UNIVERSITY FOR DEVELOPMENT STUDIES

AN ASSESSMENT OF IRRIGATION FARMING AS A LOCAL ECONOMIC DEVELOPMENT STRATEGY IN THE WA WEST DISTRICT OF THE UPPER WEST REGION OF GHANA

EDMUND LEVIEL DERI

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BY

EDMUND LEVIEL DERI (BACHELOR OF MANAGEMENT STUDIES)
(UDS/MDM/0390/16)

A TERM PAPER SUBMITTED TO THE DEPARTMENT OF GOVERNANCE AND DEVELOPMENT MANAGEMENT, FACULTY OF PLANNING AND LAND MANAGEMENT, UNIVERSITY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN DEVELOPMENT MANAGEMENT

FEBRUARY, 2018

DECLARATION

I, Edmund Leviel Deri, hereby declare that this thesis is the result of my own original work and that besides citing from authorities whom I have duly acknowledged, no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature: …… **Date:** ……...

Name: EDMUND LEVIEL DERI **Index No.:** UDS/MDM/0390/16

I hereby declare that the preparation and presentation of the term paper was supervised in accordance with the guidelines on supervision of term paper laid down by the University for Development Studies.

Name (Supervisor): SAMUEL ZIEM BONYE

Signature: ……..… **Date:** ……..……

ABSTRACT

The study revolved on how irrigation farming contributes to the livelihood of income generation as a source of support to farmers in the Ghanaian societies in the Wa West District, Upper West Region. The study is descriptive in nature and used both primary and secondary data. Also, a concurrent mixed method was used in collecting and analyzing the data. Thus, the data were discussed and presented quantitative and qualitative form. The data was examined with Statistical Package for the Social Science (SPSS) and presented in the form of tables, pie charts and bar charts. The findings were that; irrigation farming is a predominantly a traditional activity engaged in by people particularly who never attended school and the minority being literates who are engaged in it. Leafy vegetable crops were the main crop cultivated by farmers. The motive for irrigation farming in the District was for income generation. Also, households were found to consume the proceeds from the irrigation activities and hence generally improved food security at household level. Challenges such as lack of fencing the area and water shortage were noted. Irrigation facility management resides in the authority of the community chiefs and elders with basically labour support from community members. The study therefor concludes that irrigation contributes diversely to local economic development by creating employment opportunities in the dry seasons for farmers to earn income and enhance food access and availability for secured household food security. The study recommended very key that government should provide irrigational facilities District wide to enable farmers engage in dry season activities. Their awareness need to be created to get more of the educated youth involved.

DEDICATION

I humbly dedicate this piece of work to my wife, Rosemary Ayinpoka Abugre and our children, Caleb Mwinnogmeh Abeile, Clalista Somaalu Abeile.

Finally, I dedicate this research work to the Almighty God for His mercies and favours during the programme under studies.

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LIST OF ABBREVIATIONS/ACRONYMS

AIP	Asutsuare Irrigation Project
DADU	District Agricultural Development Unit
GSSP	Ghana Strategic Support Programme
GDP	Gross Domestic Products
GIDA	Ghana Irrigation Development Authority
GSS	Ghana Statistical Services
MoFA	Ministry of Food and Agriculture
NGOs	Non-Governmental Organizations
SSIDP	Small Scale Irrigation Development Project
SPSS	Statistical Package for Social Sciences
SFIP	Small Farms Irrigation Project
NCZG	Northern and Coastal Zones of Ghana
UN	United Nations
WB	World Bank
WWDA	Wa West District Assembly
WWD	Wa West District

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background of Study

Irrigation is a technique that involves artificially providing crops with water to enable them grow. This technique is used in farming when the dry season sets in, particularly in places where the rain season is not all year round, especially in arid areas. Global statistics indicate that between the years 1970 and 1990, total irrigated land in the world increased from one-sixth of all cultivated lands to one-third (Andrew and Jackson, 1996). According to Siebert et al. (2006 as cited in Amosah, 2009), an estimated 2,788,000 km^2 (689 million acres) of agricultural land was equipped with irrigational infrastructure by the year 2000. A breakdown of these statistics indicate that about 68 percent of the area for irrigation is located in Asia, 17 percent is located in America, 9 percent in Europe, and the remaining found within Africa and Oceania.

In Ghana, irrigation started in the early 1960's under the Land Planning and Soil Conservation Unit of the Ministry of Agriculture (source). The basis for the establishment of irrigation in Ghana was to improve the livelihood of farming communities. Agriculture as the main source of livelihood in most Ghanaian communities required promotion through artificial supply of water since rainfall pattern has been erratic especially in the savannah part of the country.

Due to the increasing significance of irrigation in Ghana, the Irrigation Development Authority (IDA) was established to be at the forefront of irrigation. The Authority is primarily responsible for identifying possible irrigation projects, and in some instances involved in the management and maintenance of irrigation schemes (MoFA, 2013). The Authority is wholly owned and financed by the Government of Ghana. By its Act of incorporation, however, the Authority can borrow money from the open market for its development programme. It has a Board of Directors and a Chief Executive who reports directly to the Ministry of Agriculture.

Currently, there are twenty-two (22) Irrigation Projects all over the country constructed by the authority covering a total of 6,505 hectares (ha). Also, 22 schemes were constructed under the Small Scale Irrigation Development Project (SSIDP) and 6 schemes under the Small Farms Irrigation Project (SFIP). Each of these projects is less than 1,000 ha in size with the exception of the Tono and Kpong Irrigation Projects, which have about 2,500 ha and over developed. The main beneficiaries of the Irrigation Projects have been indigenous small-scale farmers. The outputs have however, not been very encouraging and the lack of maintenance of the projects have rendered most of the schemes unproductive (MoFA, 2013).

Small scale irrigation farming is one definite way of arresting the redundancy of the labour force in the long dry season. Most especially, it is an important strategy for addressing the growing poverty situation in the Wa West District (WWD) in the face of the increasingly erratic and unreliable nature of rains in this part of the country. However, these small scale irrigation schemes are beset with numerous difficulties, notable among them being inadequate water supply for farming. There is also the

cumulative effect of such other problems with ownership, management, operations and maintenance of the schemes among others; which raises questions about the sustainability of dry season farming as a livelihood strategy. Moreover, in many developing countries the success of irrigation systems is highly affected by policy, institutional and social factors, much more than technical issues (Gebemedhin and Peden, 2002).

Access to reliable irrigation can enable farmers to adopt new technologies and intensify cultivation, leading to increased productivity, overall higher production, and greater returns from farming. This, in turn, opens up new employment opportunities, both on-farm and off-farm, and can improve income, livelihoods, and the quality of life in rural areas. Generally, access to good irrigation allows poor people to increase their production and income, and enhances opportunities to diversify their income base, reducing vulnerability caused by the seasonality of agricultural production as well as external shocks.

Thus, access to good irrigation has the potential to contribute to poverty reduction (through the movement of people from ill-being to well-being) and overall development of the local communities which are around the irrigation facility (Hussein *et al.,* n.d). A cost benefit analysis performed by Sithole (1995) revealed that irrigation schemes did not only improve the food security position of the irrigators, but also benefitted the entire community.

Sithole (1995) further indicated that the incomes of the irrigators were higher than the incomes of the non-irrigators. As a result of the higher incomes, the irrigation participants were in a position to purchase grain to satisfy household requirements to make up for any

shortfall in production, as compared to non-participants. Results of the study thus indicated that the smallholder schemes were both financially and economically viable and that, participants were able to meet both the capital and running costs of smallholder irrigation schemes.

Similar inferences were also highlighted in a study of an irrigation scheme in the village of Chakunda in Gambia by Webb (1991) who indicated that increased income was translated into increased expenditure, investment, construction, and trade. Barau *et al.* (1999) stress greater emphasis on irrigation development as a means of increasing food and raw material production as well as promoting rural development. Similarly, (Hussain, *et al.* n.d) pointed out that agricultural water/irrigation has been regarded as a powerful factor for providing food security, protection against adverse drought conditions, increased prospects for employment and stable income, and greater opportunity for multiple cropping and crop diversification. It is within this context of meaningful contributions of irrigation schemes that, this study basically seeks to assess the role of irrigation as a strategy for overall local economic development within the Wa West District in Ghana.

1.2 Problem Statement

Irrigation farming is one of the main intervention areas to boost agricultural production, especially in many rural parts of the country. This therefore, helps poor farmers to overcome rainfall and water constraints by providing a sustainable supply of water for cultivation and livestock, strengthening the base for sustainable agriculture, providing

increased food security to poor communities through irrigated agriculture and contributing to the improvement of human nutrition (FAO, 2003).

According to Ghana Statistical Service (GSS) (2010) the agriculture sector employs about 45.8 percent of households in the country. It therefore means that agriculture is an important sector in Ghana's economy as it employs close to 50 percent of the populace and also contributes massively to Gross Domestic Products (GDP) and foreign exchange earnings.

Although the country is endowed with three main resources namely land, water and labour for production, agriculture in the country is mostly small-scale, rainfall dependent, traditional and subsistence farming with limited access to technological support services. Hence, the ability of the nation to address food and nutritional insecurity, poverty, and to stimulate and sustain national economic growth and development is highly dependent on the performance of agriculture. Yet, achieving higher and sustained agricultural productivity growth remains one of the greatest challenges facing developing nations (Belay and Degnet, 2004; Spielman et al., 2010).

In the case of Upper West Region, GSS (2010) revealed that 77.1 percent of households are undertaking agriculture. Wa West District falls under the Guinea Savannah which is characterized by a short, single-peak rainfall regime from May to September and a long dry season from October to April (MoFA, 2013). Therefore, agricultural production in WWD is primarily rain-fed. As such, it is depended on erratic and often insufficient rainfall, leading to redundancy of farmers during dry season which affects food security and their income negatively. Meanwhile, according to GSS (2010), agriculture accounts

for 80% of the District's economy and which activities is mostly center on a combination of crop and animal production.

So much have been done in the area of irrigation especially on the contribution of smallholder irrigation to household food security (Oni *et al.,* 2011)

Despite the numerous studies that have been conducted, little evidence is available on irrigation farming as a local economic development strategy in Wa West District. Therefore, this study seeks to fill this gap by assessing how irrigation farming serves as a local economic development strategy within the District.

1.3 Research Questions

1.3.1 Main research question

- How does irrigation farming contribute to local economic development in Wa West District?

1.3.2 The Specific research questions

1. What kinds of crops are grown during dry season farming?
2. What amount of household income is earned from irrigation farming?
3. What is the contribution of irrigation farming to household food security?
4. What are the local management strategies of the irrigation facilities?
5. What are the challenges faced by the irrigation farmers?

1.4 Research Objectives

1.4.1 Main research objective

- To assess how irrigation farming contribute to local economic development in Wa West District.

1.4.2 The specific research objectives

1. To identify the kinds of crops grown during the dry season farming;
2. To determine the amount of household income earned from dry season farming;
3. To examine the contribution of irrigation farming to household food security;
4. To assess the local management strategies of the irrigation facilities in Wa West District; and
5. To identify the challenges faced by the irrigation farmers in Wa West District.

