mind sets and perceptions regarding certain technologies that were not responsive to the local context. They did not invest time to understand dynamics in the community and hence some activities implemented such earth dams on individual land only benefited owners of the land.

In both cases, zai pits, terraces, green grams were seen as effective interventions. However, in Mary's case, NGOs introduced interventions such as fishponds that were irrelevant to this area. However, effectiveness of interventions in Mark's case was measured against success of interventions in addressing of farmer's needs, increasing incomes and availability of markets. In Mary's case, NGOs never demonstrated commitment to the farmers. They did not have a clear exit strategy. While in Mark's case, NGOs were committed and walked with the farmers to ensure that they are successful.

In general, the above findings on farmers' participation in NGOs food security interventions demonstrated that NGOs involved farmers more on implementation and monitoring and less on formulation of projects. The process of participation especially in the stages of project initiation was generally hurried. Farmers demonstrated the desire to be involved in all phases of food security interventions. Specifically, farmers were more inclined to participate in NGO interventions if NGOs took time to demonstrate through evidence that the promoted actions were indeed working. Further, farmers were keen that there was inclusion of all, especially the poor and vulnerable as opposed to focusing on the community elite.

4.6.9 Hypothesis Testing for Objective Two

The second objective was to examine the extent to which farmers' participation in NGOs interventions affect household food security in Yatta Sub County**.** In order to assess farmers' participation in NGO food security interventions, factor analysis was applied. In this case, one common factor was extracted from the Principal

Component Analysis (PCA) (see Appendix VIII) and interpreted to represent farmers' participation. This factor accounted for 51.839% of variation in the scores. The Kaiser-Meyer-Olkin measure of sampling adequacy was recorded at 0.638 and the Bartlett's test of sphericity was significant (χ^2=127.038 (6df); p=0.000). This score was found to be reliable and thus included in the logistic regression.

In order to understand whether farmers' participations accounts for household food security outcomes, this study tested the following null hypothesis

> $H_{0:}$ Farmers' participation in NGOs interventions is not positively associated with household food security outcomes.

Firstly, assumptions for logistic regression analysis were tested. The test results demonstrated that the assumptions were met (see Table 4.26)

Table 4.26: Preliminary Test

Assumptions	**Test**	**Observation**	**Conclusion**
Binary , independence of observation	Household food security	(Yes , No) Mutually exclusive and exhaustive categories.	Not violated
Sample size	Minimum (10*2 IV /.10) =200	N= 357	Sufficient
Multicollinearity	VIF	VIF between (1 - 3)	No Multicollinearity

The study similarly tested the goodness of fit using Omnibus test; Hosmer and Lemeshow (see Table 4.28 and 4.29). R^2 was tested to check the validity of the logistic regression model (Table 4.27).

Table 4.27: Omnibus Tests of Model Coefficients

	Chi-square	Df	Sig.	
Step 1	Step	7.859	1	0.005
	Block	7.859	1	0.005
	Model	7.859	1	0.005

The omnibus test, which measures whether or not the explained variance in a set of data is significantly greater than the overall unexplained variance, is presented in Table 4.28. The model is found to be significant at the 0.95 confidence level.

Table 4.28: Model Summary

Step	-2 Log likelihood Initial model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	434.681a	424.982a	0.278	0.337

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

In Table 4.29, both Cox and Snell R Square and Nagelkerke R Square scores indicate the amount of variance explained by the logistic model. Higher Nagelkerke R Square score indicates better model fit and the R square score that is equal to 1 show perfect model fit. Nagelkerke R Square was found to be 0.337 and the score indicates that 33.7 percent of the model is explained by the independent variables. The -2-log likelihood value is used for investigating the contribution of independent variables to the model and testing the significance of the regression coefficients. The -2-log likelihood is found to be 424.982 at 95 % confidence level. In the initial model that includes only the constant term, the -2-log likelihood value is found to be 434.681, but at the end of the fourth step, the value is found to be 424.982. The decreasing -2-log likelihood indicates improvement in model-data fit as independent variables are added to the model.

Table 4.29: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	17.095	7	0.017

The Hosmer–Lemeshow test is used to measure the goodness of fit for logistic regression models. This test examines whether or not all logistic regression (logit) coefficients (except the constant) term is equal to zero. The hypotheses are follows:

H0: There is no significant difference between observed and predicted value in the model.

H1: There is significant difference between observed and predicted value in the model.

As shown in Table 4.30, since the p value of the chi-square value of the model with 7 degrees of freedom ($\chi 2$ =17.095) is found to be less than 0.10 , H_0 hypothesis is not rejected at 10% level of significance.

Table 4.30: Classification Table

	Observed		**Predicted**		
			Household Food Security		**Percentage**
			No	**Yes**	**Correct**
Step 1	Household Food Security	NO	5	100	4.8
		YES	2	250	99.2
	Overall Percentage				71.4
a. The cut value is 0.500					

The classification scores obtained from logistic regression model are presented in Table 4.31. The ratio of the total correct classification of the model at 5%

significance level is found to be 71.4%. The model correctly estimates 250 of 350 food secure households.

Table 4.31: Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Farmers Participation	0.808	0.291	7.742	1	0.005	2.244	1.270	3.966
	Constant	-0.222	0.106	4.386	1	0.036	1.037		

a. Variable(s) entered on step 1: Farmer's Participation.

The standard error of coefficients of independent variables (SE), Wald statistics (Wald), significance levels (Sig) and Exp (B) statistics are portrayed in Table 4.31. In logistic regression, Wald statistic, which has a specific distribution known as chi-square, is a measure of the significance of β. The variables including farmers' participation is found to be significant at 95 % confidence level. Eventually, the model is constructed as follows;

$$ln\left[\frac{p}{1-p}\right] = -0.222 + 0.808 Farmer's\ Participation$$

According to the model, the more the farmer participates in NGO interventions, the more the likelihood of a household food security increasing by 2.244 times. This study therefore accepts the alternative hypothesis and concludes that there is a positive relationship between farmers' participation in NGOs interventions and household food security outcomes.

4.7 To Examine Farmers' Perceptions of NGO Interventions and their Effect on Household Food Security

The third objective sought to examine farmers' perceptions of NGO interventions and their effect on household food security. The study used a Likert scale to measure farmers' perceptions on the effectiveness of different interventions undertaken by NGOs. These were classified under rainwater harvesting, drought tolerant crop promotion, soil fertility enhancement, horticultural crops, extension services, farm inputs and livestock production. The criteria involved scoring 1 to 5 against different elements as discussed in the section below. In the Likert scale, 1 represented strongly agree and 5 strongly disagree. Cronbach alpha was applied to determine the reliability of scores within each sub-set (see appendix VIII). The analysis utilized the mean, standard deviation and employed logistic regression to test the relationship between perceptions and household food security. The results are discussed next.

4.7.1 Effectiveness of Rain Water Harvesting Interventions

Effectiveness of rainwater harvesting interventions recorded a Cronbach alpha of 0.735, which demonstrated that the scores were reliable. In this, farmers' perceptions were assessed on whether different types of rainwater harvesting interventions promoted and undertaken by NGO increased water for crop production, applied appropriate technologies, were less labour intensive, were affordable and generally harvested enough water to last from one season to another in order to mitigate drought. Table 4.32 below presents mean scores of different rainwater interventions. This summary demonstrates that Earth Dams, Sand Dams, Boreholes, Farm Ponds and Zai Pits were perceived to be the most effective interventions in rainwater harvesting by farmers.

Table 4.32: Effectiveness of Various Rainwater Harvesting Interventions

	Earth dams Mean (sd)	Sand dams Mean (sd)	Water pans Mean (sd)	Farm ponds Mean (sd)	Boreholes Mean (sd)	Terracing Mean (sd)	Zai pits Mean (sd)
Increases water for food/crop production	1.47 (.810)	1.73 (.771)	1.96 (.845)	1.86 (.881)	2.15 (1.24)	1.60 (.601)	1.58 (.841)
The choice of technology is appropriate	1.63 (.682)	2.05 (.711)	2.51 (1.12)	2.22 (1.00)	2.21 (1.02)	1.89 (.61)	1.87 (.91)
It is less labour intensive to construct	3.17 (1.52)	3.39 (1.15)	3.77 (1.11)	3.78 (1.06)	3.86 (1.21)	3.06 (1.13)	3.07 (1.23)
Harvests enough water to last from one season to another hence mitigating drought	1.46 (.861)	2.71 (1.33)	3.34 (1.34)	2.81 (1.24)	1.96 (1.25)	4.40 (.832)	4.39 (.77)
Overall mean	1.9325	2.4700	2.895	2.6725	2.545	2.7375	2.7275
overall sd	.612	.571	.762	.674	.751	.428	.631

Key: 1-strongly Agree , 5 -strongly Disagree

Farmers in the focus group discussions noted that Earth Dams, individual Farm Ponds, on-farm terracing, zai pits, and sand dams were effective because these interventions were responsive to the recurring drought in the area. Earth dams were effective because they harvested large volumes of water that can last from one season to another. Except for Earth Dams, farmers preferred water-harvesting interventions that they can manage individually, particularly, farm ponds, on-farm terracing, zai pits and water pans. Some NGOs assisted farmers to install plastic dam liners in farm ponds and water pans in order to reduce water from sipping to the ground. In general, individual interventions boosted farmers' ownership, enabled good management of water systems, encouraged on-farm replication of technologies, limited competition and increased a desire to invest in future expansion.

However, farmers reckoned with underlying financial and labour premium involved in implementing some of these interventions. Water Pans and Farm Ponds require a dam liner to reduce water sipping to the ground that is common in this area due the porous soils. This costs approximately sixty thousand Kenya Shillings and thus unaffordable by many farmers. Similarly, farmers revealed that Zai pits have good outcomes in terms of water retention and hence improved food production. However, they involved a lot of labour in excavating them. Similarly, they were susceptible to rodents that dug out all planted seeds thus compromising their effectiveness. One key lead farmer in Katangi noted that:

> *"Although most rain water interventions were relevant to our context and acceptable, they are labour-intensive especially when it comes to excavating soil structure manually using ordinary tools. It is about time NGOs came up with appropriate technologies to lessen the burden of farmers. It is not good to provide farmers with basic tools and expect them to work on farm ponds, water pans, terraces, zai pits among others".*

Similar sentiments were captured by a key informant (an agricultural extension officer) working in Ndalani and Matuu wards. She noted that:

> *"Rainwater harvesting is good for these areas. However, there is need to examine different soils in terms of their porousness and structure. Some soils increased spillage while others needed other technologies to break them. It is difficult to expect farmers to use rudimentary tools to do this"*

4.7.2 Effectiveness of Drought Tolerant Crops

The scores of drought tolerant crops had a Cronbach alpha of 0.841 indicating their reliability (see appendix VIII). Farmers' perceptions were scored on effectiveness of different drought tolerant crops. This was measured based on crops ability to increase food production; respond to farmers' food preference; its relevance to the local conditions and capacity to be less-labour intensive. A detailed summary of the scores

as shown in Table 4.33 indicates that farmers perceived cowpeas, green grams, pigeon peas, maize and beans to be effective in contrast with sorghum and millet.

Table 4.33: Results of Effectiveness of Different Drought Tolerant Crops

	Maize **Mean (sd)**	**Beans** **Mean (sd)**	**Green grams** **Mean (sd)**	**Cow peas** **Mean (sd)**	**Pigeon peas** **Mean (sd)**	**Millet** **Mean (sd)**	**Sorghum** **Mean (sd)**
The varieties promoted contribute to increased food/crop yields for our households	1.35 (.551)	1.41 (.671)	1.22 (.432)	1.21 (.431)	1.20 (.419	2.21 (1.60)	1.41 (.618)
The technologies applied are less labour intensive	1.86 (.941)	1.88 (.957)	1.67 (1.01)	1.62 (.934)	2.01 (1.25)	3.07 (1.51)	2.25 (1.27)
The varieties promoted matches household food preferences	1.34 (.512)	1.41 (.589)	1.23 (.511)	1.27 (.499)	1.25 (.501)	2.30 (1.51)	1.65 (.872)
The varieties promoted are preferable for local conditions	1.41 (.671)	1.63 (.972)	1.19 (.451)	1.18 (.432)	1.23 (.494)	2.60 (1.54)	1.86 (1.04)
Overall mean	1.4775	1.5825	1.3275	1.3200	1.4225	2.5450	1.7925
Overall sd	.481	.602	.422	.451	.442	1.27	.522

Key: 1-strongly Agree , 5 -strongly Disagree

Farmers in focus group discussions confirmed that cowpeas, green grams and pigeon peas performed favorably well in the area even in the event that the rains were not sufficient. These crops also provided good yields and matured earlier. A farmer in a focus group discussion in Ikombe Ward noted:

> *"Cowpeas are usually early maturing. Within a month, we have started eating its green leaves as a vegetable. The crop also withstands prolonged drought and at the end of the day we can have some harvest."*

Moreover, farmers also preferred to grow improved drought tolerant maize (*Katumani* and pioneer), as well as beans. Farmers in all focus group discussions noted that Kenya Agriculture Livestock and Research Organization (KALRO) have developed various varieties of drought tolerant maize and beans seeds which are suitable for the local conditions. However, farmers in focus group discussions were adamant that even if millet and sorghum were promoted by NGOs and KALRO, they were susceptible to bird invasion, hence costing farmers a lot time in labour in chasing birds. One farmer in a focus group in Matuu noted that:

> *"We stopped growing sorghum because it is preferred by birds. Nowadays we do not have children at home to chase away the birds as was in the past because they are in school. Similarly, there is no assurance of markets for sorghum in the country."*

Further, green grams had good market prospects, survived with less rains and was commonly eaten as a protein within many households. These findings suggest that farmers adopted crops on the basis of their suitability to be responsive to the local conditions; their yielding potential, their ability to correspond to household food preferences and attract markets, as well their estimated labour costs. Farmers also asserted that NGOs have not invested in on-farm soil tests to determine which types of crops were suitable on their farms. They maintained that they were different soil types even within the same farm. Soil tests will enable farmers make informed choices on which drought tolerant crops are appropriate in their area.