1.5 Relevance of the Study

The study would add to the available literature on how irrigation farming contributes to local economic development in Wa West District. Thus, the study provides much needed knowledge and information about dry season farming. Thus, the research offers ideas to future researchers in the area of irrigation farming and its relevance to income generation and food security.

The result of this study could identifies loopholes and serves as a feedback to stakeholders in the implementation processes of irrigation farming in Wa West District.

Some recommendations are made as the way forward for the District and other interesting groups who may see dry season irrigation farming as a mean of employment. Especially, this may be in lined with government one-district one-dam policy in the country.

1.6 Scope of Study

The study was limited to WWD due to the number of irrigation facilities that exist within the District. Comparably, other Districts have a lesser number of irrigation facilities in the Upper West Region.

In terms of content, the research examined how irrigation farming contributes to local economic development in the District.

1.7 Limitation of the Study

Considering the number of communities in WWD engage in irrigation farming, the researcher selected four communities. The reason being that, it is not possible to study everyone, everywhere doing everything" (Punch, 2004:54). The four communities were selected using simple random sampling. Also, the study is based on irrigation farmers both males and females

In addition, there was an attempt to dilute or filter information from farmers of the selected communities because some saw this exercise as exposing their activities to strangers. As a result, they attempted to filter or dilute the information and some were not willing to grant the researchers an interview. In overcoming this, the researcher used

indirect questions and follow-up questions to obtain the desire results and those respondents who were not willing to grant an interview to the researcher were replaced.

Finally, since the views of participants regarding irrigation farming was sought, the individual came with some biases regarding their responses. In delimitating this, the research assistants were taken through training on questionnaires administration and how to their own biases as well as respondents. Also, the same standard of handling respondents was maintained as well as exhibiting similar personal attributes, for instance, the researcher and assistants were friendly, supportive to respondents. And where issues were not clear the researcher and the assistants took time to explain to the understanding of respondents in order to get their maximum cooperation.

1.8 Organization of the Study

This study was divided into five chapters. Chapter one gives a general introduction to the study which encompassed the background, problem statement, research questions and objectives, scope, relevance of the study and organization of the study. Chapter Two covers literature review, theoretical framework, and conceptual framework. Chapter three contains research methodology. Chapter four covers analysis of data and discusses findings whilst chapter five concludes the study and makes the necessary recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the conceptual review, theoretical review and empirical review of literature on issues of irrigation and local development. Concepts such as irrigation, irrigation systems, and development among others are reviewed in the first sub-section below. Based on which a framework has been developed to connect these relevant concepts as the conceptual review of the study. The theoretical underpinning of the study was reviewed in the second aspect of the study, whereas other works done by people in the field were reviewed finally in the third major sub-section.

2.2 Conceptual Review

2.2.1 Irrigation

Irrigation farming has been recognized as an important avenue for improving the wellbeing of poor people living in arid and marginal areas of the world like ours. The contribution of small scale irrigation can be seen in its ability to ensure food security as well as contribute to the income of farmers and the development of the entire economy (Asamoah, 2009). In the face of erratic rainfall in most regions of agricultural production, especially in the developing worlds, irrigation has become an indispensable support system for agricultural production. The concept irrigation can be succinctly explained as the process of getting and channeling water to the root zone of crops to facilitate plant growth. The human domination in any irrigation process makes Thorntorn (1978) to

perceive the concept irrigation as the supply of water for crop growth to supplement deficient rainfall.

The concept has further defined as any process (other than natural precipitation) which supplies water to crops, orchards, grass or any other cultivated plants (Stern, 1979 as cited in Aziabah, 2008). His definition was expatiated to include run-offs, farming humid culture and micro and manual irrigation, which were considered as highly significant features of small scale development.

An irrigation system therefore is any arrangement that supports the conveyance of water from a source to an area needing water so as to support the production of desired crops. Irrigation systems involve one or more sources of water fields; a functioning set of principles and techniques adopted by humans to create a water flow pattern within the physical structure and the varying needs of the fields. An irrigation system unreservedly requires appropriate institutional arrangement for the construction and maintenance of the physical facilities as well as procedures for the movement and distribution of water (Stern, 1979 as cited in Aziabah, 2008).

Miller (1982) affirmed that irrigation facilitated the growing of crops, not only in arid zones, but in flood areas to augment food production. With wide evidence of increased crop production in regions where irrigation systems are used, irrigation has become an attracting feature for countries to increase irrigated lands in recent years. Also, there have been a widespread incidence of irrigational farming in semi-arid regions.

There are different criteria for the classification of irrigation schemes around the world. The main criteria frequently used for the classification of irrigation schemes are the

irrigated area, scale of operation and management types. The most commonly used classification is small, medium and large scale irrigation schemes, though the interpretation of these categories may vary from country to country. For example, in Ghana an irrigation scheme of 300 ha is classified as small-scale, whereas in India 10,000 ha is categorized as small-scale (Smith, 1998).

Irrigation systems observed in Ghana may be classified into two types: conventional systems, which are mainly initiated and developed by the Ghana government or various Non-Governmental Organizations (NGOs), and emerging systems, which are initiated and developed by private entrepreneurs and farmers. Little is officially known about emerging systems, but they are expanding at a rapid rate, mainly fueled by access to relatively affordable pumping technologies and export markets for horticultural crops (GSSP, 2011).

When irrigation is employed due to insufficiency of rainfall to allow crop growing, irrigation is said to be supplementary. This form, is the process of distributing additional water to the crop with the objective of stabilizing and increasing yield, in environments where the given crop is usually grown under rain-fed agriculture. In dry and semi-dry areas, irrigation is largely utilized for production during the dry season as a result of the absence of rain. Under this condition, irrigation is regarded as full. In relation to full irrigation, one can sometimes use deficit irrigation to conserve water. Deficit irrigation is an optimization strategy in which irrigation is applied during drought-sensitive growth stages of a crop (FAO, 2012).

2.2.2 Development

The economic and social development of the world's poorest countries is perhaps the greatest challenge facing mankind at the beginning of this new millennium. An estimated one billion of the world's six billion populations live in absolute poverty.The same number also suffer various degrees of malnutrition and millions have no access to safe water, healthcare and education (UN, 2010). Poverty is concentrated largely in countries that are described as developing and these countries co-exist with the affluence. This vast majority of people who enjoy in these countries are described as developed (Thirlwall, 1986).

Development can be perceived as a multi-dimensional process involving major changes in social structures, popular attitudes and a national condition of life from unsatisfactory to satisfactory (Servaes, 1999:77). Development denotes change. These are changes among individuals, societies and countries (Thirlwall, 1986). Others perceived development as "change accompanied by growth" (Travillion, 1968). According to Julius Nyerere, as cited in Maendeleo (1974), development is the process of making people happy and content. From the foregoing, development can be understood as an upward adjustment in the entire social structure, one in which the lives of the people are enhanced.

This work, its primary aimed is unravelling the role of irrigation in local economic development, it is imperative to explore the concept development by consideration of several variables which describe local economic development.

2.2.2.1 Poverty Reduction

The concept, poverty reduction is a major characteristic of development in any locality. The initial conception of development indicates that development at the national level would automatically improve the well-being of all sectors of the population (the trickling-down effect). Experience from most countries that sought to implement this ideology showed that even in cases where growth occurred, by and large, it failed to benefit the poor. In Sub Saharan Africa, the situation was even worse. Not only have the economies stagnated since the end of the 1960s but also, the number of poor people increased rapidly.

Poverty reduction or alleviation was then later conceived as a development objective in itself in the 1970s (UN, 2000). Poverty reduction serves a dual purpose; one by increasing the rate of growth. Secondly, by triggering changes in income distribution. Additional key factors include the reduction in inequality and the reduction in income differentials in a given society (ODI, 2000).

A new conceptualization of poverty reduction by the World Bank report (2000) suggests that, poverty should be perceived beyond lack of goods - monetary or essential - to embody the lack of ability to choose, being considered as the essential factor for wellbeing. This approach is based on the concept of security, empowerment, and opportunity. Security explores the vulnerability of the people to risk of all kinds, (ill health, economic dislocation, and natural disasters). The poor are the most vulnerable to these events which formed aggravating factors of poverty. Empowerment connotes integration and de-marginalization. Empowerment explores the relations between the

poor and the institutions in a given society, while marginalization is seen as the absence of activities that shows active participation of people in community life such as exercising your franchise through voting, belonging to an association, and so no (World Bank, 2000).

2.2.2.2 Effects of Irrigation on Poverty Reduction

According to the World Bank (WB) (2000), three basic mechanisms exist for the poor to improve their real incomes. First is through increases in their own productive assets. The second is by improved employment and returns to the assets already owned. Such improved returns could be obtained, for instance, through increased utilization of unused land, profits from increases in prices for the products the poor produce and sell, or increases in employment and wages. The last channel is through increased productivity of the assets the poor own. This could involve, for example, increased land or labor productivity, namely increased output per unit of land or labour at unchanged prices (World Bank, 2000).

Concerning the diverse sources of income for different classes of the poor in any given locality or area, it is ideal to categorize them as income from agriculture (normally divided by income from crops and livestock, or as income from food and non-food, or income from tradable and non-tradable products depending on the data and context), income from farm and non-farm labour employment, profit income from own enterprise activity, income from land rentals, and income from various other sources such as transfers, remittances, dividends among others (Ziba, 2015).

Majority of the Ghanaian populace is employed in agriculture, with a larger proportion of these people being in the rural areas (GSS, 2010). It becomes important to affirm that in consideration of the rate of distribution of Ghana's employment statistics for the achievement of the aims of poverty reduction strategies, it is important that productivity - enhancement programmes are designed and implemented. In Ghana, the incidence of poverty is basically rural and concentrated in the food crop sector. Efforts to address poverty therefore, should target the capacity of the sector to raise production. Measures should also be taken to promote pro-poor growth strategies. This means that economic growth should be tied with the equitable distribution of the gains of growth. It is only through the effective distribution that governments can ensure that people escape from their vulnerability and participate fully in the social processes (Iddrisu, 2011).

The fact has been established that poverty has many dimensions, ranging from low income, malnutrition, ill health and illiteracy to insecurity. Other empowerment dimensions such as sense of powerlessness and exclusion have also been identified. These different aspects interact and combine to keep households, and even communities at a stage of stagnation and poverty. As revealed in the actions taken to combat poverty globally, policies on poverty reduction should be comprehensive and must be based on timely information on the living standards of the population. It is with this rationale that the study seeks to ascertain how irrigation can boost local economic development by raising the incomes of smallholder farmers to enable them live decent lives.

2.3 Theoretical Framework

Several theories establish the relationship between agriculture and development, citing relationship between increased agricultural production and economic development.

The Industrial Impact Hypothesis model, which establishes the implications of the Fisher-Clark structural transformation model for the agricultural sector have been formulated by Schullz in the form of three statements:

- Economic development occurs in a specific locational matrix
- These locational matrices are primarily industrial-urban in composition
- The existing economic organization works best at or near the center of a particular matrix of economic development and it also works best in those parts of agriculture which are situated favourably in relation to such a center.

In formulating this hypothesis, Schultz placed his primary focus on the failure of agricultural production and price policy to remove the substantial regional disparities in the rate and level of development amidst American agriculture. A consideration of the policy implications of the Schultz industrial impact hypothesis appear to be most relevant for developing regions of the developed countries (Rutan, 1965).

In relation to the three statements used in the explanation of the theory, it can be established that agriculture can be developed as matrix which will produce multiplier effects and boost the overall development of any region. This locational development of agriculture will then tend to concentrate the benefits within the region, thereby boosting regional development.

In relation to the structural change hypothesis however, both Rostow and the agricultural development stage theorists have emphasized the importance of structural changes during the early stages of economic development. Agricultural promotion factors such as tenure reform, fiscal policy reform, and others have been identified as important factors in

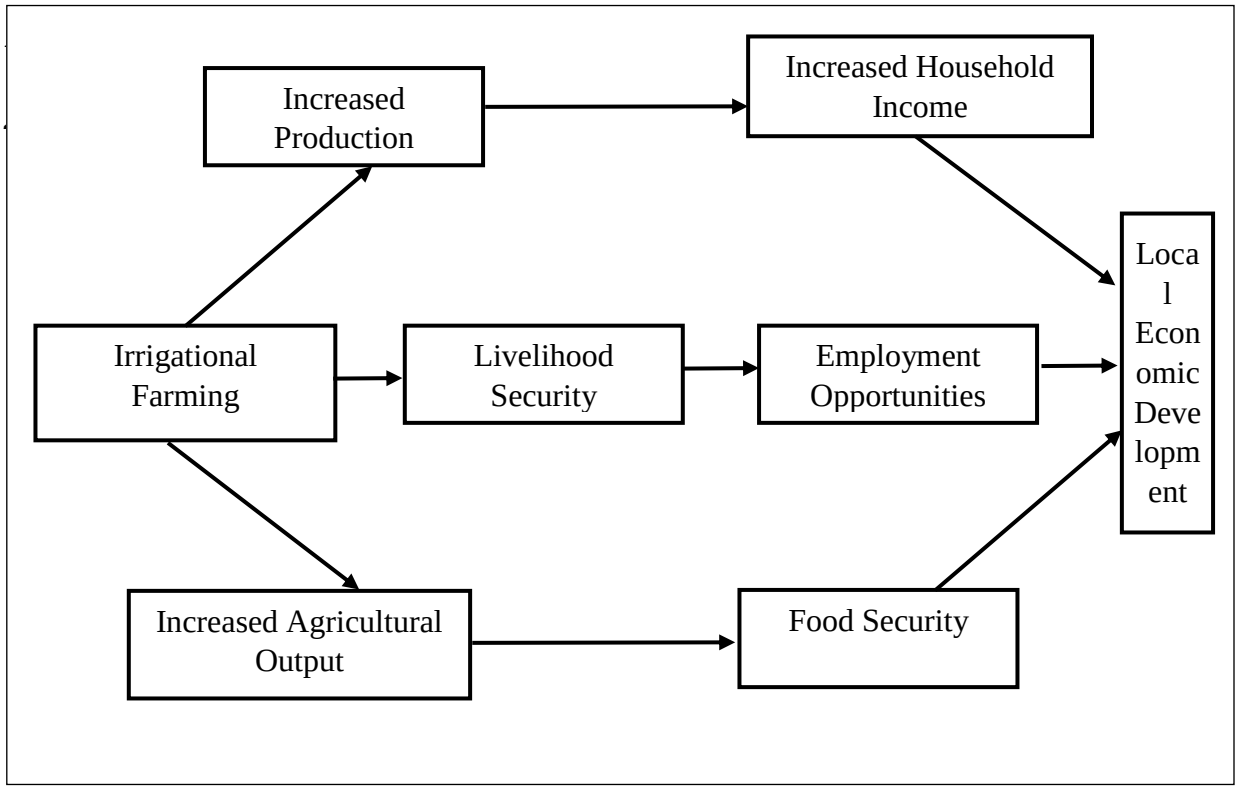
reducing the political power of those who have a vested interest in the status quo, and releasing the productive energies of the peasants and the emerging middle class.

Rutan (1965) explained that such theories reveal that with these reforms, agricultural prosperity is expected to stimulate development by providing the mass purchasing power needed to sustain an expanding urban-industrial sector. The central idea presented in these growth theories is adopted as a theoretical direction for this research, in the sense that even though irrigation was not singled out among the reforms, it can be obviously averred that modern reforms for agriculture will ultimately encompass expansion of irrigational farming in rural areas.

It can be said that irrigational farming, coupled with the use of political means to alter the income distribution effects of the earnings or to achieve any of the desired structural reforms, is particularly difficult to achieve in practice.

2.4 Conceptual Framework

Figure 2.1: Conceptual framework for the study



Source: Author's construct, 2017

The above framework which is the main domain of the study seeks to elaborate how the provision of irrigation can open opportunities for people to attain local economic development. Since irrigation farming is a specialized area, farmer organization and extension are paramount. Thus, effective irrigational farming would provide pathways for other crosscutting issues like increased productivity, increased agricultural production and increased number of times with which farmers can produce within a given year, thereby increasing their livelihood securities. These opportunities well-tailored would lead to outcomes in food security, creation of employment opportunities throughout the year and increase in income levels.

With intensive irrigational farming, coupled with other proper agricultural practices and opportunities, irrigation communities would attain a reduction in vulnerability and exclusion, good nutrition, better housing and general increases in access to health and education. The overall result would be a gradual reduction in poverty levels in the communities.

2.4 Empirical Literature on Irrigation and Local Development

2.4.1 Brief Overview of Irrigational development in Ghana

It has been established globally that irrigation farming plays an indispensable role in food production and food security in the world today. In the case of Ghana, irrigated agriculture has been thought of to have started little over a century ago (Smith, 1969).

Scholarly evidence revealed that the first scheme that the government conceived was in 1920. This was reported to have been accounted for as part of the then Winneba Water Supply Project (Smith, 1969, cited by Iddrissu, 2011). In the same work, Iddrissu (2011) further cited Agodzo and Bobobee (1994), where he averred that there was evidence to show the development of some forms of shallow well irrigational systems in South-Eastern Ghana in the 1930s.

This evidence was not disputed by any scholar who attempted to delve into the phenomenon. He further maintained that the 1950's and early 1960's saw the development of some water schemes in the Guinea, Sudan and Coastal Savannah belts. This he said accounted for about 240 earth dams and dug-outs in the northern part of Ghana, and about 66 in the Ho-Keta plains of the south purposely to provide water for

domestic use, livestock and for dry season farming (Agodzo and Bobobee, 1994). The high figure reported showed the steady nature of early irrigational farming in Northern Ghana which is largely attributable to the trend in rainfall distribution.

It was reported that soon after independence around 1959, the first national irrigation project in Ghana was in Dawhenya. However, available records indicated that Asutsuare Irrigation Project (AIP) was the first to be completed in 1967 thereby revealing a disagreement in reports regarding which was started first. Even though records indicated that irrigation in the country dated back a century ago, it is clear that serious irrigation is a more recent phenomenon. The realization of the role of irrigation in Ghana's agricultural development dated back to the 1960s. This was manifested in the Northern and Coastal Zones of Ghana (NCZG) where a significant investment in irrigation infrastructure was made against the backdrop of drought conditions in these areas.

Recently, irrigation has been embraced across the entire country as a major mechanism for supporting agricultural production and stimulating growth in the country. A more recent yet to be considered by the government is the one-district one-dam policy which is geared towards creating irrigations farming for beneficiary communities.

2.4.2 Contribution of Irrigational Agriculture to Development

Improvement in income levels was identified across literature as a major positive impact of irrigation on farmers. With effective application of irrigation, as well as appropriate support systems for agricultural production, irrigation has been established to contribute towards raising the incomes of those farmers with access to irrigated land. This was reported in the works of Lipton and Litchfield (2003), who found significant evidence to

suggest that income in irrigated areas had risen across India, though not uniformly. Dhawan (1988), cited in Lipton and Litchfield (2003) also showed that average income in the Indus basin rises from about 350 Rupees to about 1,830 Rupees based on 1970 - 1971 prices. He further reported that in the Gang etic basin, income levels have been raised from 440 Rupees to 2,200 Rupees. Other financial records obtained indicated that irrigational farming significantly contributes towards the rising of income levels.

Mellor (2001) made reference to the case of Malaysia, which has been considered as a country with physical agricultural resources similar to those of Western Africa. The success of Malaysia in agricultural development and poverty reduction has been given a lot of scholarly evidence. The agricultural growth of Malaysia has been largely attributed to their prowess in export trade in cash crops, particularly of which are rubber and palm oil, rather than food crops (Mellor, 2001). The fame in agriculture enjoyed by Malaysia was due to their adoption of a policy of support for irrigation, research and rural infrastructure. This adoption resulted in a considerable yield increase. The massive increase in yield then triggered trade and induced large income increases from even the numerous small producers of the commodities. Upon realization of the advantage, they had in rice production, Malaysia invested heavily in irrigation. The result was a massive increase in incomes of rural folks, which were translated into an increase in non-farm employment. The multiplier effects of such agricultural development strategy have been documented by Hazell and Roell (1983).

Well-grounded in literature and with adequate empirical evidence is the fact that irrigational agriculture boosts overall productivity and incomes (Lipton and Litchfield, 2003) by ensuring adequate water for production throughout the growing season. This

reliable supply of water for production consequentially contributes to higher yields and quality of produce.

In further attempt, Lipton and Litchfield (2003) trying to expatiate on the influence of irrigation on employment cited Binswanger and Quizon (1986), who used a general equilibrium model of India's Agricultural Post-Green Revolution (IAPR) sector to analyze the effect of expanding irrigated area by 10 percent on the rural poor. Binswanger and Quizon realized that, the effect is to increase aggregate output by 2.7 percent, whiles decreasing aggregate price level by 5.8 percent. Considering the fact that irrigational agriculture requires labour, it causes labour employment and real wages to rise slightly.

Further, irrigation contributes to poverty reduction indirectly through the reduction in food prices. With irrigation, much yield in terms of staple or non-staple foods is obtained. This increased output *"all things being equal"* then results in a reduction in the prices for staples and food or if there are significant transport costs internationally or from food surplus areas to towns or food deficit areas. When this happens, both rural and urban consumers gain from cheaper food (Swamikannu and Berger, 2009). The amount of money that these consumers spend on staples and the share of expenditure on food tend to fall, thereby resulting in a higher net income from off-farm employment activities.