4.7.3 Effectiveness of Soil Fertility Enhancement Interventions

Likert scale scores on soil fertility enhancement interventions recorded a Cronbach alpha of 0.755 further confirming that they were reliable (see appendix VIII). Farmers' perceptions on both organic and inorganic fertilizers were measured in terms of their ability to improve soil fertility, increase crop yields, their affordability and capacity to mitigate long-term negative impact on the soil fertility. The results are presented in Table 4.34. The findings indicate that organic manure was perceived as effective compared to in-organic fertilizers.

Table 4.34: Effectiveness of Use of Organic Fertilizer in Soil Fertility Enhancement

	Organic manure Mean(sd)	**In organic fertilizer Mean (sd)**
The interventions increase household crop yields	1.25(.461)	1.64(.602)
The technology applied is less labour intensive	1.99(1.03)	2.47(1.021)
It is affordable by the farmers	1.84(1.14)	3.63(1.341)
Has less long-term negative effect on the soil fertility	1.71(.891)	2.81(1.08)
Overall mean	1.6975	2.6375
Overall sd	.542	.611

Key: 1-strongly Agree , 5 -strongly Disagree

The above findings were consistent with the farmers' assertions in the focus group discussions, which reported that organic manure increased yields, was affordable, was locally available and had a less likelihood of negatively affecting soils on a long-term. Conversely, use of fertilizers was restrictive because of its costs and in most cases farmers relied on NGO distributions, which were irregular, and given in rations that were not matching with the size of their farms. Although fertilizers increased crop yields on a short-term, the farmers reported that it increased soil acidity on a

long-term if not applied in the right rations and sometimes destroyed (burned) seeds if rains failed. Soil acidity has to be treated with lime that is not only expensive but also unavailable. One farmer in Ikombe ward focus group discussion noted that:

> *"Use of fertilizers destroys our seeds, when it does not rain. The seeds are completely destroyed and this forces us to replant again, unlike when we use our organic mature. Besides, continuous use of fertilizers makes our soils acidic. This requires us to apply lime to treat the soil"*

As already mentioned above, farmers emphasized the need for continuous testing and treating of soils to enhance better crop yields. The farmer focus group discussions maintained that in some farms, the soil has been exhausted and drained off essential nutrients because of soil erosion. It is therefore important for NGOs to work with farmers and soil scientists to test these soils and determine their status and institute relevant treatment measures. Farmers noted that even within the same farm, they experienced different types of soils further emphasizing the need to test soils first before planting.

4.7.4 Effectiveness of Various Horticultural Crops

Farmers were also asked to rate the effectiveness of different horticultural crops that they grow. The overall Cronbach alpha score was 0.874. Farmers' perceptions were assessed in terms of these crops contributing to the household nutrition, meeting local food preferences, being marketable and increasing farmers' incomes. Notably, most of these crops were grown by farmers who had a favourable access to water via micro irrigation from their farm ponds, water pans, and earth dams and among those who lived near Yatta irrigation canal or along Athi River. As shown in Table 4.35, kale/spinach, tomatoes and onions scored as the most effective horticultural crops in terms of increasing household incomes and nutrition.

These results concurred with findings from focus groups discussions and key informant interviews, which together confirmed that promotion of horticultural crops, have been effective and well received by farmers. This is because they

contribute to improving incomes and nutrition of respective households. Farmers also revealed that growing of different vegetables, especially kales and spinach indirectly benefitted households that were not targeted by NGOs, as many would purchase the crops that were now locally available. Farmers maintained that their household food security improves if they have constant incomes from marketing horticultural crops. Incomes improve household purchasing power and thus their food security prospects. However, farmers felt that NGOs should assist farmers in marketing of horticultural crops so that they are not exposed to private companies and intermediaries who offered them low prices for their produce.

Table 4.35: Effectiveness of Different Horticultural Crops

Growing Horticultural Crops	French Beans Mean(sd)	Onions Mean(Sd)	Tomatoes Mean(sd)	Kale/Spinach Mean(sd)	Others Mean(sd)
The crops promoted contribute to good nutrition for households	1.73(1.02)	1.55(.58)	1.32(.488)	1.23(.448)	1.57(.503)
The crops promoted meet food preferences for local household	2.24(1.21)	1.96(.957)	1.42(.682)	1.33(.557)	1.77(.625)
Markets for the crops promoted are readily available	2.42(1.58)	2.11(1.281)	1.69(.852)	1.32(.602)	1.67(.617)
The crops contribute to increased household incomes	1.99(1.24)	1.73(.85)	1.43(.670)	1.21(.517)	1.51(.502)
Overall mean	2.095	1.8375	1.465	1.2725	1.63
Overall SD	1.106	0.767	0.489	0.428	0.674

Key: 1-strongly Agree , 5 -strongly Disagree

4.7.5 Effectiveness of Extension Services

Farmers also reviewed the effectiveness of extension services provided by NGOs. The scores recorded Cronbach alpha of 0.832. The extension services were evaluated in terms of their relevance to the local conditions, frequency, sufficiency and their ability to be understood by ordinary farmers. As indicated in Table 4.36, trainings, post-harvest and marketing services were perceived as the most effective extension services provided by NGOs. They were rated high on their relevance to the local conditions, were easily understandable by farmers and had a good follow-up strategy.

Table 4.36: Effectiveness of Extension Services

	Training Mean(sd)	**Marketing Mean(sd)**	**AI Mean(sd)**	**Post harvesting Mean(sd)**	**Record keeping Mean(sd)**
The services given are relevant to the local conditions	1.34(.54)	1.69(.88)	2.71(1.52)	1.43(.71)	1.52(.71)
The services are frequent and regular	3.04(1.12)	3.25(1.06)	3.84(1.12)	3.06(1.23)	2.52(2.14)
There is sufficient follow-up through the model/lead farmer	2.96(1.31)	3.17(1.32)	3.91(1.23)	2.88(1.16)	4.53(.72)
The services are simple and understandable by farmers	1.87(.98)	2.18(1.13)	3.12(1.55)	1.94(1.11)	2.11(1.43)
Overall mean	2.3025	2.5725	3.395	2.3275	2.67
Overall sd	.673	.753	1.105	.813	.182

Key: 1-strongly Agree , 5 -strongly Disagree

Farmers in focus groups discussions confirmed that extension services that have been effective are those that are responsive to the local conditions, simple to be understood and implemented by the ordinary farmer and those that have frequent follow-up mechanism. These extension services have enabled farmers to improve their farming knowledge, marketing and post-harvest techniques. However, farmers reaffirmed their preference for practical trainings that were inclusive of all farmers and are carried out on-farm as opposed to theoretical trainings undertaken in hotels.

One farmer in Ndalani Ward captured this in the focus group discussion by noting that:

> *"Some NGOs provided training only to elite farmers within hotel settings. This practice effectively excludes majority of the farmers. These NGOs assume that these elites will automatically train us. Most of the time, this does not happen. We are interested only in trainings that are carried out on our farms and are involving all farmers. These trainings must also be accompanied by regular follow-up by the government and NGO extension staff. This way, all of us will benefit"*

4.7.6 Effectiveness of Different Farm Inputs Provided by NGOs

The effectiveness of different farm inputs provided by NGOs was also reviewed. The Cronbach alpha score was 0.829. The farm inputs were measured on their ability to increase food production, ability of the farmers' capacity to afford them, as well as timeliness and frequency of distribution. A summary of overall averages presented in Table 4.37 below demonstrates that seeds and tools/machineries were the most effective farm inputs. This is because they largely improved food production.

Table 4.37: Effectiveness of Different Farm Inputs Provided by NGOs

	Tools/ machinery Mean(sd)	**Seeds Mean(sd)**	**Fertilizer Mean(sd)**
The inputs given improve food production in that area-	2.01(1.4)	1.46 (.80)	2.16(1.31)
The inputs given are affordable/accessible for our local areas	2.52 (1.3)	1.82 (.89)	3.01 (1.5)
The inputs are given in a timely manner	3.05 (1.4)	2.41 (1.2)	3.13 (1.4)
The inputs are given frequently	4.3 (.820)	4.23 (.94)	4.27(0.99)
Average mean	2.97	2.48	3.14
Overall sd	.962	.641	.981

Key: 1-strongly Agree , 5 -strongly Disagree

Although farmers preferred farm inputs from NGOs, both NGOs and farmers' focus group discussions reported that this trend sometimes created dependence on NGOs. NGOs preferred to device a method in which farmers would be able to afford basic tools and seeds on their own, instead of NGOs regularly distributing these to them. Farmers on their part suggested that expensive tools would be availed to farmer groups by NGOs as a subsidy and used communally through a loaning system. Farmers maintained that it is important for NGOs to explore avenues of enabling them to access less-labour intensive automated machineries to improve farming effectiveness.

The tools that were provided by NGOs were rudimental, labour-intensive, of low technology and thus generally ineffective. Whereas, farmers appreciated the improved varieties of seeds given by NGOs, they noted that these were given in small quantities that do not match the size of their land. They preferred to receive these in sufficient portions as a loan and repay after their harvests.

4.7.7 Effectiveness of Various Livestock Supported by NGOs

Lastly, farmers assessed the effectiveness on various livestock promoted by NGOs. The Cronbach alpha score was 0.866, thus demonstrating reliability of the scores. Farmers were asked to rate whether the livestock promoted were suitable to the local conditions, increased production of milk, meat or eggs, as well as improved household incomes. As shown in Table 4.38, chicken and goats were ranked as the most effective livestock. Farmers preferred these because they supplemented household incomes, increased production (milk and meat) and were suitable for the local conditions. Farmers in focus group discussions confirmed that they preferred livestock, especially goats and chicken as a safety net, particularly when the crops failed in order to provide much-needed household income. Farmers maintained that livestock promotion by NGOs should be accompanied with continuous training on disease control, breed improvement and access to markets in order for them to leap favourable benefits.

Table 4.38: Perception of Farmers on Effective Livestock

	Cows Mean(sd)	Goats Mean(sd)	Chicken Mean(sd)
The breeds promoted are suitable for our local areas	1.61 (.91)	1.43 (.701)	1.31 (.639)
The breeds increase production (milk, meat, eggs)	1.71(.972)	1.36(.671)	1.32(0.6)
Livestock activities increase and supplement household incomes	1.53(.841)	1.34(.692)	1.25(.541)
Overall mean	1.616	1.377	1.293
Overall sd	.834	.627	.549

Key: 1-strongly Agree , 5 -strongly Disagree

The above farmers' perceptions confirmed that interventions such rainwater harvesting corresponded to their local context and were effective in increasing water for crop production. However, farmers asserted that NGOs should devise ways to respond to emerging challenges pertaining to choice of technologies to reduce labour-intensity on interventions. In most cases, farmers used hand tools to excavate water pans, farm ponds, terraces, zai pit, among others. The farmers recommended improvement of technologies such as use of automated machinery to lessen their labour input; provision of subsidies to offset large costs involved and use of shed nets and dam liners to reduce water evaporation that is common in the area. In general, farmers agreed that drought tolerant crops promoted are relevant to the local context. Yet, farmers in focus group discussions noted that effects of climate change manifested in prolonged droughts is becoming frequent and bringing with it new challenges. NGOs need to invest more on research and direct efforts in scaling adaptation and mitigation measures to combat emerging effects of climate change. Farmers noted that prolonged droughts occasioned by erratic and unreliable rainfall is progressively discouraging farmers from producing crops and this might have a long-term impact on their food production. Although farmers agreed that NGOs

understood the local context concerning soil fertility enhancement, a lot of investment needs to be directed at soil testing.