In support of the positive contributions of irrigation to development, employment creation has been identified as a major contribution. Irrigation results in additional demand for labour as a result of irrigational projects. The first sphere is the requirement of labour for construction and on-going maintenance of canals, wells and pumps and so

on. This dimension presents itself as a major sector of employment for the poor, especially the landless rural poor or rural households with excess labour or seasonal excess labour. The second avenue for employment creation by irrigation as identified by Lipton (2003) is in the output of the irrigational farming itself. He maintained that with increased farm output as a result of irrigation, there will be the stimulation of demand for farm labour, both within the main cropping season and across new cropping seasons. This stimulus will result in increasing requirement for both numbers of workers required and length of employment period. With increased employment, rural income levels will increase, thereby reducing poverty levels and creating avenue for development of infrastructure (Lipton 2003).

Another prime role of irrigation in development is in the fact that irrigation makes incomes more reliable as well as higher. It safeguards farmers from loss of assets and also prevents peasants from getting into debt-traps. This is in the fact that irrigation acts as a buffer against bad years and hence the deprivation and indebtedness that these years may entail. Lipton (2003) described this situation as reduction of risk. A major risk he identified is the risk of disposing off assets such as mortgaging or selling land to buy food or meet debts, which he indicated are significantly reduced if irrigation farming is practiced.

This impact of irrigation is well documented in India among many other countries. For instance, it was established that India during the twenty-year period since the introduction of irrigation and the new varieties, poverty levels dropped by almost 50%. The factors that resulted in this significant change were identified as increased employment of the poor in agriculture and rural small scale industries that provided goods using labor

intensive techniques. However, most of the higher farm incomes led to increments of expenditures in local employment, intensive goods and services, which consequentially resulted in the creation of many local industries (Chambers, 1993).

Lipton and Litchfield also further cited Howes (1985), who described how irrigation by poor families with hand pumps has prevented them from becoming landless. Farmers who prior to the engagement of irrigation on their farms were threatened by their inability to actively engage their land in production were able to retain ownership of their lands. Further scholarly evidence affirms that irrigation also liberates people from maintaining demeaning social relations such as with creditors. According to Chambers et al. (1989), cited in Lipton (2003), poor farmers and landless labourers alike, irrigation liberates them from being underdogs to the "rich" since it provides them with some form of insurance against bad seasons or bad times of a year when food runs out and loans are needed to survive.

The role of irrigation in improving upon household security cannot be understated. In drought prone countries, particularly in developing countries such as Ghana, there is a wide consideration of irrigation development as a strategy to sustain agricultural production and ensure food security in most households. It is in view of this that most national planners are strongly attracted to irrigation as a means of propelling future food strategies. Leahi (1988) affirmed that for countries with arid and semi-arid climates, the unpredictable nature of rainfall, coupled with increasing demographic pressure on rain-fed agricultural land would strongly be pointed to irrigation as a prime candidate to support future food strategies in the medium and long term. Dessalegn (1999) established that, in areas where rainfall is scanty and unpredictable, rain-fed agriculture

cannot fully support food production, suggesting that investment in water management (irrigation) schemes will help stabilize agricultural production and promote food security.

Further evidence by Burrow (1987) suggested that irrigation schemes have proven to be a reliable and attractive option for rural farmers in developing countries. He buttressed his point with the assertion that returns from irrigated farming even on very small plots have the tendency of turning out greater returns from rain-fed production. In many developing countries, irrigation schemes were relied upon as means of increasing crop cultivation, reducing vulnerabilities associated with erratic rainfall and augmenting food security and employment to poor farmers. Kundlande et al. (1994), also maintained that food production from irrigated farms is a major source of wealth creation to the extent that it is the basis for economic growth in a number of countries.

Swamikannu and Berger (2009) also investigated the impact of credit on farm households. Their findings indicated that the employing of irrigation in agricultural production enhanced the access to credit by the farmers. Through enhanced access to credit, farmers are able to change their land use from subsistence rain-fed farming to high value crop irrigation farming, cushioning the security of households. What is notable is the fact that even at an estimated interest rate of 25%, households were found to still apply for farm credit to expand their area under irrigation farming. The results show that access to credit would likely increase the average household income and food energy consumption. From the above empirical findings by Swamikannu and Berger it can be said that providing access to credit without expansion of irrigation facilities would not give the intended result of improving the livelihood of poor subsistence rain-fed farmers.

A review of the plethora ways through which irrigation farming can contribute towards local economic development shows that its efficacy cannot be underestimated. Further deepening the relevance of an enquiry into unravelling other dimensions of such contribution, which is the primary aim of this research.

2.4.3 Negative Effects of Irrigational Farming

Irrigation as a tool for local economic development and poverty reduction does not translate only into positive results. An assessment of effective irrigation usual suggests positive outcomes which accompany irrigation. However, there is a great tendency of the practice yielding other evils (Hasnip et al., 2001). Prime among the effects they identified are equity issues, which can arise between geographical areas, and inter or intra households. The utilization of irrigation is an act of technological change, and obviously, technological change will be better suited to some regions than others. Hence, the first of these dimensions of inequity is generally unavoidable (Hasnip et al., 2001).

It is further asserted that even though irrigational farming may benefit the surrounding and wider areas, inequities will tend to be widen. It creates variation in output prices among farmers, and the depression of output prices for significant numbers of farmers who may still be dwelling on rain-fed agriculture for food production is a concern. The mediation mechanism therefore suggests that even in the face of promotion of irrigation, rain-fed agricultural growth also reduces poverty and should not be neglected (Hasnip et al., 2001).

Considering the fact that productivity-raising technologies have equitable on-farm benefits (for example mechanization subsidies or anti small-scale biases in research and

extension), irrigational farming may tend to disadvantage smallholder farmers against commercial producers (Thirtle *et al*., 2001)). Larger and relatively 'resource-rich' irrigators will benefit most, especially from certain benefits that accompany the utilization of irrigational facilities on their farms, the poor also still benefit in absolute terms.

Thirtle *et al.*, (2001) further asserted that, irrigation may worsen absolute poverty for some if it reinforces processes of land consolidation in which poor households lose rights to land, or if it is associated with displacement of labour by mechanization or herbicide use. With the advent of irrigation, poor people may be displaced by the construction of reservoirs and canals. In cases where the livelihoods of these farmers and rural dwellers depend on flowing rivers or water bodies, livelihoods may be adversely affected by upstream or downstream impacts. Badly designed or managed irrigation can negatively impact public health and human capital through the spread of water-borne diseases, usually with a greater incidence for the poor. It is therefore imperative that in the construction of irrigational equipment, these farmers and rural dwellers should be taken into account.

2.5 Challenges of Irrigational Farming

In general, data on irrigation systems, particularly on small-scale systems of a few small systems have been technically monitored or have had their performance analyzed (Turner, 1994; Pearce, 1993; Morris and Thom, 1990).

A survey indicated that based on experiences of irrigation farmers at a defunct irrigation scheme. Eighteen items were used to measure the perceived main constraints and

challenges. These were sub-categorized as: Quality and nature of support and extension services; Skills and training needs: agricultural training, information and research; Inputs and product market; and Physical factors influencing irrigated crop production; climatic conditions, soil and water quality and availability, pest and diseases, tenure security and farm size (Babalwa, 2007). From the result of the survey, it was realized that primary constraints and challenges identified for the future in a rehabilitated irrigation scheme are finance and credit, market and marketing, institutional support, training and support, and extension services. Respondents were unanimous in their belief that this has the potential to undermine the viability and sustainability of the scheme.

Other researchers have identified similar problems as found out by Babalwa (2007), hence can be seen as largely universal issues that affect the irrigational schemes in most developing countries. With the prevalence of these and their negative effects on overall production and productivity, issues identified will ultimately affect the sustainability of the scheme and hence the livelihoods of the farmers.

Other scholars stated that the major problems for many irrigation systems are: free riding, rent seeking, and corruption (Ostrom, 1992 as cited in Penov, 2004). In areas where farmers attempt to practice irrigation by pooling resources, corruption often surfaces, and the management of the schemes becomes a challenge, thereby affecting the sustainability and efficiency of the schemes.

The problems related to irrigation development and management in Sub-Sahara Africa (SSA) can be categorized as follows:

- Environmental factors: issues identified from literature under this theme include water scarcity and poor water quality especially as related to sediment concentration; land degradation as a result of poor operation and maintenance activities (partly related to inefficient water management resulting in water wastage and water logging), as well as land-use regulation.

- Capacity of the farmers: Lack of know-how in, and access to the opportunities of irrigation technology; weak economic base of most farmers; and the relatively high development costs involved in developing irrigation schemes (Penov, 2004).
- Government policy/ institutional and legal support: Limited or no priority given to irrigation development during national and local planning and budgeting; poor management structures in place to support farmers and promote irrigation development. For example, the infrastructure to facilitate agricultural development is underdeveloped; a land tenure system that does not encourage farmers to invest in permanent improvements on their plots and make improvements which can be used to obtain credits for further development; Unclear water rights and their enforcement (Tefesse, 2003).

In the case of Ghana, Government has put institutional and legal supports in place for irrigation development an example is the National Irrigation policy. What is interesting is that, farmers still do not invest in permanent improvements on their plots because of the land tenure systems where the lands are borrowed or leased to farmers.

In a more introspective report, Assefa (2008) described challenges that irrigated agriculture is likely to face in the coming years that is, how to increase water productivity

in the face of growing water scarcity and the limited availability of water for agriculture. Moreover, climate change may affect the amount of rainfall and its distribution, and therefore requires policy development a factor which is already prominent in the Northern sector of Ghana. Based on the numerous findings in his work, he maintained that the sustainability of small-scale irrigation projects largely depends on (operational) management.

Further research revealed social, economic, institutional and policy problems as general constraints for the development of small-scale irrigation schemes (FAO, 1986; Shawki and Le Guy, 1990; Teshome, 2003). Poor design and management have contributed to few peasant irrigation systems in SSA countries (FAO, 1986; World Bank, 1986). These factors can be said to be in tandem with those earlier identified and reported above. The meaning is that; irrigational challenges are usually similar even across different geographical locations.

Moreover, both technical and social factors constrain small-scale irrigation development in Sub Saharan Africa and among them, institutional and management problems tend to be most constraining (FAO, 1986). Small-scale irrigation schemes in Ethiopia are generally characterized by: Low efficiency, Lack of finance, inadequate marketing, and Weak extension services (CTA, 2003).

Works that sought to identify these challenges, specific to the Ghanaian context reported that one of the major problems of irrigated agriculture in Ghana has to do with sustainability of the schemes (Appiah-Nkansah, 2009). Miyoshi and Nagayo (2006) attributed the decreasing irrigated land area to the declining capacity of aging facilities to convey and distribute water, the abandonment of irrigated agriculture due to the complete

collapse of facilities and suspension of irrigation owing to the cost of operating pump stations.

Like other developing countries, Ghana has focused on the implementation of irrigation schemes without the participation of farmers and without charging them for the use of the facilities (Appiah-Nkansah, 2009). Therefore, farmers who have had poor awareness of their responsibilities have heavily depended on the Government. This lack of awareness has been a major hurdle to the development and enhancement of farmers' organisations.