4.7.8Hypothesis Testing

The third objective of this study was to examine farmer's perceptions of NGO interventions and their effect on household food security. The respective null hypothesis (H_0) assumes that farmer's perceptions of NGOs interventions are not positively associated with household food security outcomes. The PCA method was used to extract a common factor to represent farmers' perceptions of NGOs interventions as shown in Table 4.39. This factor accounted for 51.840% of variation in the scores. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.735 and the Bartlett's test of sphericity was significant (χ^2=527.810 (21df); p=0.000). This score was found to be reliable and thus included in the logistic regression as discussed below.

Firstly, assumptions for logistic regression analysis were tested. The test results demonstrated that the assumptions were met (see Table 4.39).

Table 4.39: Preliminary Test

Assumptions	Test	Observation	Conclusion
Binary , independence of observation	Household food security	(Yes, No) Mutually exclusive and exhaustive categories.	Not violated
Sample size	Minimum (10*2 IV /.10) =200	N= 357	Sufficient

The study similarly tested the goodness of fit using Omnibus test; Hosmer and Lemeshow (see Table 4.40 and 4.42). R^2 was tested to check the validity of the logistic regression model (Table 4.40).

Table 4.40: Omnibus Tests Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	78.214	1	0.000
	Block	78.214	1	0.000
	Model	78.214	1	0.000

Results of the omnibus test in Table 4.41 indicate that the model is significant at the 0.95 confidence level.

Table 4.41: Model Summary

Step	-2 Log likelihood Initial model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	427.621[a]	416.693[a]	0.297	0.362

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

The Cox and Snell R Square and Nagelkerke R Square scores indicate the amount of variance explained by the logistic model. In Table 4.41, the Nagelkerke R Square is 0.362 that implies that 36.2 percent of the model is explained by the independent variables. The -2-log likelihood value is used to investigate the contribution of independent variables to the model and testing the significance of the regression coefficients. The -2-log likelihood is 416.693 at 95% confidence level. In the initial model that includes only the constant term, the -2-log likelihood value is 427.621, but at the end of the fourth step, the value is found to be 416.693. The decreasing -2-log likelihood indicates improvement in model-data fit as independent variables are added to the model.

Table 4.42: Hosmer and Leneshow Test

Step	Chi-square	Df	Sig.
1	21.212	8	0.007

The Hosmer–Lemeshow test is used to measure the goodness of fit for logistic regression models. The hypotheses are:

H_0: There is no significant difference between observed and predicted value in the model.

H_1: There is a significant difference between observed and predicted value in the model.

According to Table 4.42, the calculated p-value of the Chi-square is 0.007, which is below the critical value of 0.05. Thus, the study rejects H_0 and concludes that there is significant difference between observed and predicted values in the model.

Table 4.43: Classification Table

	Observed		**Predicted Household Food Security**		**Percentage Correct**
			No	**Yes**	
Step 1	Household Food Security	No	19	86	18.1
		Yes	8	244	96.8
	Overall Percentage				73.7

a. The cut value is 0.500

Classification scores obtained from logistic regression model are presented in Table 4.43. The ratio of the total correct classification of the model at 5% significance level is found to be 73.7%. The model correctly estimates 244 of 330 food secure households.

Table 4.44: Variables in the Question

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Farmers' perception of NGO interventions	1.389	0.307	20.491	1	0.000	4.010	2.198	7.317
	Constant	-1.182	0.469	6.343	1	0.012	0.307		

a. Variable(s) entered on step 1: Farmers perception of NGO interventions.

The standard error of coefficients of independent variables (SE), Wald statistics (Wald), significance levels (Sig) and Exp (B) statistics are displayed in Table 4.44. In logistic regression, Wald statistic, which has a specific distribution known as chi-square, is a measure of the significance of β. The variables including farmers' perceptions of NGO interventions are found to be significant at 95% confidence level. Eventually, the model is constructed as follows;

$$ln\left[\frac{p}{1-p}\right] = -1.182 + 1.389\ Farmers'perception\ on\ NGO\ interventions$$

According to the model, the more the positive the farmers' perceptions of NGO interventions are, the more the likelihood of a household food security improving by 4.010 times. The study rejects the null hypothesis, which states those farmers' perceptions on NGO interventions, is not significantly associated with household food security. Therefore, the study accepts the alternative hypothesis

4.8 To investigate the Extent to Which Conditions Exerted by Funding Agencies Mediate the Association between Farmers' Participation and Perceptions of NGOs Interventions and Household Food Security

Objective four investigated the extent to which conditions exerted by funding agencies mediate the association between farmers' participation and perception of

NGOs interventions and household food security. This was examined through the lens of duration of funding, predetermined interventions and standardized results usually given as conditions by funding agencies to NGOs involved in food security interventions. These conditions were identified through qualitative data collected through focus group discussion with NGOs and NGO key informants. The farmers were asked to report whether conditions of funding agencies identified by NGOs such as duration of funding, predetermined interventions and standardized results affected their household food security. According to Table 4.45, 43.1% of the farmers ranked the short duration of funding by NGOs (< 5 years) as having a negative impact on household food security.

Additionally, 28.3% reported that NGOs pursued pre-determined interventions given by their backdoor funding agencies that influenced their household food security. Another 28.3% noted that NGOs were in a hurry to implement interventions in order to meet stringent deadlines and schedules provided by their funding agencies. Similarly, 25.5% mentioned that funding agencies imposed standardized results to be achieved in food security interventions that were not always compatible with the local conditions. Finally, 39.5% felt that farmers did not have skills, advantage and power to negotiate with either NGOs or backdoor funding agencies for favourable conditions.

Table 4.45: Ways in which Funding Affects Household Food Security

	Frequency	**Percent**
Duration of funding was too short (<5 years) to make impact	154	43.1
NGOs pursue predetermined interventions given by their funding agencies	101	28.3
NGOs were a hurry to implement in order to meet their funding agencies demands	101	28.3
NGOs interested in implementing standardized results provided by their funding agencies	91	25.5
Farmers lacked skills to negotiate with either NGOs or funding agencies for favourable conditions	141	39.5

These findings were corroborated by farmers in all five focus group discussion who overwhelming affirmed that the duration of implementation of food security interventions were often too short (< 5 years) to allow them to succeed. They noted that some of the NGO food security interventions were implemented either for one or three years on average. Very few organizations had programs that run for 5 years. Consequently, NGOs hurried implementation of activities to meet certain prescribed deliverables without necessarily giving farmers sufficient time to understand such interventions.

Farmers' noted that they did not have adequate time to either experiment, test or review interventions. This process generally affected sufficient participation of farmers in these interventions. Further, farmers asserted that some NGOs abruptly phased out of food security programs. This trend left farmers in suspense and without a good hand-over mechanism forcing some to stop implementation altogether. Farmers opined that lack of clarity of duration of funding, disjointed programming and abrupt withdrawal of funding significantly affected successful implementation of food security interventions.

Data from key informants, focus group discussions and case study consistently confirmed that those NGOs that implemented interventions for a longer duration (>5 years) recorded better results. For instance, the farmer with a positive experience in the case study argued that interventions in their community were successful because the NGO they worked with, did this for a longer duration. This gave the farmers time to experiment, review, enrich and get rid of interventions that were not working. The farmers were also able to participate in governance, implementation and the process of monitoring. This significantly increased ownership of the interventions by the farmers. NGO focus group discussion also noted that there were sometimes under intense pressure to implement programs within a short duration because of the type of funding facilities they received from their funding agencies.

In all cases, funding agencies determined the duration in which interventions were to be implemented (usually 12 to 36 months on average). This made NGOs to fast-truck interventions to safeguard funding. This trend sometimes compromised

learning and quality of the interventions. The NGO focus group discussion further noted that they worked within a very competitive sector where all NGOs haggle for resources for their survival from often-similar funding agencies. They were sometimes forced to go for certain resources tendered by funding agencies even if they knew it was difficult to achieve meaningful results within a short duration. They asserted that periods for implementation of interventions were given as a condition by the donors and failure to adhere to such deadline were considered as a capacity failure on the part of the NGO. For instance, a period of 2 years is given for the entire process that includes mobilization of farmers, training, planting, harvesting and marketing of crops and eventually reporting on agreed results.

The NGOs felt that a period of 10 years would be sufficient to implement successful interventions. In their opinion, the first five years would be used for mobilization of farmers, understanding farmers' needs, assessing interventions, training farmers, researching together with farmers (particularly on rain patterns, types of soils, seed varieties, existing markets among others) and determining relevant interventions. The last 5 years will be utilized for adoption, consolidation, follow-ups, evaluation of the interventions and a phased exit strategy (usually handing farmers over to the Ministry of Agriculture for sustainability).

Farmers in focus group discussions echoed the above views. For example, a farmer respondent in a focus group discussion Ikombe Ward noted that:

> *"NGOs were usually in early to implement their programs and leave the community without investing time for research, understanding the needs of the community and market dynamics. For instance, in my community, NGOs hurriedly introduced sorghum because they promised farmers of a ready market with a brewery company. However, the type of sorghum introduced turned out to be bitter and most of it was left in the farms to be eaten by the birds. This made farmers to be disillusioned. This forms a good example where NGOs introduce intervention because they have secured a funding from their donors without first understanding the perspective of the farmers"*

Farmers' focus group discussions also noted that some NGOs were keen to impress their backdoor funding agencies and were not flexible to change interventions that were not working. Farmer respondents in these focus group discussions asserted that some NGOs implemented pre-determined interventions that had been sanctioned by their backdoor funding agencies. These NGOs were unwilling to change interventions, as this would make them lose funding. For instance, a farmer with a negative experience in the case study noted that the NGO they worked with introduced fishponds irrespective of the fact that the area received irregular rains. The NGO ended up abandoning the intervention that was heavily funded because of lack of water and disinterest from farmers. Farmers in Matuu focus group discussion pointed out that one NGO they had worked with introduced a certain variety of green gram seeds that was not palatable. Although the harvest was good, there was no market for this type of green grams. Farmers were left with the entire harvest. Similarly, farmers in all wards noted that sorghum and millet that was introduced by NGOs to respond to the effects of climate change was susceptible to birds' invasion, did not constitute of the locally preferred foods and lacked markets. NGOs focus group discussion also noted that, to some extent some funding agencies insisted on some predetermined interventions. Usually, these interventions were based on proven evidence of success in other either areas or countries. One NGO respondent in the focus group discussion summed this up as follows:

> *"The funding agencies adopted top-down approach in which projects were copied from other areas and even countries where they had some proven success. These are replicated and NGOs were forced to adopt them and scale them if they wanted to gain funding. This was a common practice with Institutional Funding. Given different contexts, these types of interventions sometimes worked and in other times were a total disaster"*

According to some NGOs in the focus group discussion, the above was not necessarily unacceptable as they were easier to scale-up. However, context specific research was necessary to determine their acceptability and relevance to the local context. NGO focus group discussions and key informants within the NGO sector

also confirmed that funding agencies provided them with standardized result areas to be achieved. These usually consisted of three to five results that were initially contained in the call for proposals and later included in the contracts. NGOs were required to adhere and frame their interventions in a way that resonates with those results in order to sustain funding. Upward reporting to donors was based on those standardized result areas.

The NGOs confirmed that funding agencies used a top down approach in which they released a tender complete with objectives, result areas and specific themes in accordance to their whims and policies. It was the onus of the NGOs to find ways of aligning to these results and contextualize them. NGO key informants noted that they were usually at pains to frame interventions to correspond with these results and dissuade farmers to support them in implementation them. They asserted that there were no opportunities to discuss interventions, results and objectives of programs with funding agencies before calls for proposals were announced.

From the above discussions, this study revealed that food security interventions were often implemented within a short duration (<5 years). Some pre-determined interventions were introduced by NGOs without good consultation with farmers. The NGOs also confirmed that they were in most cases forced to adopt standard results given by their funding agencies. The above had a likelihood of influencing farmers' participation, perceptions and by extension household food security. NGOs in the focus group discussions asserted that they did not have a good forum to negotiate with funding agencies in order to determine appropriate funding periods, suitable results and interventions. NGOs worked in a fragmented way often duplicating their efforts in similar areas with different funding agencies, competing for resources and generally not appropriately coordinating their actions.

The NGOs suggested that they would work better if the County Government took the initiative to coordinate their efforts within the existing County Integrated Development Plan (CIDP) to avoid duplication and fragmentation. NGOs focus group discussions noted that they preferred to work within a multi-stakeholder partnership involving the national and county government, private sector, NGOs,

research institutes and knowledge centres, as well as farmers. This partnership will increase synergy and give NGOs leverage to negotiate with funding agencies on farmers' priorities, duration of food security interventions, suitable results and relevant interventions even before calls for proposals are released and advertised. In their opinion, NGOs focus group discussion maintained that funding agencies should respond and frame their call for proposals on appeals made by counties and NGOs based on well-researched needs of farmers. Additionally, food security interventions should be backed with periodic evaluation, gathering of evidence and willingness by NGOs and other actors including funding agencies to adapt programs to emerging issues.

The above funding conditions had a likelihood of affecting. household food security because donors defined the agenda, the interventions and envisioned results that were not in tandem with farmers and NGOs aspirations. Duration of funding was too short to achieve meaningful positive household food security indicators. NGOs exited before achieving food security targets. The funding agencies often changed their agenda mid project

4.8.1 Hypothesis Testing

The fourth objective sought to investigate the extent to which conditions exerted by funding agencies mediate the association between farmers' participation and perceptions of NGOs interventions and household food security. This was tested using two null hypotheses as shown below:

> H_{01}: Conditions exerted by funding agencies on NGOs do not mediate the association between farmers' participation in NGOs interventions and household food security
>
> H_{02}: Conditions exerted by funding agencies on NGOs do not significantly mediate the association between farmers' perceptions on NGO interventions and household food security.

This study utilized PCA to extract a common factor to represent conditions of funding agencies as represented in appendix VII. This factor accounted for 54.6% of variation in the scores. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.723 and the Bartlett's test of sphericity was significant (χ^2=100.622 (3df); p=0.000). This score was reliable and further analyzed through causal mediation analysis as discussed below. The study tested the direct effect of the independent and dependent variables. This was followed by addition of the mediating variable to test if the indirect effect was either significant or not using bootstrapping procedure. This was through re-sampling done five thousand times at 95% confidence interval using the PROCESS macro-version 3. The results are presented below.

H_{01}: Conditions exerted by funding agencies on NGOs mediate the association between farmers' participation in NGOs interventions and household food security.

Table 4.46: Model Summary

Dependent: funding conditions						
R	R-sq	MSE	F	df1	df2	P
0.482	0.233	0.1346	39.5978	1	355	0
Model						
	Coeff	Se	T	P	LLCI	ULCI
Constant	2.0992	0.07	29.9949	0	1.9616	2.2368
Farmer's Participation	-0.306	0.0486	-6.2927	0	-0.4016	-0.2103

Table 4.47: Model Summary for Mediator Variables of Funding Conditions on Farmers' Participation

Dependent :Household food security							
	2LL	**Model LL**	**Df**	**P**	**McFadden**	**CoxSnell**	**Nagelkrk**
	410.9794	21.56	2	0	0.3181	0.3861	0.4834
Model							
	Coeff	Se	Z	P	LLCI	ULCI	Exp(B)
Constant	-2.8024	0.8487	-3.302	0.001	-4.4657	-1.139	0.0607
Farmer's Participation	1.224	0.3284	3.7278	0.0002	0.5805	1.8676	3.4008
Funding conditions	1.2156	0.3361	3.6169	0.0003	0.5569	1.8743	3.3723

Table 4.48: Third Step Mediation of Funding Conditions on Farmers' Participation Direct Effect of X on Y

Direct effect of X on Y					
Effect	Se	Z	P	LLCI	ULCI
1.224	0.3284	3.7278	0.0002	0.5805	1.8676

Table 4.49: Fourth Step of Mediation Effect of Funding Conditions on Farmers' Participation

Indirect effect(s) of X on Y:						
	Effect	**BootSE**	**BootLLCI**	**BootULCI**	**Z**	**P**
Funding Condition	-0.3719	0.1246	-0.653	-0.1672	3.1362	0.0017

As shown in the tables above (4.46 to 4.49) the bootstrapping procedure revealed that approximately 48.34% of the variance in household food security was accounted for by farmer's participation and funding conditions predictors (Nagelkerk $R^2 = 0.4834$). Results showed that farmers participation was a significant predictor of household food security, (*coeff*=1.224, SE=0.3284, Z=3.7278, $p<0.05$), after controlling for the mediator, funding conditions (*coeff*=1.2156, SE=0.3361, Z=3.6169, $p<0.05$). Re-sampling was done five thousand times at 95 % confidence levels using the PROCESS macro-Version 3 (Hayes, et al., 2017). The bootstrapping statistics indicated that the mediation effect was significant at $\alpha=0.5$. It was found that there was a statistically significant direct effect (*coeff*=1.224, SE=0.3284, Z=3.7278, $p<0.05$). A statistically significant indirect effect was also found (*coeff*=-0.3719, Z=3.1362, $p<0.05$). The results suggest that conditions of funding agencies partially mediated the association between farmers' participation in NGO interventions and household food security.

H_{02}: Conditions exerted by funding agencies on NGOs do not significantly mediate the association between farmers' perceptions on NGO interventions and household food security.

Table 4.50: Model Summary of First Step of Mediation Effect of Funding Conditions on NGOs Interventions

Dependent: funding conditions						
R	**R-sq**	**MSE**	**F**	**df1**	**df2**	**P**
0.429	0.184	0.149	2.616	1	355	0.107
Model						
	Coeff	Se	T	P	LLCI	ULCI
Constant	1.547	0.082	18.813	0	1.385	1.709
Farmers perceptions on NGO interventions	0.145	0.016	8.946	0	0.018	0.29

Table 4.51: Model Summary of Second Step of Mediation Effect of Funding Conditions of NGOs Interventions

Dependent :Household food security							
-2LL	**Model LL**	**Df**	**P**	**McFadden**	**CoxSnell**	**Nagelkerk**	
404.721	27.818	2	0	0.264	0.275	0.367	
Model							
	Coeff	Se	Z	P	LLCI	ULCI	EX(B)
Constant	-2.295	0.692	3.319	0.001	-3.65	-0.94	0.101
Farmers perceptions of NGO interventions	1.368	0.312	4.379	0	0.756	1.98	3.931
Funding conditions	0.691	0.304	2.27	0.023	0.095	1.288	1.996

Table 4.52: Third Step of Mediation Effect of Funding Conditions on Farmers' Perception of NGOs Interventions

Direct effect of X on Y					
Effect	**Se**	**Z**	**P**	**LLCI**	**ULCI**
1.368	0.312	4.379	0	0.756	1.98

Table 4.53: Fourth Step of Mediation Effect of Funding Conditions on Farmers' Perception on NGOs Interventions

Indirect effect(s) of X on Y:						
	Effect	**BootSE**	**BootLLCI**	**BootULCI**	**Z**	**P**
Funding Conditions	0.059	0.05	0.02	0.275	2.205	0.027

As shown in the tables above (4.50 to 4.53), the bootstrapping procedure revealed that approximately 36.7% of the variance in household food security was accounted for by farmers' perceptions on NGO interventions and funding conditions predictors (Nagelkerk R^2 = 0.367). Results showed that farmers' perception on NGO interventions was a significant predictor of household food security, (*coeff*=1.368, SE=0.312, Z=4.379, $p<0.05$), after controlling for the mediator, funding conditions (*coeff*=0.691, SE=0.304, Z=2.27, $p<0.05$). Re-sampling was done five thousand times at 95 % confidence levels using the PROCESS macro-Version 3 **(**Hayes, et al, 2017**)**. The bootstrapping statistics indicated the mediation effect was significant at α=0.5. It was found that there was a statistically significant direct effect (*coeff*=1.368, SE=0.312, Z=4.379, $p<0.05$). A statistically significant indirect effect was also found (*coeff*=0.059, Z=2.205, $p<0.05$). The results suggest that conditions of funding agencies partially mediated the association between farmers' perceptions of NGO interventions and household food security. The study concluded that funding conditions exerted on NGOs mediated the association between farmers' perceptions on NGO interventions and household food security

4.9 Summary of Findings and Discussion

The summary of the findings and discussion is presented in this section. It is based on the hypotheses tested.

Table 4.54: Summary of Hypotheses Testing

	Hypotheses	**Estimate (B)**	**Wald – value (p-value)**	**Exp (B) odds Ratio**	**Results**
H01	Farmers' participation in NGOs interventions is not positively associated with household food security outcomes.	0.808	7.742** (0.005)	2.244	Reject null & accept alternative
H02	Farmers' perceptions of NGOs interventions are not positively associated with household food security outcomes.	1.389	7.742** (0.005)	4.010	Reject null & accept alternative
		Direct effect (Z)	Indirect Effect (Z)		
H03	Conditions exerted by funding agencies on NGOs do not mediate the association between farmers' participation in NGOs interventions and household food security	1.368* (4.379)	0.059* (2.205)		Reject Null & accept alternative
H04	Conditions exerted by funding agencies on NGOs do not significantly mediate the association between farmers' perceptions on NGO interventions and household food security	1.224*** (3.7278)	-0.3719** (3.1362)		Reject Null & accept alternative

*Ns- not sig; * - P<0.05 ; ** - P<0.01; *** - P<0.001*

The results as shown in Table 4.54 above reveal that the entire four hypotheses tested in this study corresponding to the second, third and fourth objectives were statistically significant. The study found that there was a positive significant relationship between farmers' participation in NGOs interventions and household food security outcomes. Ideally, the more the farmer participates in NGO interventions, the likelihood of household food security increasing by 2.244 times. This means that farmers' participation in NGO interventions had a positive effect on household food security outcomes. These findings are consistent with a study in Kwazulu-Natal Province (South Africa) that compared household food security among 330 beneficiaries that participated in one household one garden (OHOG) interventions with 165 non-beneficiaries. Using household dietary diversity score (HDDS) and household food security score (HFCS), the study found that households that participated in OHOG had significant positive food security outcomes (Ngema et al., 2018). Further, a study undertaken over a four-year period (Kerr et at, 2019) to investigate if agro-ecological farming approaches deployed by poor households can enhance their dietary and food security outcomes demonstrated that farmers' participation in experiments in agro-ecology resulted in activities such as intercropping, use of compost manure and residues from crops to improve soil, which in turn had a significant impact on household food security.

Another study in Tanzania (Mmbando et al., 2015), assessed the impact of maize and pigeon pea market participation of rural households, as well as their extent of participation. This data was compared with respective household consumption expenditure. This study concluded that rural households that were involved in market participation enhanced their welfare as reflected in growth in their consumption expenditure. Subsequently, it was concluded that an increase in one unit of market participation translated to an elevated consumption expenditure for both maize and pigeon peas by a rate of 0.5 and 0.3, which consequently resulted in improved household food security.

Similarly, findings of this study resonate with participatory approaches as envisaged by Chambers (1983) through his famous concept of 'putting the last first' in which

he advocates for putting people at the centre of development, inclusion of poor in decision making to chart their future, listening and understanding of their realities. It is only through this that meaningful development can be realized. Chambers (1997) in his writings of 'putting the first last' further urges professionals to change their attitudes and biases, as well as reverse their roles by empowering the poor, confronting power imbalances, triangulate information to enable the people participate in their own development.

Focus groups discussions, key informant interviews and case studies together confirmed that NGOs in diverse ways involved farmers in their interventions. However, there was no standardized way of undertaking participation. Participation in needs identification and development of interventions was skewed towards discussions and meeting between farmers and NGOs in contrast with formalized processes. Although NGOs have advocated for participation (Kumar, 2002), they are openly criticized on the way they analyse underlying needs and their engagement with farmers in food security interventions (Levine & Chastre, 2004). Although farmers affirmed that they were to some level engaged with NGOs they worked with, they felt that this would be improved. Farmer focus groups discussions, case studies and key informant interviews together confirmed that areas that needed improvement included, creating an enabling environment for participation by diffusing competition among farmer groups over scarce NGO resources; seeking feedback from farmers; not being in a hurry to implement intervention; understanding the community dynamics; working towards embracing inclusiveness of all farmers instead of a preference for local elites; weeding-off interventions that do not work; making trainings on-farm and practical, learning from failures and instituting a good exit and follow-up plan probably with the government.

Secondly, the study established that there was a significant positive relationship between farmers' perceptions on NGOs interventions and household food security. Ideally, the more the positive farmers' perceptions of NGO interventions are, the likelihood of household food security increasing by 4.010 times. This means that if farmers have good perceptions about given NGO interventions, the more likely it is

that they will adopt them. This will consequently have a likelihood of improving their household food security. These findings concur with a study in South Western Nigeria (Fawole & Ozka, 2017) that looked at drivers of household food security based on perceptions of heads and appointed representatives of households. Using binary logistic regression model, this study revealed that food security was either based on the perceptions of the household head or appointed representative who were more willing to adopt certain interventions. Another study (Mudege et al., 2017) that applied qualitative methodology in Chikwana and Phalombe in Malawi to examine farmers' perceptions on uptake of orange-fleshed sweet potatoes (OFSP) established that perceived health and economic gains determined its adoption. The study further asserted that both men and women were responsive to promotion messages that elaborated on health and nutrition benefits of OFSP. Additionally, this study supports the theory of planned behaviour as postulated by Ajzen (1991). The theory posts that intentions which results from attitudes, subjective norms, social pressure, perceived behaviour normally predicts certain uptake of behaviours and actions

The above was further corroborated by both focus groups discussions and key informant interviews which affirmed that rainwater harvesting interventions such as earth dams, sand dams, boreholes, Farm Ponds and Zai pits despite their labour and cost implications were perceived to be effective and hence adopted by farmers. Similarly, cowpeas, green grams, pigeon peas and new developed varieties of maize were the preferred drought tolerant crops as opposed to sorghum and millet, which were perceived to be susceptible to bird invasion and generally lacked good market prospects. This made farmers to develop negative perceptions regarding these interventions, particularly fish farming, as well as growing on sorghum and millet. Farmers also perceived organic manure to be effective because it was locally available as opposed to fertilizers that were expensive and had negative impact on the soil. In extension services, trainings, post-harvest and marketing services were rated highly in contrast to artificial insemination and record keeping.