2.5 Conclusion

The outcome of agricultural development for the poor can be direct, through improved incomes, or indirect, through the impacts on employment, wages, prices of products, and productivity of non-farm assets. This development has been revealed to be championed largely by irrigational development. Evidence in the literature reviewed indicates that, a major contribution of the research on agricultural growth and poverty through irrigation over the past decades has been to point out that the indirect impacts can be as large as the direct ones or even more, but may take some time to be realized. This provides a sound basis for the focus of this study which seeks to assess such impact of irrigation on local economic development in Wa West District.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This part of the work gives details as to how the entire research would be carried out. The chapter discusses the methods used in collecting primary data for analysis. Primarily, it highlights operationalization of concepts, research strategy, sampling techniques, sample size determination as well as data analyses and presentation techniques adopted in achieving the objectives of the research.

3.2 Research Design

According to Yin (1984), one condition that can determine which type of research strategy to adopt is the research questions. Schell (1992) indicated that, questions of who, what, where, how many and how much relate to surveys (quantitative) whiles questions of why and how relate to case studies (qualitative). The main research question of this study deals with 'how' whiles the specific research questions focus on questions of 'what'. In the light of the above, this study adopted a concurrent mixed method approach by collecting and analyzing both quantitative and qualitative data. It must be noted however, that the objectives of this research, took more of quantitative than qualitative approach. Specifically, a triangulation strategy was employed in this study. In this approach, the researcher collected both quantitative and qualitative data concurrently and then compared the two databases to determine their convergence, differences, or some combination (Creswell, 2009). Morgan (1998), and Greene et al. (1989) refer to this comparison as confirmation, disconfirmation, cross-validation, or corroboration.

Collection of both quantitative and qualitative data occurred in one phase of the research and the mixing of the two was done at the interpretation or discussion section of this study in order to integrate or compare results of the two types of data side by side. With this side by side integration, the discussion first provides quantitative statistical results followed by qualitative quotes that support or disconfirm the quantitative results. The advantage of this approach lies in the fact that it is familiar to most researchers and can result in well-validated and substantiated findings (Creswell, 2009).

3.3 Sources of Data

The study used both primary and secondary sources of data in order to accomplish the research objectives. Primary data was collected from both irrigation farmers within the selected study communities and key informants within the communities as well as those from institutions such as the Ministry of Food and Agriculture (MOFA) office, and the District Development Planning Unit. Primary data that was gathered from the irrigation farmers include data on types of crops grown, income earned from irrigation farming, contribution of irrigation farming to household food security, local management strategies of irrigation facilities as well as challenges they face with regards to irrigation farming. Primary data regarding the institutional structure and management systems as well as challenges that the agencies responsible face in managing irrigational facilities was also obtained from the key informants mentioned above. The secondary data was gathered from Wa West District annual planned reports among others.

3.4 Study Population and Target Population

The study focused on irrigation farmers in Wa West District. This is prompted because the study sought to assess irrigation farming as a local economic development strategy. Four communities within the District were purposively selected for this study. These are; Yeleyiri, Siiru, Gbache and Pigbengben. Data obtained from the Wa West District Agricultural Development Unit (DADU) indicated that, the total number of irrigation farmers within the four communities was 255. This constituted the sample population frame from which the sample size was drawn.

3.5 Determination of Sample Size

Yamane (1967) cited in Israel (2013) provided a simplified formula to calculate sample size which was given as $N = \frac{N}{1+N(e)2}$ Where "n" is the sample size, "N" is the population frame and "e" represents the margin of error. A confidence level of 95 percent or 5 percent margin of error was considered. The total population (N) of the irrigation farmers within the four selected communities is 255. Applying the formula, $n = \frac{N}{1+N(e)^2}$

$n = \frac{255}{1+255(0.1)^2} = \frac{255}{3.55} = 72$

Therefore, the sample size for the study is 72 irrigation farmers. This sample size was proportionately distributed among the four study communities using the formula

$$\frac{\text{Total number of irrigation farmers per community X Sample size}}{\text{Total number of irrigation farmers in the four communities}}$$

The number of irrigation farmers to which questionnaires will be administered in each community is shown in Table 3.1 below.

Table 3.1: Distribution of Sample Size among Study Communities

Name of community	Total Number of irrigation farmers	Number of questionnaires to be administered	Number of Respondents	Percentage proportion of Questionnaire distribution
Yeleyiri	48	29	13	24%
Siiru	80	49	22	31%
Gbache	110	67	31	43%
Pigbengben	17	11	4	6%
Total	**255**	**156**	**72**	

Source: Author's Construct, 2018

3.6 Data Collection Tools and Techniques

Questionnaire administration, face to face interviews, and direct observation were employed. Survey questionnaires (both close and open ended) were administered to irrigation farmers within the study communities to obtain data on types of crops grown, income earned from irrigation farming, contribution of irrigation farming to household food security and so on. Face to face interviews was conducted with key informants from the Wa West District MOFA office, the Assemblymen of the communities, the chief, women leaders and other stakeholders directly involved in irrigation farming in the study communities. Interview guides were also used to gather information from the key informants concerning the study. This helped the researcher to ask further questions when there was the need for clarification. Such data was used to compare the information collected from the irrigation farmers. Direct observation with the aid of

observation guides were used to obtain data on the kind of crops grown during dry season farming to help validate the information gathered from the irrigation farmers.

To ensure validity and reliability, the data collection instruments were pre-tested in two communities which were not part of the four selected study communities. The two main forms of validity include external and internal validity. The external validity of research findings is the data's ability to be generalized across persons, settings, and times; whiles internal validity the ability of a research instrument to measure what it is purported to measure. From the pre-testing, questions that were not clear to respondents were refined to make them unambiguous.

3.7 Sampling Techniques and Procedure

The study used both probability and non-probability sampling methods. The communities are already into clusters. Out of the clusters of irrigation farmers, four communities were purposively selected from the total of the clusters with irrigation facilities in the Wa West District. These four (4) communities were selected due to the irrigation activities and facilities in those communities as compared to the rest of the communities and how those facilities are accessible to the researcher. A sample size was then derived based on the total number of irrigation farmers within the four study communities and distributed proportionately among the communities. Simple random sampling was then employed to select the farmers for the study in each community. A list of irrigation farmers in the various communities was obtained from the DADU. Numbers were assigned to each name on the list in ascending order starting from 1. The numbers were then written on pieces of paper for each community with correspondence

to the number of irrigation farmers in each. The papers were folded and a total number corresponding to the total sample size for each community was selected for the communities respectively. Individuals whose names corresponded with the chosen numbers were then selected to participate in the study. Due to the smaller number of irrigation farmers in each community, it was not difficult locating the specific farmers selected.

3.8 Pre-Testing of Data Collection Instruments

The questions were first tested in order to reshape sensitive ones. Data collection instruments pre-tested and sensitive questions found were rephrased. Also, a cover letter was attached to questionnaires and interview guides explaining the relevance and objectives of the study to respondents.

3.9 Methods of Data Analysis

The data collected from the primary source was first edited to minimize human and arithmetic errors. Statistical Package for Social Sciences (SPSS) was used to analyze the quantitative data generated from the research and this was used to generate the bar graphs and frequency distribution tables. Qualitative data obtained on the other hand was transcribed, coded, and presented where appropriate in the form of quotations. Major findings would be discussed to arrive at answers to the research questions.

3.10 Ethical Considerations

Any researcher who solicits information from people in his/her research has certain obligations towards them and also sources of the information must be duly acknowledged. Since the participation of the sample subjects are often closely associated with data collection and the sources of data both primary and secondary, it is proper to consider ethical issues here (Singh, 2006). Ethics is one of the important elements in social research that requires critical consideration. Essentially, it can be said to be the general practices in a given profession or institution.

The key ethical issues included getting the consent of respondents to be involved in the study and issues of confidentiality and anonymity of respondents. On the matter of confidentially and anonymity, the names of respondents was excluded from the final work. All sources of secondary data were duly acknowledged as well.

CHAPTER FOUR

DATA ANALYSIS AND DICUSSION

4.1 Introduction

This Chapter presents the analysis and discussion of the data collected in line with the study objectives. It covers the background characteristics of respondents, the kind of vegetable crops cultivated by farmers, the income earned by farmers for household use, irrigation farming contribution to food security, local management of facilities and strategies as well as challenges faced by irrigation farmers during the season.

4.2 Background Characteristics of Respondents

4.2.1 Sex distribution of respondents

The data showed that dry season irrigation farming is done by both males and females. However, majority of the farmers engaged in the dry season irrigation activities were men 37 (51%) with women 35 (49%) been the minority. In the light of this, the greater proportion of men found to have engaged in the dry season farming depicted the dominant of men in almost every sector in the country as indicated in table 4.1.

Table 4.1: Sex distribution of respondents

Sex	Frequency	Percentage (%)
Male	37	51%
Female	35	49%
Total	**72**	**100%**

Source: Field Survey, 2018

4.2.2 Age category of respondents

The results revealed that the modal age of respondents was 31 - 40 representing 25%. A good number of 21% between the age bracket of 41 - 50. The remaining respondents comprising 15, 9 and 2 fall within the age range of 50years and above, 21 - 30 and below 20 years respectively. This implies that respondent between the age of 31 - 40 and below 20 years are the majority and minority groups who engage in irrigation activities in the District. Figure 4.1 below shows the respondents:

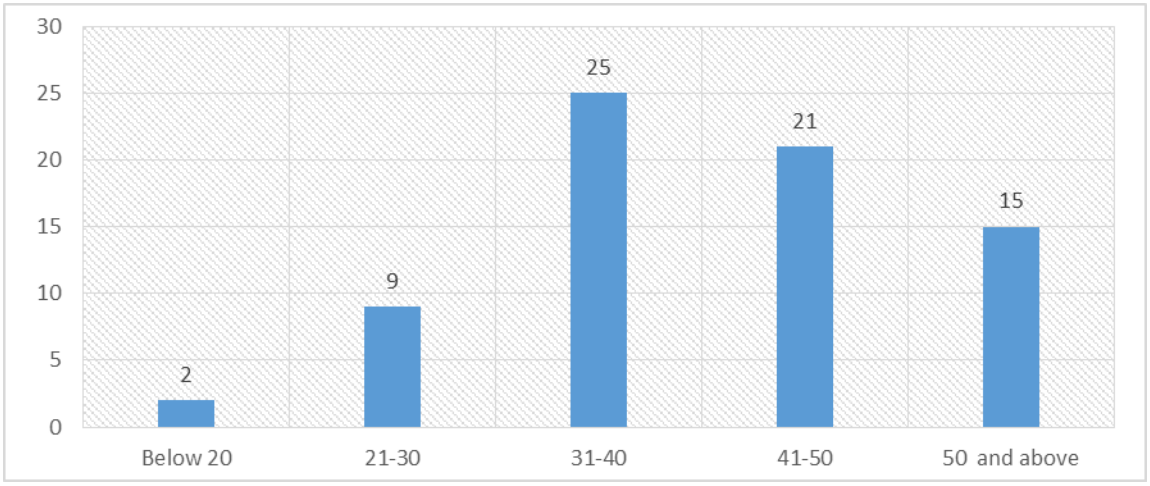


Figure 4.1: Age group of respondents

Source: Field Survey, 2018

4.2.3 Educational Level of Respondents

Results from the figure 4.2 below pointed out that majority 50 (69%) of the respondents who are engaged in irrigation farming had never been to school. While 9 (12%), 7(10%), and 4 (6%) of respondents in sequence attended up to primary, junior high and secondary school respectively, the least minority were found to have education up to tertiary level. Majority of the respondents engaged in dry season farming were found to be illiterate shows that more education needs to be carried out for literate to go into farming as another source of employment.