In horticulture, farmers preferred kale, tomatoes and onions as commodities that provided them with quick access to alternative income, while in livestock production,

chicken and goats provided a stable safety net in case crops failed. Although farmers noted that seeds and tools provided by NGOs were effective, they recommended for a better distribution mechanism to be adapted by NGOs to avert insufficient supplies. The above implies that farmers' perceptions on NGO interventions played a key role on whether they would adopt them.

Thirdly, the study found out that conditions exerted by funding agencies on NGOs significantly mediated the association between farmers' participation in NGOs interventions and household food security (Table 4.54). An estimated 48.34% variance in household food security was because of farmers' participation and conditions of funding. The study demonstrated that farmers' participation in NGO interventions substantially contributed to the household food security, (*coeff*=1.224, SE=0.3284, Z=3.7278, $p<0.05$), after controlling for the mediator, conditions of funding (*coeff*=1.2156, SE=0.3361, Z=3.6169, $p<0.05$). (*Coeff*=1.224, SE=0.3284, Z=3.7278, $p<0.05$). This was further confirmed by information from key informant interviews, case studies and focus group discussions, which noted that conditions of funding agencies manifested in duration of funding, pre-determined interventions and standard results had an effect on overall farmers' participation in NGO interventions, and hence influenced household food security.

Fourthly, the study established that conditions of funding agencies significantly mediated the association between farmers' perceptions of NGOs interventions and household food security. The study demonstrated that 36.7% of the variance in household food security resulted from farmers' perceptions of NGO interventions and conditions of funding. Data demonstrated that farmers' perceptions of NGO interventions was an important predictor of household food security, (*coeff*=1.368, SE=0.312, Z=4.379, $p<0.05$), after controlling for the mediator, conditions of funding (*coeff*=0.691, SE=0.304, Z=2.27, $p<0.05$). Farmers' focus group discussions and key informants noted that funding agencies introduced pre-determined interventions that would have worked elsewhere. Whereas, some would be relevant, farmers needed more time to test, choose and contextualize those that was applicable.

Additionally, it was revealed that funding agencies forced NGOs to utilize certain standard results sometimes; this led to disjointed alignment of interventions with unsuitable results, which ultimately influenced on household food security. Studies (Rooy, 2004, Pearson, 2011, Hulme, 2012, Ferguson, 1991) confirm that NGOs are under intense pressure to demonstrate impact. In order to guarantee impact, funding agencies have systematically taken control of formulation of NGO policies; agenda and have now a leeway to introduce tools and results to be achieved that only bolster upward accountability (Wallace et al., 2007). The findings of this study further confirms the false paradigm model which notes that developing countries continue to churn defective, unsuitable advice that is usually advocated by prejudiced, ethnocentric and uninformed experts from development donors and agencies (Todaro & Smith, 2010).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of key findings, conclusions, recommendations, contribution to knowledge and areas of further research. The findings are related to the objectives and hypotheses that were tested by the study.

5.2 Summary of Key Findings and Conclusions

The general objective of this study was to assess farmers' participation and perceptions of NGO interventions and their effect on their household food security. The study specifically identified types of interventions undertaken by NGOs to influence household food security; the extent to which farmers' participation in NGO interventions affect household food security; examining farmers' perceptions of NGO interventions and their effect on household food security, as well as finding the extent to which conditions exerted by funding agencies on NGOs mediate the association between farmers participation and perceptions of NGOs interventions and household food security.

5.2.1 Types of Interventions Undertaken by NGOs to Influence Household Food Security

The first objective of this study identified the types of interventions undertaken by NGOs in Yatta Sub County to influence household food security. Using qualitative methods and a survey, the study found that NGOs promoted and deployed a variety of food security interventions simultaneously among farmers to influence household food security in Yatta Sub County. These included rainwater harvesting, soil fertility enhancement, drought tolerant crops, extension services, horticultural production, and provision of farm inputs and livestock production. On their part farmers applied various interventions concurrently. In rain water harvesting, farmers implemented terracing, construction of water pans, farm ponds, zai pits, subsurface dams (sand

dams) and earth dams. Similarly, farmers grew drought tolerant crops especially green grams, cowpeas, maize, beans, pigeon peas, millet and sorghum. In horticulture, farmers grew vegetables predominantly kale, spinach, tomatoes, as well as different varieties of fruits. In addition, farmers received and used different farm inputs such as seeds and farming tools provided by NGOs. In extension services, farmer received trainings in new farming methods and post-harvesting. Similarly, farmers utilized both compost manure and fertilizer (DAP) to enhance soil fertility. In livestock production, farmers kept chicken and goats. Lastly, farmers were involved in village level saving schemes, especially table banking and utilized linkages with other micro financing institutions. It was found that the farmers that applied and/or implemented the above interventions demonstrated positive household food security indicators manifested in increased yields, improved incomes, surplus sale and reduction in dependence on relief food.

5.2.2 Extent to Which Farmers' Participation in NGO Interventions Affect Household Food Security

The second objective sought to examine the extent to which farmers' participation in NGO interventions affect household food security. This objective gave rise to ($H_{O1)}$ which predicted that farmers' participation in NGOs interventions was not positively associated with household food security outcomes. Using logistic regression model, the study findings revealed that there was a significant positive association between farmers' participation in NGOs interventions and household food security. The null hypothesis was thus rejected because farmers' participation in NGO interventions was statistically significant at 95% confidence level in predicting household food security. This meant that a unit increase in farmers' participation either in needs assessment, selection of interventions, implementation and monitoring of NGO interventions had a corresponding likelihood of increasing household food security manifested in either increasing food production, incomes or reduction in reliance on relief food. Results indicate that the farmers' participation was skewed to consultative meetings in the initial stages compared to needs assessment, but improved in the implementation and monitoring phases. Similarly, NGOs did not

have common standards to undertake farmer participation. It is also found that factors such as willingness of NGOs to engage farmers, to listen, not to be in a hurry, being inclusive, and having capacity to understand community power dynamics enhanced participatory processes. Similarly, effective farmer group organizational structure that embraced project management committee and a culture of implementation, undertaking periodic reviews and monitoring of progress achieved better farmer participation and hence positive household food security.

5.2.3 Examining Farmers' Perceptions of NGO Interventions and their Effect on Household Food Security

The third component of this study sought to examine farmers' perceptions of NGOs interventions and their effect on household food security. This objective was connected to (H_{O2}) which predicted that farmers' perceptions of NGOs interventions were not positively associated with household food security. Using logistic regression model, the study indicated that farmers' perception of NGOs interventions was significant (at 95% confidence level) in predicting household food security. The null hypothesis was thus rejected. The study found that a unit increase in a positive perception among farmers on NGO interventions had a concurrent likelihood of improving household food security. The study found that farmers adopted and scaled up NGO interventions they considered effective and neglected those that they saw as ineffective. Considerations of effectiveness of interventions were informed by factors such as affordability, technologies applied, productivity, labour inputs required, ownership and availability of markets.

5.2.4 Extent to which Conditions Exerted by Funding Agencies on NGOs Mediate the Association between Farmers' Participation and Perceptions of NGO Interventions and Household Food Security

The fourth objective examined the extent to which conditions exerted by funding agencies on NGOs mediated the association between farmers' participation and perceptions of NGOs interventions and household food security. This objective was linked to two null hypotheses which stated that (H_{03}) conditions exerted by funding

agencies on NGOs did not mediate the association between farmers' participation in NGOs interventions and household food security and (H_{O4}) conditions exerted by funding agencies on NGOs did not significantly mediate the association between farmers' perceptions on NGO interventions and household food security. Using causal mediation analysis, the study found that conditions exerted by funding agencies on NGOs significantly mediate the relationship between farmers' participation and perception and household food security. It was found that conditions exerted by funding agencies on NGOs had a significant indirect effect on farmers' participation, perceptions and household food security. NGOs that were confronted by these conditions were unable to candidly negotiate for better terms because of competition over resources among them. It was found that conditions such as short duration of funding, application of donor predetermined interventions and standardized results made NGOs hurry implementation and exit projects earlier before household food security was secured. As a result, the two null hypotheses above were rejected and the study concluded that conditions exerted by funding agencies on NGOs significantly mediates the association between farmers' participation and perceptions of NGO interventions and household food security.

5.3 Conclusions

5.3.1 NGO Interventions in Yatta Sub County

The first objective was to identify the types of interventions undertaken by NGOs to influence food security in Yatta Sub County. The study found that NGOs introduced a diversity of interventions in water harvesting, drought tolerant crops, horticulture production extensions services among others which farmers adopted and applied concurrently resulting in positive indicators in their household food security manifested in yields in different crops, increase in incomes and reduced dependence on relief. It is concluded that NGOs are a key player in addressing food security in Yatta Sub County and farmers who implement a combination of various interventions have a better likelihood of improving their household food security.

5.3.2 Farmers Participation and Household Food Security

The second objective was to determine the extent to which farmers' participation in NGO interventions affect household food security. It is concluded that better engagement, involvement by NGOs, as well as good structure and organization among farmers at all stages of executing NGOs interventions is a likely contributor to household food security. It is also concluded that a positive attitude among NGOs towards farmer participation and a culture of listening and empowering farmers will result in better participation and ultimately a likelihood of improving household food security.

5.3.2 Farmers Perceptions and Household Food Security

The third objective was to examine farmers' perceptions of NGO interventions and its effect on household food security. The study found the farmers' perceptions of NGOs interventions was a predictor of household food security. It is concluded that household food security is dependent of farmers' adoption, uptake and scaling of NGOs interventions that is informed by their perceptions based on their assessment of the effectiveness of those interventions.

5.3.3 Conditions Exerted Funding Agencies

The fourth objective assessed whether conditions exerted by funding agencies on NGOs mediate the association between farmers' participation and perceptions of NGO interventions and household food security. The study established that conditions exerted by funding agencies on NGOs mediated the association between farmers' participation and perception of NGOs interventions and household food security. It is concluded that funding agencies exercise some overt control over NGOs interventions that are implemented by farmers which is likely to influence the outcome of household food security.

5.4 Recommendations

The first objective identified types of interventions undertaken by NGOs in Yatta Sub County. It was concluded that NGOs are critical actors in enhancing household food security. Similarly, farmers that implement interventions are likely to improve their household food security. Based on this, it is recommended that NGOs should expand their programs to reach a wider range of farmers for enhanced household food security impact. NGOs should work with farmers, funding agencies, academia, research institutions to enhance effective communication between farmers and NGOs through training and support provision of services such soil testing, crop marketing and testing of innovations for improved household food security.

The second objective explored the extent to which farmers' participation affect household food security. It was concluded that improved engagement, organization and involvement of farmers at all phases on interventions, as well as an empowering NGO attitude, among others are likely to lead to household food security. As a result, this study recommends that NGOs should revisit the entire farmers' participation process in NGO interventions to ensure that it involves farmers in all phases, invests time, resources, as well as make the process more inclusive, accountable and comprehensive. Additionally, NGOs should develop clear and standardized participation protocols that enable them to engage farmers in a more open, structured and formalized participatory processes that are subject to audits. Funding agencies should recognize the importance farmers' participatory processes in enhancing household food security and engrain them in contracts with NGOs to ensure it is executed.

The third objective assesses the farmers' perceptions on household food security. Farmers' perceptions were found to be a predictor of household food. It is concluded that household food security relied on farmers' capacity to adopt and upscale NGOs interventions they viewed as successful. To enhance household food security, NGOs should inbuilt customer satisfaction reviews into their programming to proactively capture farmers' perceptions periodically, take remedial measures and strengthen interventions that farmers consider effective.

Lastly, the fourth object of this examined the extent to which conditions exerted by funding agencies on NGOs mediates that the association between farmers' participation and perception of NGOs and household food security. Conditions exerted by funding agencies on NGOs were found to have an indirect effect on farmers' participation, perceptions and household food security. It was concluded that funding agencies had some influence on NGO interventions that would have ramifications on household food security. It is recommended that NGOs work collaboratively among themselves and with national and county governments in order to build household food security agenda based on County Integrated Development Plans (CIDP), national government policies, evidence-based research and aspiration of farmers. NGO should strengthen their negotiating position with funding agencies by working with counties and national government. Finally, NGOs should have a clear exit strategy that is transparently and contractually shared with farmers and other stakeholders to avoid abrupt phase out.

5.5 Contribution to Existing Body of Knowledge

This study contributes to the existing body of knowledge by bringing new dimensions of the importance of farmers' participation and perceptions in influencing household food security. For instance, the study has illustrated the importance of farmers' participation in all phases of NGO interventions and its contributions to household food security. The study has demonstrated that NGOs willingness and attitude to create a conducive environment for farmers' participation play a key role. Similarly, the study has established that farmers are not dormant participants, but have inherent perceptions that are shaped by effectiveness of interventions that will have a far reaching implication on household food security. This is because such perceptions will determine whether farmers apply interventions that improve household food security. This will go a long way in challenging other researchers and academic communities to unravel factors that have inhibited farmers' participation in different interventions championed by government, private sector or NGOs to improve household food security.

The study adds to the empirical literature by demonstrating that a significant relationship exists between farmers' participation and perceptions of NGO interventions and household food security. The study also unravels the intricate conditions exerted by funding agencies on NGOs. This allows NGOs and government to have a deep and broader discussion on conditions of funding and weed off those that are affecting household food security.

5.6 Areas for Further Research

Notably, this study will arouse interest of other researchers to advance knowledge on various gaps that were not addressed, particularly as regards to variables that influence household food security in different communities. Whereas, the focus of this study is on NGOs interventions, other studies should consider government and private sector interventions and how they influence household food security. It is also critical for future researchers to take a cue from this study to explore and interrogate whether findings can be replicated in other geographical areas and contexts. Potential studies should also critically review household food security through conducting comparative studies before and after implementation NGOs interventions to determine which indicators of household food security have improved.

It would be interesting to examine whether these findings can be generalized in other contexts, particularly those that are not arid and semi-arid as is the case of Yatta Sub County. Future studies should also examine whether there are differences in household food security when NGOs work with individual farmers as opposed to farmer groups. This study focused on NGOs working through farmer groups. Arid and semi-arid areas such as Yatta Sub County are now battling with the effects of climate change. It would be interesting for future studies to specifically look at effect of emerging climate change on household food security. This will go a long way in informing farmers on mitigation and adaptation measures that can be taken to safeguard gains already made.

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APPENDICES

Appendix I: Questionnaire for Farmers

Introduction

My name is Edwin Onyancha and I am a student at JKUAT. I am undertaking a research in your area in an effort to understand the impact of NGOs interventions in improving household food security in Yatta Sub County. Your participation in this study is purely voluntary and any information that you give will be confidential. Your name will be kept anonymous and will not appear in compilation of the final report.

1.0 Check list

Date of interview	
Coordinates	
Interviewer's name	
Start time	
End time	
Village	
Respondent' Telephone Number	
Checked by	

Section A Background information

1.1.1 Name of respondent	
1.1.2 Gender	0=Male
	1=Female
1.1.3 Number of household members	
1.1.4 Who is the main decision maker regarding farming within the household	
1.1.5. Who provides labour and management of the farm	
1.1.6 Years of schooling (Level of Education)	
1.1.7 Ward	1=Ndalani
	2= Matuu
	3=Kithimani
	4= Ikombe
	5=Katangi
1.1.8 What is the name of the farmer (s) group (s) you belong to?	
1.1.9 What is the name(s) of NGO(s) you (are) have worked with	
1.1.10 Which member of your household is directly in contact with the NGO(s) you work with?	
1.1.11 How many years have you worked with the NGO(s) above	
1.1.12 What is the total acreage of your land (in acres)?	
1.1.13 What are your main sources of livelihoods (indicate as many as possible)	1=farming (various crops)
	2=livestock production (goats, cattle, chicken)
	3=formal employment
	4=Casual employment
	5=business (grocery sales)
	6=Art and craft (basketry, carvings)
	7=Remittances
	8=others specify
1.1.14 What is your household average monthly income	1=Below 5000
	2= 6000 – 10,000
	3= 11,000 – 15,000
	4=16,000 – 20,000
	5= Above 20,000
	6= Others specify

Section B Types of interventions undertaken by NGOs to improve food security	
2.1 What types of NGOs supported agriculture and livestock interventions are you involved in?	
2.1.1 Rainwater harvesting	1=Earth dams (*Silanga sya Matinga*)
	2=Subsurface /sand dams *(Koo)*
	3=Water pans *(silanga sya moko)*
	4=Farm Ponds *(Silanga syina ithangu)*
	5=Boreholes
	6=Roof catchment (water tanks)
	7=Terracing
	8=Zai pits
	9=Other specify
2.1.2 Soil fertility enhancement	1=Mulching
	2=Use and making compost manure
	3=Use of synthetic fertilizer (i.e. DAP)
	4=Terracing to control soil erosion
	5=Planting of nitrogen fixing trees (agroforestry)
	6=Conservation agriculture (zero tillage)
	7=Others specify……
2.1.3 Growing drought tolerant crops	1=Maize (Katumani, pioneer etc.)
	2=Beans (*mboso*)
	3=Cowpeas (*nthooko*)
	4=Pigeon peas (*nzuu*)
	5=Millet (*wimbi*)
	6=Sorghum (*muvya*)
	7=Green grams (*ndengu/voyo*)
	8=Dolichos (*nzavi*)
	9=Soybeans (*saina*)
	10=Others specify…
2.1.4 Extension services supported by NGOs	1=Training in new farming methods
	2=Follow-up of training
	3=Post harvesting training and follow-up
	4=Processing of agriculture products
	5=Connecting producers with buyers/markets
	6=Supporting running and management of cooperatives for farmers.
	7=Supporting farmers undertaking seed bulking
	8=Advice on animal feeding and treatment
	9=Provision of artificial insemination
	10=Exchange visits with other farmers/agricultural shows
	11=Others, specify…..

2.1.5 Provision of Inputs (fertilizer/certified seeds	1=Synthetic fertilizer (DAP) 2=Improved varieties of seeds (maize, beans, millet, sorghum, cowpeas, green grams --- Others specify…….. 3=Farming tools (hoes, spades, machetes etc) 4=Hiring of farm tools/machinery (*kukomboa*) 5=Others specify
2.1.6 Off-farm activities/small business	1=Table banking/merry-go-round 2=Connection to financial and lending services (micro-credit) 3=Formal employment 4=Casual employment 5=Apiculture 6=Livestock production (goats, cattle, chicken 7=Others specify…..
2.1.7 Horticultural production	1=Growing vegetables through irrigation (kale, spinach, onions, tomatoes, French beans, Capsicum……..)for markets and household consumption 2=Growing fruits through irrigation (Mangoes, oranges, papaya, banana, passion……) for market and household consumption 3=Others specify……
2.1.8 Livestock production	1=Improving breeds of cattle through artificial insemination 2=Improved animal feeding (ie growing pasture, silage, hay, artificial feeds……..) 3=Animal disease control 4=Improved goat keeping for milk and meat. 5=Dairy farming for household consumption and markets 6=Poultry (chicken) farming 7=Apiculture (bee keeping)

Section C Farmers participation in formulation of food security interventions	
3.1 Were you involved by the NGO you work with in identifying your household food security priority needs?	1=Yes 2=No
3.2 If yes, how were you involved	1=Undertaking a formal needs assessment (community resource mapping, transect walks developing community action plans and a formal report etc) 2=Undertaking joint meetings with NGOs through farmer groups 3=Identifying selected leaders in the community to have formal consultation with NGOs about needs/priorities 4=Through informal consultation with NGOs 5=Others specify
3.5 Were you involved in identifying key food security interventions to be implemented by NGO you work with	1=Yes 2=No
3.6 If yes, how were you involved	1=Asked by NGOs to prioritize the types of interventions to be implemented 2=Discussed with NGOs and identified priority interventions in the community action plans 3=Choose from a list of interventions proposed by NGOs 4= NGOs supported interventions that were already being implemented by the farmers 5=NGOs listened and reviewed/changed interventions based on input from farmers. 6=Farmers and NGOs reached a consensus regarding the types of interventions to be implemented in advance by sharing their local knowledge 7=Others, specify
3.7 Were you involved by the NGO you work with in developing (actual writing) the project proposal	1=Yes 2=No
3.8. Were you involved in discussing the content of the proposal	1=Yes 2=No
3.9 Were you involved in giving feedback to the proposal written/developed by NGOs	1=Yes 2=No
3.10 Were you involved in implementation of food security interventions	1=Yes 2=No
3.11 If yes, how were you involved	1=Directly executing interventions on my farm 2=Executing the interventions on group farm 3=Executing the interventions in the demonstration farms 4=Others Specify
3.12 Were you involved in monitoring food security interventions supported by NGOs	1=Yes 2=No
3.13 If yes, how were you involved?	1=Monitoring as a member of project management committee/village management committee 2= By participating in monthly/quarterly monitoring review meetings 3=Giving feedback to my group on progress 4=Monitoring progress on my farm and maintaining up-to-date records and sharing farmer group 5=Giving feedback to NGO by filling monitoring tools developed by NGOs periodically. 6=Others Specify

3.14 Do you participate in reviewing and giving feedback on performance NGO supported food security interventions (evaluation)?	1=Yes
	2=No
3.15 If yes, how do you participate?	1=By providing input in what should be reviewed (terms of reference)
	2=By being part of the review team
	3= By providing input and feedback of review findings
	4=By participating in developing joint action plans to follow up review of the evaluation
	5=By holding NGOs accountable to implement action plans emerging from project reviews.
3.16 Does the NGO you work with involve you in generating lessons learned?	1=Yes
	2=No
3.17 If yes, how do the NGOs involve you in generating lessons learned from implementation of food security interventions?	1=Through human interest stories generated by farmers
	2=Through reflection days with other stakeholders where farmers share on what works and what does not
	3=By asking the farmers to document the lessons learned
	4=Lessons are picked only by NGOs without involving farmers using external consultants
	5= Not involved
	6=Others specify……..
3.18 In your own opinion, do you feel that the NGOs engaged/involved you adequately in all participatory (project) processes (i.e. needs assessment, prioritizing interventions, implementation, monitoring and evaluation)?	1=Yes
	2=No
3.17 If not, what are the reasons for your inadequate engagement/involvement?	1=Negative attitude of the NGOs staff that are not listening to farmers
	2=NGOs are in early to start projects without allocating enough time to understand, analyse priorities and develop relationship with farmers
	3=NGOs bureaucratic power structures that manifest in power differences and top-down engagement with farmers
	4=Provision of pre-determined interventions by NGOs and fear of farmers to contradict NGOs
	5=Lack of skills among farmers to negotiate for their preferred interventions
	6=Lack of appreciation of local skills and knowledge by NGOs/NGOs focused on technical solutions.
	7=Hurried implementation of projects by NGOs in order to meet donor implementation schedules and requirements
	8=NGOs only consult with government technical staff and assume they understand the needs/priorities of farmers
	9=NGOs listen more to community elites/gatekeepers than farmers.
	10=High staff turnover among NGOs to allow for effective consultation and follow-up
	12=NGO project duration is too short to have meaningful engagement
	13=NGOs have pre-determined results they want to achieve hence offer little time for engagement with farmers.
	14=Others specify……

Section C Perception of farmers regarding of food security interventions

4.0 What are your perceptions regarding food security interventions supported by NGOs in your area in terms of their effectiveness and NGOs understanding of the local context? Please tick as appropriate. Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree

4.1 Effectiveness of rain water harvesting interventions

Key: 5=Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree, 1=Strongly agree	4.1.1 Earth dams (Silanga sya matinga)					4.1.2 Sand Dams					4.1.3 Water Pans					4.1.4 Farm Ponds				
Statements	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Increases water for food/crop production																				
The choice of technology is appropriate.																				
It is less labour intensive to construct																				
Harvests enough water to last from one season to another hence mitigating drought.																				

Key: 5=Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree, 1=Strongly agree	4.1.5 Boreholes					4.1.6 Terracing					4.17 Zai Pits					4.18 Other				
Statements	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Increases water for food/crop production																				
The choice of technology is appropriate.																				
It is less labour intensive to construct																				
Harvests enough water to last from one season to another hence mitigating drought.																				

4.2 Effectiveness of drought tolerant crops

Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	**4.2.1 Maize**					**4.2.3 Beans**					**4.2.4 Green Grams**					**4.2.5 Cowpeas**				
Statements	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
The varieties promoted contribute to increased food/crop yields for our households																				
The technologies applied are less labour intensive.																				
The varieties promoted matches household food preferences																				
The varieties promoted are preferable for the local conditions																				

Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	**4.2.6 Peagon Peas**					**4.2.7 Millet**					**4.2.8 Sorghum**					**4.2.9 Others**				
Statements	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
The varieties promoted contribute to increased food/crop yields for our households																				
The technologies applied are less labour intensive.																				
The varieties promoted matches household food preferences																				
The varieties promoted are preferable for the local conditions																				

4.3 Effectiveness of soil fertility enhancement

Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	**4.3.1 Organic Manure**						**4.3.2 Inorganic fertilizer**				
Statements	5	4	3	2	**1**		5	4	3	2	**1**
The intervention increase household crop yields.											
The technology applied is less labour intensive.											
It is affordable by the farmers											
Has less long-term negative effect on the soil fertility											

4.4 Growing of horticultural crops

Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	**4.4.1 French beans**					**4.4.2 Onions**					**4.4.3 Tomatoes**					**4.4.4 Kale/spinach**					**4.4.5 Others**				
Statements	5	4	3	2	**1**	5	4	3	2	**1**	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
The crops promoted contribute to good nutrition for households																									
The crops promoted meet food preferences for local households																									
Markets for the crops promoted are readily available																									
The crops contribute to increased household incomes.																									