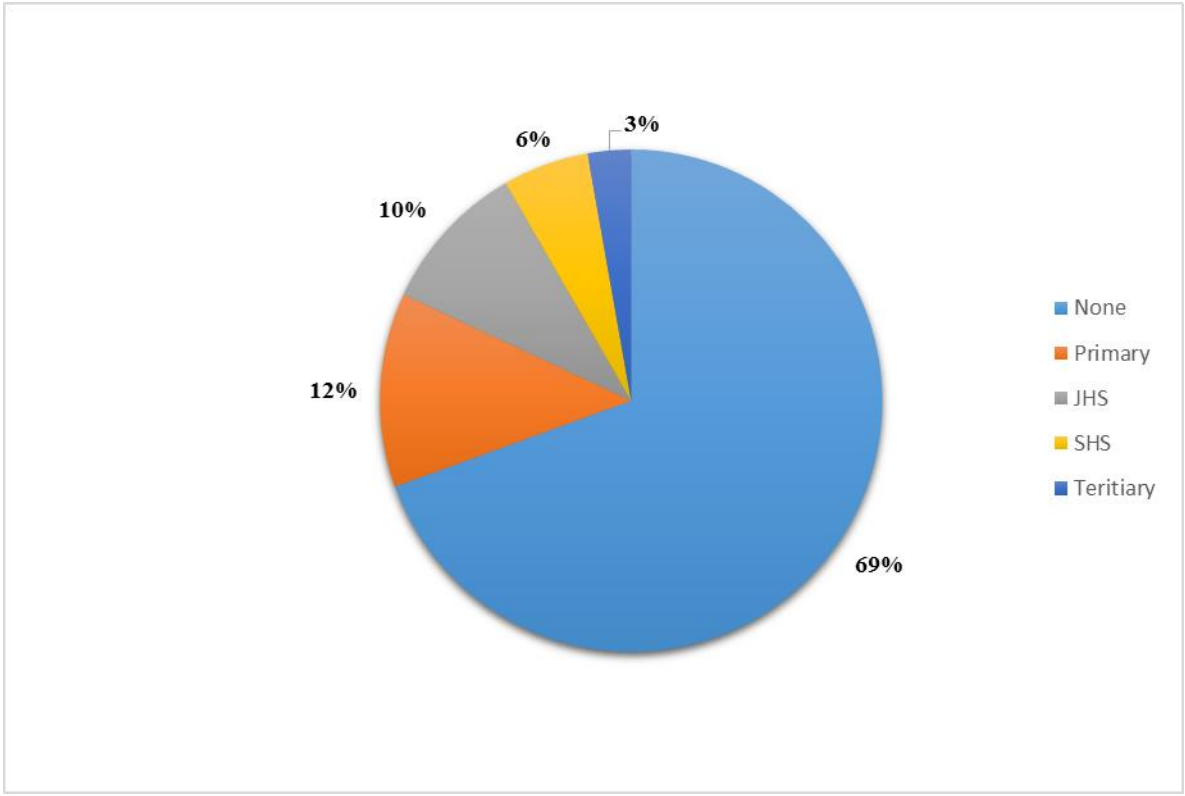


Figure 4.2: Educational level of respondents

Source: Field Data, 2018

4.2.4 Religious background of respondents

Observation from the table 4.2 indicated that majority 34 (47.2%) of the respondents who practice dry season irrigation farming are traditionalists. This was followed by Christians who constitute 24 (33.3%) and that of the Islam comprising of 14 (19.4%).

Table 4.2: Religious background of respondents

Religious background	Frequency	Valid Percent (%)
Traditional	34	47.2
Islam	14	19.4
Christian	24	33.3
Total	**72**	**100.0**

Source: Field Data, 2018

4.3 To identify the kind of crops grown during the dry season farming

4.3.1 Type of crops cultivated by respondents

The study sought to identify the type of crops cultivated by irrigation farmers. Results in figure 4.3 showed that majority 42% (25) produce leafy vegetable crops. While the minority 4% (3) of the respondents cultivate other crops such as rice and cassava, 35%, 14% and 5% cultivates tomatoes, okro and pepper respectively. From the results it is assumed that majority of the farmers produce basically vegetable crops as major dry season irrigation scheme activity because they can easily sell them or demand for by people was high. This therefore agrees with Hussain, *et al. (*n.d) who pointed out that agricultural irrigation has been regarded as a powerful factor for providing for multiple

cropping and crop diversification. Figure 4.3 below indicated the data obtained from the field.

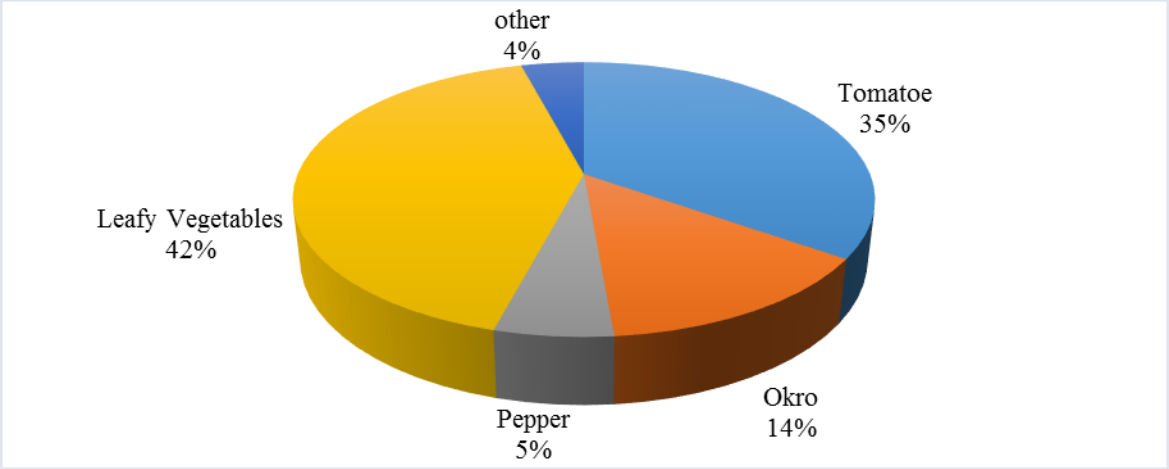


Figure 4.3: Kind of crops produce by irrigation farmers

Source: Field Survey, 2018

The above quantitative data results is supported by results from focus group discussions. During one of the discussions a female respondents revealed that the main crop produce.

> *"……the major crop we produce here are vegetables. Vegetables such as beans and pumpkin are what we produce because they are of high demand. She also indicated that we depend on them to some extend for our home consumptions. These are however produced basically by us the women…."*

4.3.2 Respondents reasons for irrigation crop production

From the table below vast majority 52 (72%) of the respondents indicated they engage in dry season irrigation farming purposely for income generation. This is followed by 14 (20%) respondents engage in crop production for household consumption. Very low

number of respondents representing 1 (1%), 2 (3%) and 3(4%) engage in irrigation farming for reasons of ease to cultivate, good production and ease to access seeds for production respectively. There is significant evidence to conclude that irrigation farmers produce basically for income.

Table 4.3: Respondents reasons for irrigation farming

Reason of crops cultivated	Frequency	Percentage (%)
Income	*52*	*72%*
Household consumption	*14*	*20%*
Good production	*2*	*3%*
Ease of access to seed	*3*	*4%*
Easy to cultivate	*1*	*1%*
Total	***72***	***100%***

Source: Field Survey, 2018

4.3.3 Respondents views on crop yield

Out of the 72 respondents interviewed, 28 respondents who constitute the majority indicated that the yield of crop was average, while 21 and 19 respondents revealed the yields in their view was good and bad respectively. However, 6 respondents revealed that the yield from irrigation farming produce was very good. This therefore rated the overall yield performance of the irrigation produce at an average level.

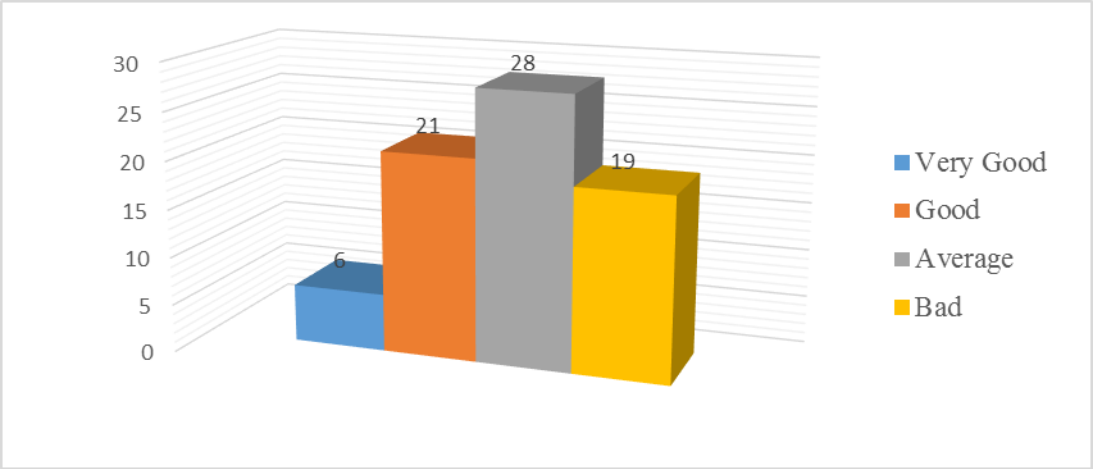


Figure 4.4: Respondents rating on crop yield

Source: Field Data, 2018

4.4 Determine the amount of household income earned from dry season farming

4.4.1 Income earned by respondents

Respondents were able to indicate that they earned income from the irrigation farming activities. Observation from the figure below showed that majority of 28 out of the 72 respondents indicated that they earned income less than GH¢100. A good number of 24 respondents revealed that they earned income ranging from GH¢100 - 200. Also 13 and 5 respondents earned income ranging from GH¢200 - 300 and GH¢300 - 400 respectively. The smallest number of respondents 2 only earned GH¢400 and above. The figure demonstrates a clear trend of income range earned by irrigation farmers. That is fewer number in descending order earned higher incomes.