4.5 Effectiveness of extension services

Key: 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	**4.5.1 Training**					**4.5.2 Marketing**					**4.5.3 AI**					**4.5.4 Post Harvest**					**4.5.5 Others**				
Statements	5	4	3	2	**1**	5	4	3	2	**1**	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
The services given are relevant to the local conditions																									
The services are frequent and regular																									
There is sufficient follow-up through the model/lead farmer																									
The services are simple and understandable by farmers																									

4.6 Effectiveness of inputs provided

Key : 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	4.6.1 Tools/Machinery					4.6.2 Seeds					4.6.3 Fertilizer					4.6.4 Others				
Statements	5	4	3	2	**1**	5	4	3	2	**1**	5	4	3	2	1	5	4	3	2	1
The inputs given improve food production in the area.																				
The inputs given are affordable/accessible by the farmers																				
The inputs are given in a timely manner																				
The inputs are given frequently																				

4.7 Effectiveness of Livestock production

Key : 5=Strongly disagree, 4= Disagree, 3=Neutral, 2= Agree, 1= Strongly agree	4.7.1 Cows					4.7.2 Goats					4.7.3 Chicken					4.7.4 Others				
The breeds promoted are suitable for our local areas	5	4	3	2	1	5	4	3	2	**1**	5	4	3	2	1	5	4	3	2	1
The breeds increase production (milk, meat, eggs etc)																				
Livestock activities increase and supplement household incomes																				

4.8 NGOs understanding of the local context

	Rain patterns		Soil types		Temperatures		Terrain		Local food preference	
Statement	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Does rain water harvesting Interventions promoted compatible the above indicators										
Does droughts torelant crops										
Are the soil fertility interventions compatible to the above indicators										
Are promoted livestock breeds compatible with the above indicators										
Are horticultural crops promoted compatible with the above indicators										

Section E Household Food Security

5.1 Fill the table below by indicating your household food production of key staples per season and quantity utilized for food.

Crops	Long rains March-May	Long rains Harvest June-July				Other Crops grown off season					Short Rains October - December	Short Rains Harvest January-February			
	Crops Planted	Quantity of Staple Food Produced in sacks of 90 Kgs	Quantity consumed per household in sacks of 90 Kgs	Was the quantity consumed sufficient for household food needs (Yes/No)	Quantity Marketed in sacks of 90 Kgs	Crops Planted	Quantity of Staple Food Produced in sacks of 90 Kgs	Quantity consumed per household in sacks of 90 Kgs	Was the quantity consumed sufficient for household food needs (Yes/No)	Quantity Marketed in sacks of 90 Kgs	Crops Planted	Quantity of Staple Food Produced in sacks of 90 Kgs	Quantity consumed per household in sacks of 90 Kgs	Was the quantity consumed sufficient for household food needs (Yes/No)	Quantity Marketed in sacks of 90Kgs
Maize															
Beans															
Sorghum															
Green grams															
Peagon peas															
Cow peas															
Millet															
Vegetables															
Fruits															
Other															
Totals															

5.2 Has your household income increased as a result of sales of surplus food and other activities initiated by NGOs you have worked with?

1=Yes

2=No

5.2.1 In your opinion, is the food you produce and income earned from other activities you are involved in sufficient to provide your monthly household food needs?

1=Yes

2=No

5.3 Fill the table below by indicating whether or not your household received relief food in past season

Whether or not household received relief food	**Yes**	**No**
Long rains March- May		
Long Rains Harvest June-July		
Dry Season August-September		
Short Rains October-December		
Short Rains harvest January – February		

5.4. Fill the table below by indicating different patterns of food consumption, coping strategies and food supply per season.

	Long rains Harvest June-July	Dry Season Harvest August-September	Short Rains Harvest January-February
Indicate the types of foods your household members consume during different seasons?	1=Energy (Maize, millet, Sorghum, wheat, rice)	1=Energy (Maize, millet, Sorghum, wheat, rice)	1=Energy (Maize, millet, Sorghum, wheat, rice)
	2=Proteins (Beans, pigeon peas, green grams, cowpeas,	2=Proteins (Beans, pigeon peas, green grams, cowpeas,	2=Proteins (Beans, pigeon peas, green grams, cowpeas, milk,
	3=Vitamin (Different vegetables and fruits)	3=Vitamin (Different vegetables and fruits)	3=Vitamin (Different vegetables and fruits)
	4=Others, specify	4=Others, specify	4=Others, specify
Indicate if your household uses any coping strategies in various seasons.	1=Dietary Change/eating less expensive meals	1=Dietary Change/eating less expensive meals	1=Dietary Change/eating less expensive meals
	2=Rationing/skipping meals	2=Rationing/skipping meals	2=Rationing/skipping meals
	3=Short term borrowing of food/money	3=Short term borrowing of food/money	3=Short term borrowing of food/money
	4=Short term migration in search of employment	4=Short term migration in search of employment	4=Short term migration in search of employment
	5=Sale of assets/cattle/tools	5=Sale of assets/cattle/tools	5=Sale of assets/cattle/tools
	6=Begging	6=Begging	6=Begging
Indicate if your household feels anxious about food supply in any of the seasons	1=Yes	1=Yes	1=Yes
	2=No	2=No	2=No

Appendix II: Sampled List of Farmer Groups in 5 Wards and Selected Sample Size

	Katangi Ward			
Farmer Group	**Members**	**Number of years working with NGOs**	**Number of members per group /Total number of members *356**	**Sample size (rounded up)**
Mungukya SHG	31	3	3.303202634	3
Nyumba ya Itatu	54	3	5.753965878	6
Uvonge wa Syokisinga	19	6	2.02454355	2
Kuweta wa Kwika	30	7	3.19664771	3
Wendano Wa Nzengya	29	4	3.090092787	3
Kikuthuko	35	6	3.729422329	4
Kalitya Women	27	5	2.876982939	3
Umiisyo wa aka Ndiuni	30	3	3.19664771	3
Kalusi Katheke	50	5	5.327746184	5
Kanini Kaseo	20	6	2.131098474	2
Muuo wa Malatani	27	6	2.876982939	3
Katothya Village	16	5	1.704878779	2
Iaani water project	26	6	2.770428016	3
Katindanya Kaseo	18	7	1.917988626	2
Kyaani Self Help Group	16	6	1.704878779	2
Maiki Village	27	6	2.876982939	3
Umui wa Maletya	62	6	6.606405268	7
Ngai Ndethya women group	59	5	6.286740497	6
Muuo wa Ivutu	40	6	4.262196947	4
Munyiiki Women Group	15	6	1.598323855	2
Wendano wa Uai	18	6	1.917988626	2
Kasanga	22	5	2.344208321	2
Katangi Dam	16	5	1.704878779	2
Wendo wa Mbuini	31	3	3.303202634	3

St Teresa	27	3	2.876982939	3
Mukyaki	32	3	3.409757558	3
Musandukuni	38	3	4.0490871	4
Ningwene SHG	28	3	2.983537863	3
Subtotal	843		89.82580066	90
	Ikombe Ward			
Kinyongo Water harvesting	33	4	3.516312481	4
Kikesa Horticulture	24	4	2.557318168	3
Imanga	20	4	2.131098474	2
Green Valley	30	4	3.19664771	3
Mwanga	20	4	2.131098474	2
N3K SHG	40	11	4.262196947	4
Wendo wa Ndua	15	8	1.598323855	2
Makutano Community Group	500	4	53.27746184	53
Mukilye SHG	30	3	3.19664771	3
Vamwe Tuthi Mbee	30	3	3.19664771	3
Mumo wa Kathamani	50	10	5.327746184	5
Kyeni Kya Kilaatu	35	10	3.729422329	4
Wikwatyo wa Ngangani	16	10	1.704878779	2
Mbukilye Ngukilykilye	28	11	2.983537863	3
Muuo wa Ngangani	30	11	3.19664771	3
Mbiki SHG	25	10	2.663873092	3
Maiuni Farmers SHG	26	3	2.770428016	3
Kasooni farmers	24	3	2.557318168	3
Subtotal	976		103.9976055	104
	Kithimani Ward			
Mutwanthi SHG	22	3	2.344208321	2
Multi-Purpose	18	3	1.917988626	2
Kithimani fruit	21	4	2.237653397	2

farmers				
Jikaze Women Group	25	3	2.663873092	3
Wendo SHG	68	3	7.24573481	7
Kondo Women Group	25	3	2.663873092	3
Muimi Museo Kambi	60	3	6.393295421	6
Upendo Kalukuni	18	3	1.917988626	2
Subtotal	257		27.38461538	27
	Matuu Ward			
Katulani Stove Builders	28	3	2.983537863	3
Ndwike Ngatwiike	38	3	4.0490871	4
Kituneni	30	3	3.19664771	3
Ngengi farmers	50	3	5.327746184	5
Umatuthi	25	4	2.663873092	3
Ndalasyani Youth Group	15	3	1.598323855	2
Tusyaaniwe Twiana	20	3	2.131098474	2
Maiuni Windano	24	3	2.557318168	3
Ikawiyike	24	3	2.557318168	3
Uluma wa Aka	26	3	2.770428016	3
Jimundu for Disabled	30	3	3.19664771	3
Kiaamisyoni Kwamatinga	42	3	4.475306794	4
Mkombozi	24	3	2.557318168	3
Subtotal	376		40.0646513	40
	Ndalani			
Ndalama CBO	43	5	4.581861718	5
Mwireri	25	5	2.663873092	3
Kivoyo Kya Center	35	6	3.729422329	4
Katengui	40	6	4.262196947	4
Muamba	30	5	3.19664771	3
Wakunesa	26	7	2.770428016	3
Light to Read	24	6	2.557318168	3
KEWs	35	3	3.729422329	4
Muliluni	40	3	4.262196947	4

Nguumo Farmers	20	3	2.131098474	2
Mukamoni/Kiaani	26	6	2.770428016	3
Ndalani Mango	40	6	4.262196947	4
Tumaini Women	35	5	3.729422329	4
Ledo organization	50	5	5.327746184	5
Katilini 55	30	5	3.19664771	3
Kiwanza	19	5	2.02454355	2
Tei Wa Mbembani	45	5	4.794971565	5
Moonlite	25	5	2.663873092	3
Kanini Kazee	30	5	3.19664771	3
Kyeni Kya Katangini	28	5	2.983537863	3
Mukameni	23	5	2.450763245	2
Ngwatanio ya Ata ma Iviani	21	5	2.237653397	2
Mwoloto wa Inyanzaani	26	5	2.770428016	3
Thome wa Muno	37	5	3.942532176	4
Nzisyo Ngusya	40	5	4.262196947	4
Ata wa Atangwa	34	5	3.622867405	4
Kyeni Kya Multi	30	5	3.19664771	3
Vinga wa Nthungulula	32	5	3.409757558	3
Subtotal	889		94.72732715	95
Total	3341			357

Appendix III: Key Informant Interview Guide

1. What types of food security interventions are supported by NGOs in your area?
2. In your opinion, how do the NGOs involve farmers in formulating, implementing, monitoring and evaluation of food security interventions
3. What is your opinion on relevance, efficiency and impact of food security interventions supported by NGOs in your area?
4. How do farmers in your area generally perceive these food security interventions in terms of effectiveness on addressing household food security
5. In your opinion, how do farmers perceive these interventions in terms of their relevance to the local context
6. How do conditions exerted on NGOs by their funders such as duration of funding, standardized results and interventions influence household food security
7. What specific indicators would you use to describe a household that is food secure in your area
8. What changes do you feel should be addressed by NGOs in order to improve household food security in this area?

Appendix IV: Farmers Focus Group Discussion Interview Guide

1. Which NGOs have you worked with in the past?
2. What type of food security interventions do you (have you) implement (ed) with NGOS in the area?
3. Which of the above interventions are farmers still implementing/practicing in your area?
4. Which interventions have farmers stopped implementing and why?
5. Explain how you participate in formulation of food security interventions that are implemented by you and NGOs in this area (from needs assessment, proposal development, monitoring, implementation and evaluation).
6. Explain whether there are reasons that prevent farmers from adequately participating in formulation of NGO interventions above.
7. Explain whether NGOs consider your feedback in improving food security interventions.
8. Explain what your general perceptions are regarding NGO food security interventions in respect to improving household food security. Please elaborate whether these interventions are relevant to your context, cost effective, easy to apply, efficient and have impact.
9. Which of the interventions do you feel are compatible with the local context in regards to rain patterns, soil types, terrain, food preference?
10. Explain whether in your opinion NGOs interventions are improving household food security in your area.
11. What areas would you like to improve in your area current relations with the NGOs you work with in order to increase household food security.