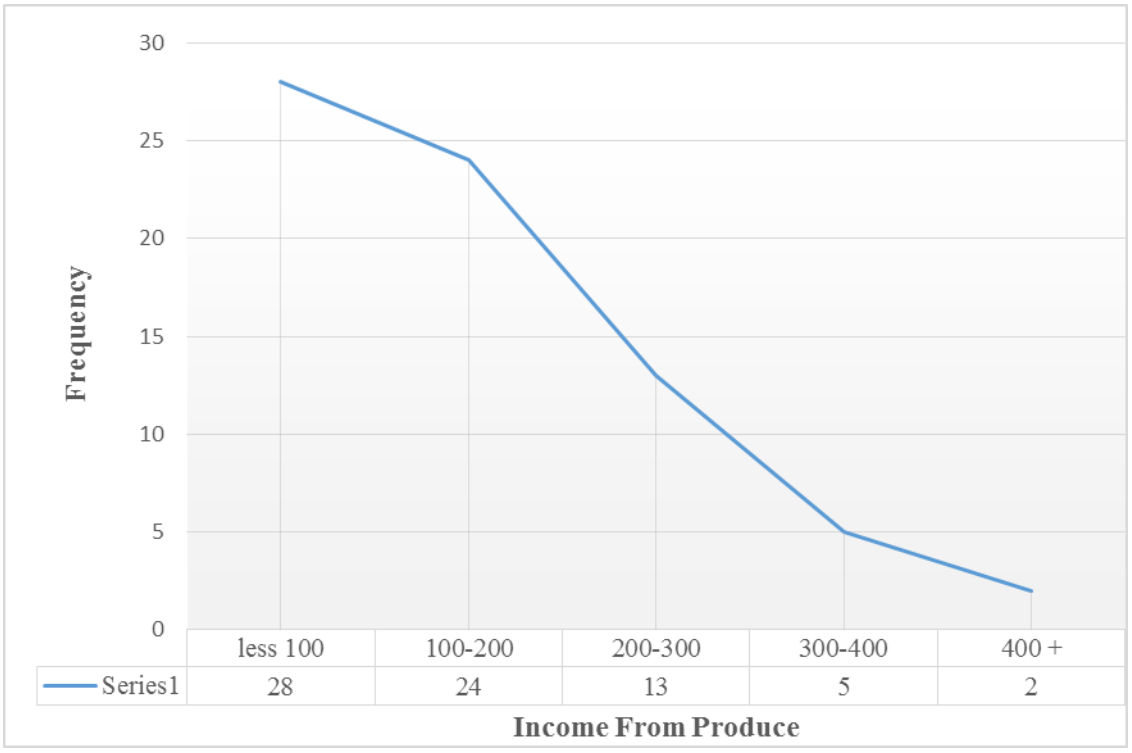


Figure 4.5: Income earn from sale of irrigation farm produce by respondents

Source: Field Data, 2018

4.4.2 Use of income from irrigation produce

Results from the figure 4.6 below revealed that majority 34 out of the 72 respondents used the income earned from irrigation farming to improve household lives. The least number of 2 respondents indicated that they used their income earned to pay health bills. With regards to fees payment, buying of food stuff and purchase of agricultural inputs; 3, 18 and 5 out of the 72 respectively revealed that they used the income in fulfillment of such purposes. So, many of the farmers used their earnings from the dry season irrigation farming to take care of family members. This implies that living condition could get better if the government could improve upon irrigation farming in that area and other places.

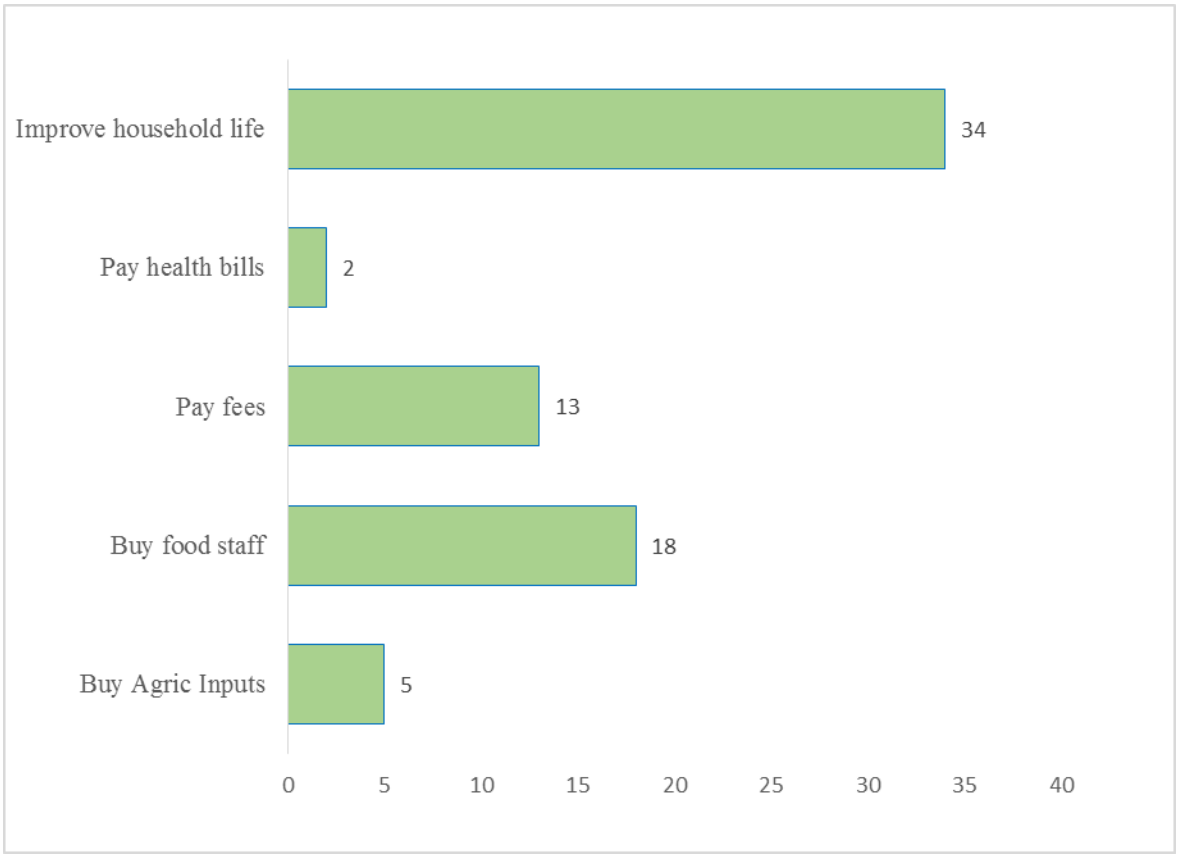


Figure 4.6: Use of income by irrigation farming by respondents

Source: Field Survey, 2018

4.4.3 Rating of farm produce income against irrigation crop produce income

Majority of respondents 35 (49%) as observed in the table 4.4 below revealed that income earned from normal farming crop produces was very high as compared to earnings from irrigation farming produce. A number of 19 (26%) pointed out that income earned was high, while 13 (18%) and 5 (7%) which is the lowest confirmed that income earned from farming produce is low and very low respectively.

Table 4.4: Respondents rating of Income earn from normal farming produce

Rating	Frequency	Percentage (%)
Very High	35	49%
High	19	26%
Low	13	18%
Very Low	5	7%
Total	**72**	**100%**

Source: Field Data, 2018

4.5 Examine the contribution of irrigation farming to household food security

4.5.1 Consumption of crop produce

This question sought to find out whether farmers consume the crop produce in their households. All the 72 respondent representing 100% revealed that they consumed part of the produce from their irrigation farming activities. This signified that irrigation farming contributed to food availability and access in the respondent's households.

Table 4.5: Response crops produce consumption

Response	Yes	No	**Total**
Frequency	72	0	71
Percentage (%)	**100%**	**0**	**100%**

Source: Field survey, 2018

4.5.2 Respondents views on contribution to improve household food security

Results from the figure 4.7 showed that majority; 29 out of the 72 respondents agreed irrigation farming slightly improved their household food security. Observation from the figure indicated that 13 and 9 respondents had their household food security moderately and highly improved. However, 21 respondents revealed that their household food security had not improved despite their engagement in the irrigation farming. Evidence from the figure testified that majority of the respondents experienced slight improvement in their household food security.

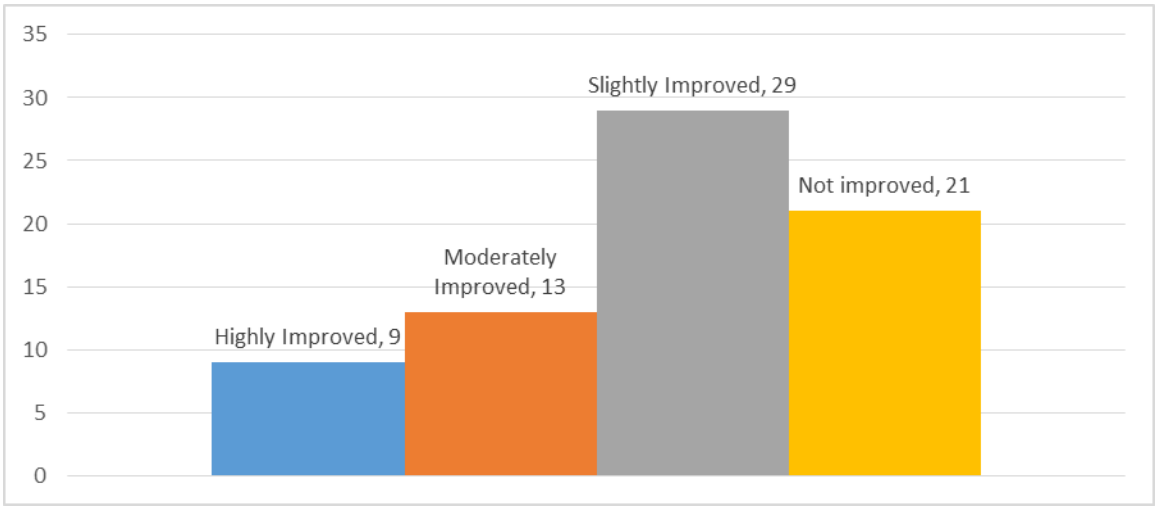


Figure 4.7: Extend of contribution to improve household food security

Source: Field survey, 2018

4.5.3 Sustaining period of produce to household food security

With regards to the duration irrigation farm produce supported households as supplementary food, 30 respondents been the majority revealed that it sustained them for less than 3 months, while for the periods of 3 – 6 months, 6 – 9 months and 9 - 12; 23, 11

and 8 respondents indicated that the produce sustained them for such durations respectively.