Appendix V: Focus Group Discussions with NGOs

1. What types of food security programs do you (have you) supported farmers to implement in this area?
2. Which of the above interventions are farmers still implementing in your areas of operation?
3. Which interventions have farmers stopped implementing and why?
4. How have you (did you) formulated these interventions?
5. How do you involve farmers in the project (program) processes (needs assessment, proposal development, implementation, monitoring and evaluation)?
6. What perceptions do farmers have regarding effectiveness of your programs?
7. What are the conditions exerted on you as NGOs programming food security by your funding agencies? (I.e. duration of funding, pre-determined results etc.)?
8. How do these conditions affect improvement of household food security?
9. What changes would you like funding agencies to address in order to improve household food security in this area?
10. What adjustments farmers and NGOs to enhance food security in Yatta should undertake.

Appendix VI: Case Study Guide

1. What are the food security interventions have your groups implemented in this area?
2. How were you involved in formulating needs, priorities and interventions for your group?
3. What is your view about the relevance, efficiency and impact of NGOs food security interventions implemented in your area?
4. What specific changes would you like NGOs to address in order to improve household food security in this area?

Appendix VII: Factor Analysis

Factor farmers' participation in NGO interventions

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.758
Bartlett's Test of Sphericity	Approx. Chi-Square	272.038
	Df	6
	Sig.	.000

Communalities

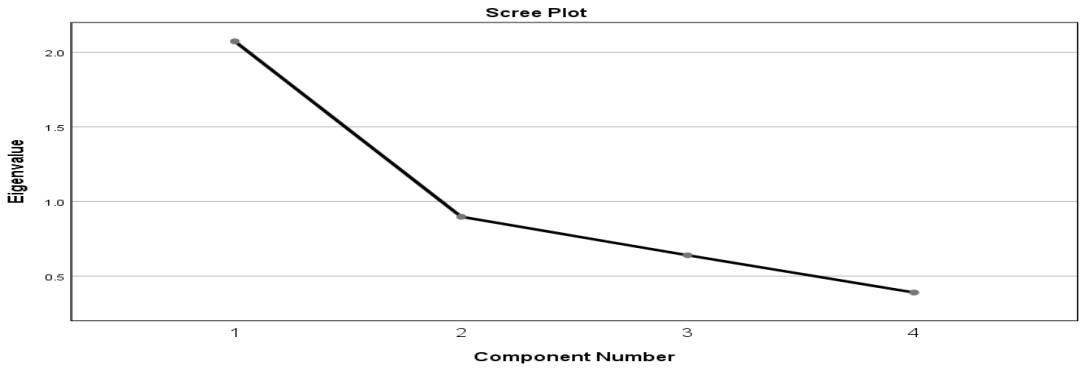
	Initial	Extraction
Problem Need Ident	1.000	.509
Interventions	1.000	.273
Implementation	1.000	.647
Monitoring	1.000	.644

Extraction Method: Principal Component Analysis

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.074	51.839	51.839	2.074	51.839	51.839
2	.898	22.438	74.277			
3	.639	15.984	90.260			
4	.390	9.740	100.000			

Extraction Method: Principal Component Analysis



Component Matrix[a]

	Component 1
Implementation	.804
Monitoring	.802
Problem Need Ident	.714
Interventions	.523

Extraction Method: Principal Component Analysis

Factor analysis for farmer's perception on NGO interventions,

Factor analysis for effectiveness

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.735
Bartlett's Test of Sphericity	Approx. Chi-Square	527.810
	Df	21
	Sig.	.000

Communalities

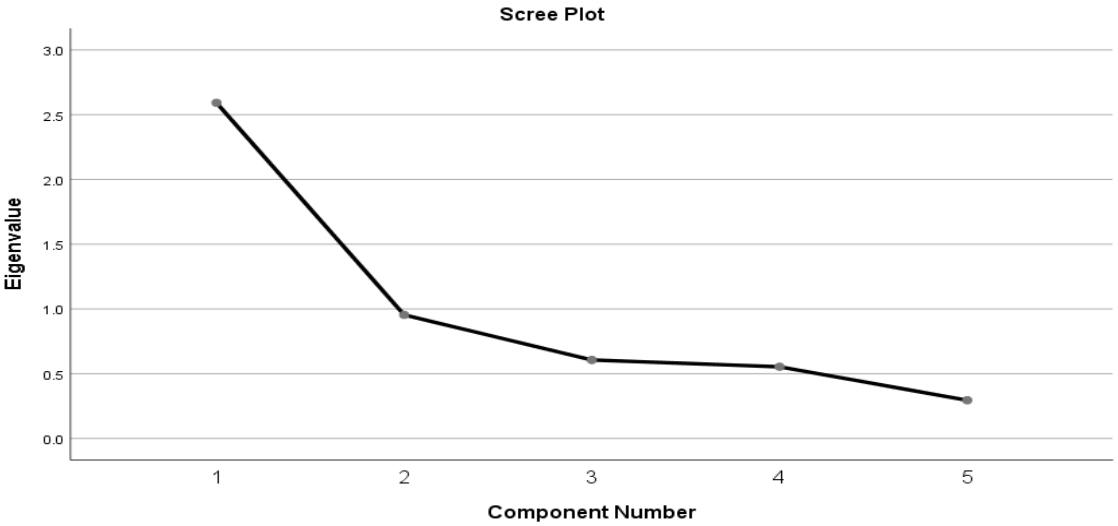
	Initial	Extraction
EffRainwater	1.000	.686
EffDroughtTcrops	1.000	.608
EffSoilFertility	1.000	.505
EffGrowHortiCrops	1.000	.662
EffextensionServices	1.000	.766
EffInputs	1.000	.639
EffLivestock	1.000	.569

Extraction Method: Principal Component Analysis

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.592	51.840	51.840	2.592	51.840	51.840
2	.954	19.080	70.920			
3	.606	12.114	83.034			
4	.553	11.068	94.103			
5	.295	5.897	100.000			

Extraction Method: Principal Component Analysis


Scree Plot
Eigenvalue
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
Component Number

Component Matrix[a]

	Component 1
EffextensionServices	.872
EffRainwater	.831
EffGrowHortiCrops	.787
EffInputs	.683
EffLivestock	.678
EffDroughtTcrops	.638
EffSoilFertility	.536

Extraction Method: Principal Component Analysis.

Factor analysis for farmer's perception on NGO interventions,

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	.111
	Df	1
	Sig.	.739

Communalities

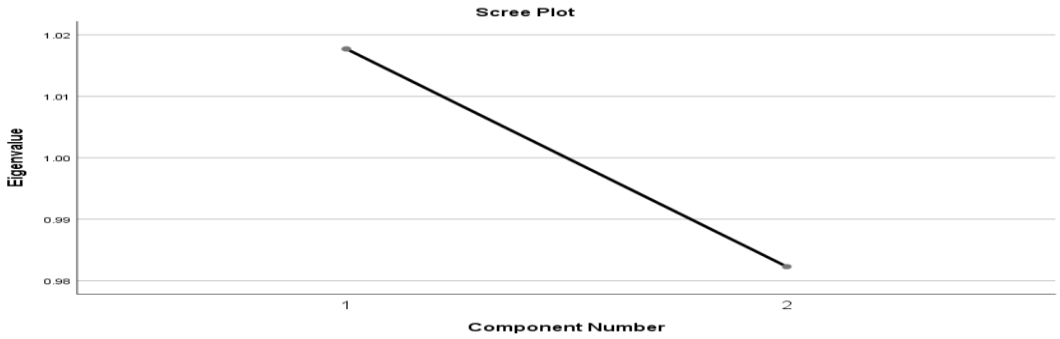
	Initial	Extraction
Effectiveness	1.000	.509
NGO local Context	1.000	.509

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues Total	% of Variance	Cumulative %	Extraction Sums of Squared Loadings Total	% of Variance	Cumulative %
1	1.018	50.886	50.886	1.018	50.886	50.886
2	.982	49.114	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component 1
Effectiveness	.713
NGO local Context	.713

Extraction Method: Principal Component Analysis.

Factor analysis Conditions for funding agencies excerpted on NGOs

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.723
Bartlett's Test of Sphericity	Approx. Chi-Square	100.622
	Df	3
	Sig.	.000

Communalities

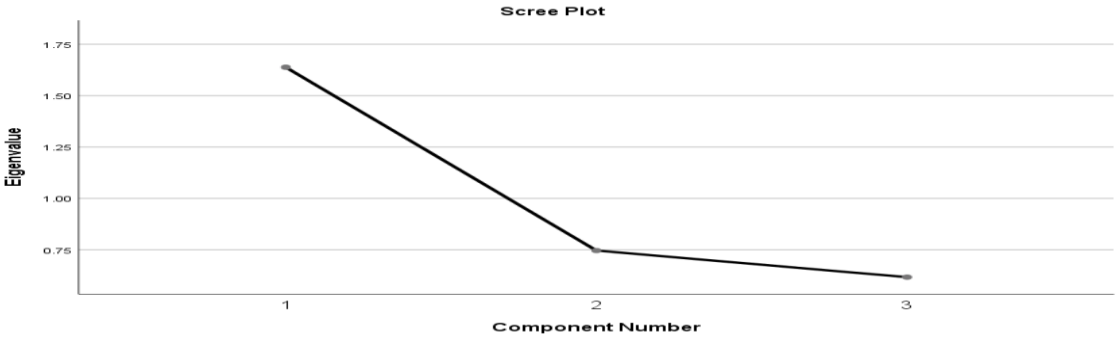
	Initial	Extraction
Duration	1.000	.603
Results	1.000	.562
Standard intervention	1.000	.473

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.638	54.604	54.604	1.638	54.604	54.604
2	.746	24.857	79.461			
3	.616	20.539	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component 1
Duration	.776
Results	.750
Standard intervention	.688

Extraction Method: Principal Component Analysis.

Factor analysis for household food security

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.702
Bartlett's Test of Sphericity	Approx. Chi-Square	9.150
	Df	3
	Sig.	.027

Communalities

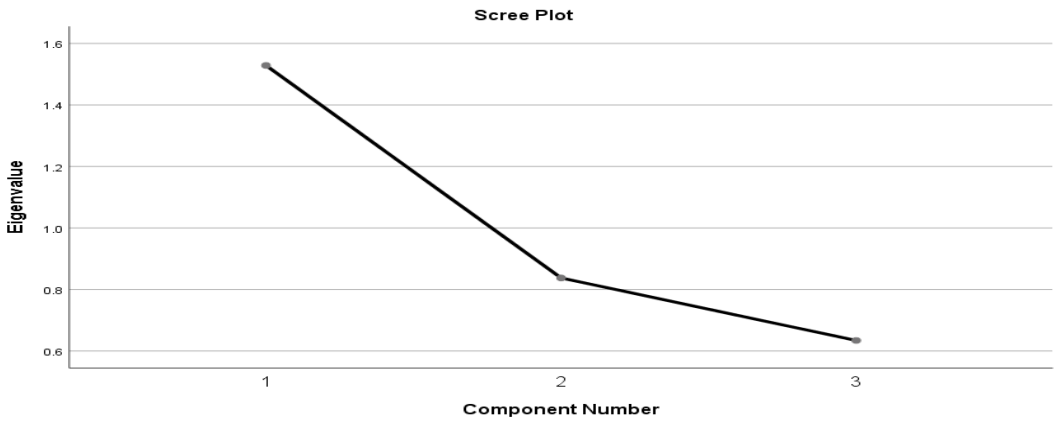
	Initial	Extraction
IncreasedIncome	1.000	.548
Relief	1.000	.690
ConsumtionRatio	1.000	.685

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.528	50.947	50.947	1.528	50.947	50.947
2	.837	27.915	78.862			
3	.634	21.138	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component 1
IncreasedIncome	.740
Relief	.625
ConsumtionRatio	.757

Extraction Method: Principal Component Analysis.

Appendix VIII: Results of Cronbach Alpha

Perception	**N**	**Cronbach's Alpha**	**Conclusion**
Effectiveness of rain water harvesting interventions	28	0.735	Reliable
Effectiveness of drought tolerant crops	28	0.841	Reliable
Effectiveness of soil fertility enhancement	8	0.755	Reliable
Growing horticultural crops	16	0.874	Reliable
Effectiveness of extension services	16	0.832	Reliable
Effectiveness of input provided	12	0.829	Reliable
Effectiveness of livestock production	9	0.866	Reliable