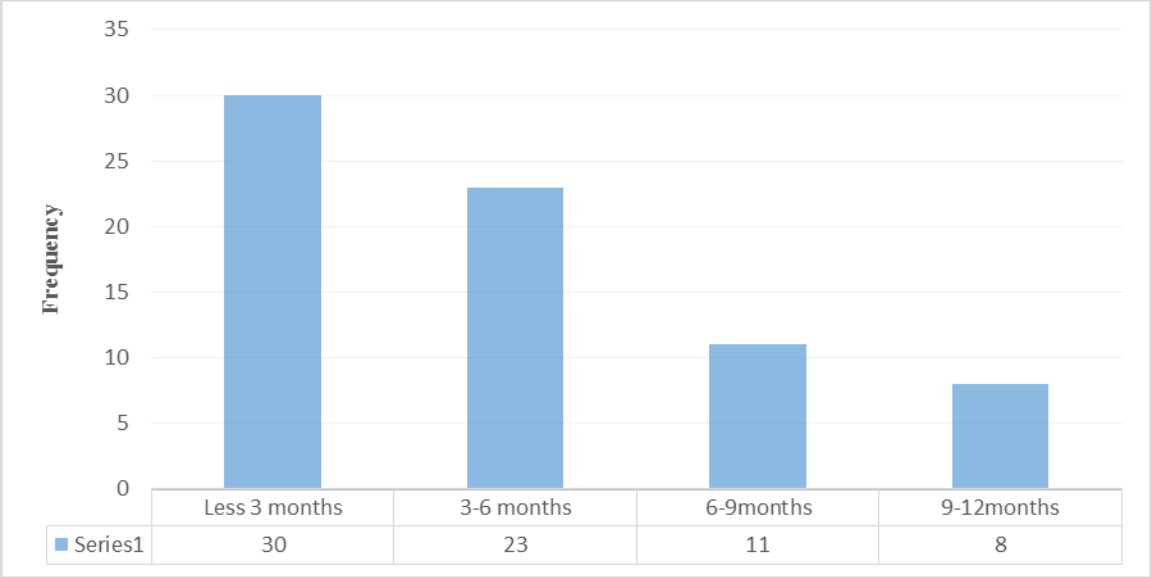


Figure 4.8: Period produce sustain households

Source: Field Data, 2018

4.6 Assess to local management strategies of the irrigation facilities

4.6.1 Management of irrigation facilities

From the table below respondents were able to indicate the management responsible for the irrigation facilities. A higher number of respondents 48 (67%) revealed communities chiefs/elders were responsible for the facilities management. Also, 13 (18%) of the respondents indicated that the facilities were managed by farmer cooperative groups. Individual farmers constitute 14% in the management of the irrigation facilities. Only 1% of the facilities is being managed by District authorities. From the above analysis, respondents were not certain as who manages the facilities which the researcher thought

wasn't appropriate though majority is of the view that chiefs/elders were in-charge of affairs.

Table 4.6: Management of the irrigation facility

Management	Frequency	Percentage (%)
Chief/Community elders	48	67%
District Assembly	1	1%
Farmer Cooperative groups	13	18%
Individual	10	14%
Total	**72**	**100%**

Source: Field Survey, 2018

4.6.2 Respondents contribution to facility management

The field data showed that 60% of the respondents offer labour to support the management of the irrigation facilities in the communities. Again, 30% of the respondents attend meetings regarding the management of the facilities. Only 10% of the respondents indicated they contribution financially towards the management of the facilities. The majority support to labour was further confirmed by respondents during the focus group discussions. During the discussions this was what one of the elders has to say;

> *"…. We constructed the dam ourselves with technical support from irrigation experts and funding support from our sons abroad. During the construction every individual had to carry stones and some people had to*

dig in order to bridge the dam. Financial commitments were made by individuals to support the completion of the project which was supervised by the chief and elders of the communities…"

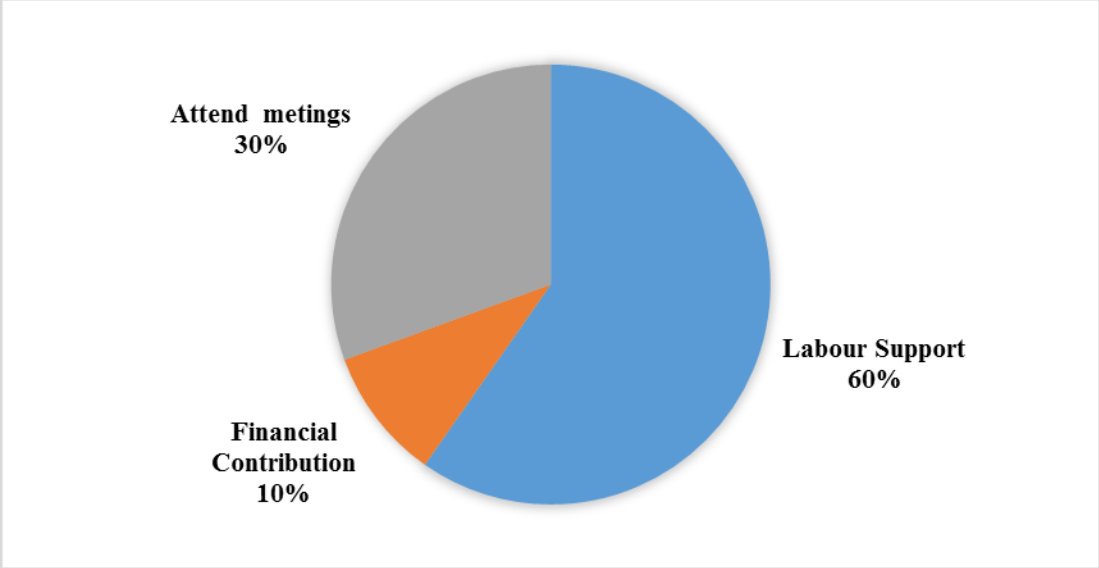


Figure 4.9: Respondents financial contribution to facility management.

Source: Field survey, 2018

4.6.3 Respondents Suggestions for the facility management

From the figure 4.10 below, it was observed that 42 out of the 72 respondents were the majority who believed that the maintenance of the facility was effective. Cooperation with management received 22 responses as a way of strengthening management. Again, 6 and 3 respondents were of the view that adoption of best practices and other issues respectively could enhance effective management.

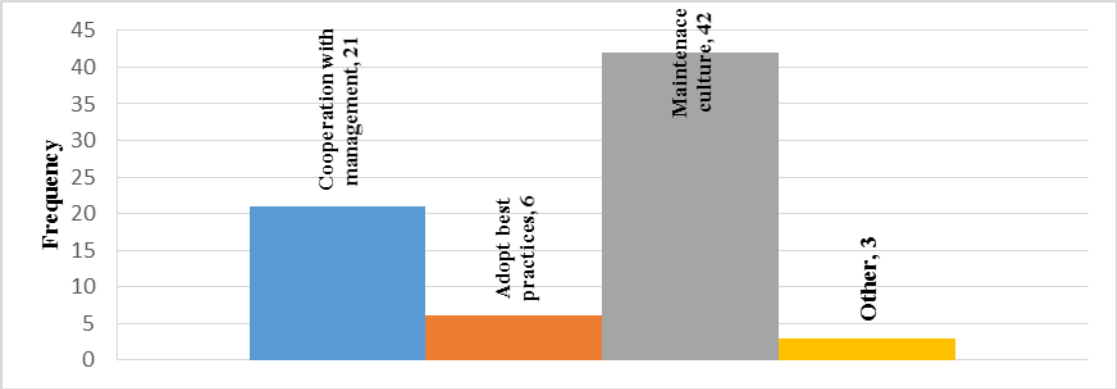


Figure 4.10: Respondents views on solutions to management

Source: Field Data, 2018

4.7 Identify of challenges faced by the irrigation farmers

The study sought to establish the challenges faced by irrigation farmers in production. From the figure below, it showed lack of fencing of the area was confirmed by 58 respondents as the main challenge hindering the activities of irrigation crops cultivation. Lack of inputs and equipment to aid production was also found to be a big challenge as indicated by 56 respondents out of the 72. Also, 41, 28, 20 and 19 respondents indicated that break down of canals, acquisition of land, water shortage and the type of crops suitable to cultivate as well as other challenges respectively. From the presentation, the major challenges faced were fencing of the area, lack of input and equipment as well as canals breakdown. The qualitative data collected from the focus group discussions backed this findings. During the discussions a woman revealed that the serious challenges the communities faced included;

> *"……. The problem our irrigation site faced was the absence of sustainable fencing area. Most often animals destroyed our crops particularly the Fulani headsmen and sometimes people take advantage to*

steal. Besides, we have no access to modern technology and inputs to enable us improve production particularly those of us whose plot are neither close to a canal nor the dam main stream to draw water……". This finding agreed with Penov (2004) finding which states farmers lack access to the opportunities of irrigation technology; weak economic base of most farmers.

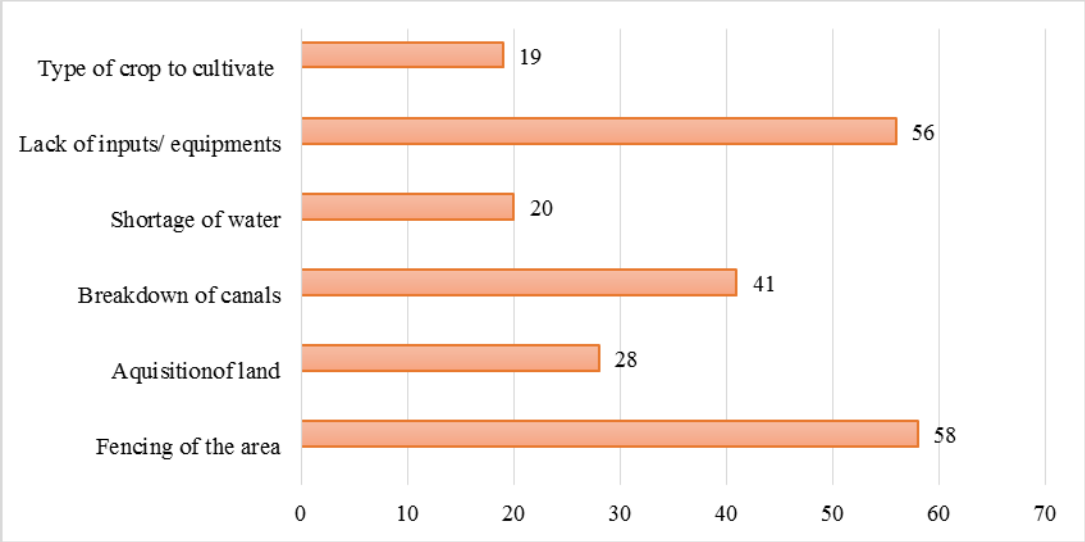


Figure 4.11: Challenges faced by Irrigation farmers

Source: Field survey, 2018

4.7.1 Local strategies adopted by respondents to mitigate challenges

Majority of the respondents representing 40 out of 72 indicated fencing with sticks and stock was a major local strategy adopted. About 37 of them also revealed dredging of canals while 29, 17 and 13 respondents indicated diging of wells, patching of canals and used of other strategies respectively. With reference to the above results, it can be concluded that fencing with sticks was the most local strategy used by irrigation farmers. This therefore means, that the government and other benevolent organisations need to

step up to support farmers with modern strategies to improve production in the community.

The figure 4.12 below gave a clearer picture with regards to the local strategies adopted by the irrigation farmers. The highest bar is fencing which represented 40. While the least bar represented other strategies used by the farmers which is the least representing 13 on the chart. This implies that fencing was the main local strategy by farmers as far as dry season irrigation farming was concerned.

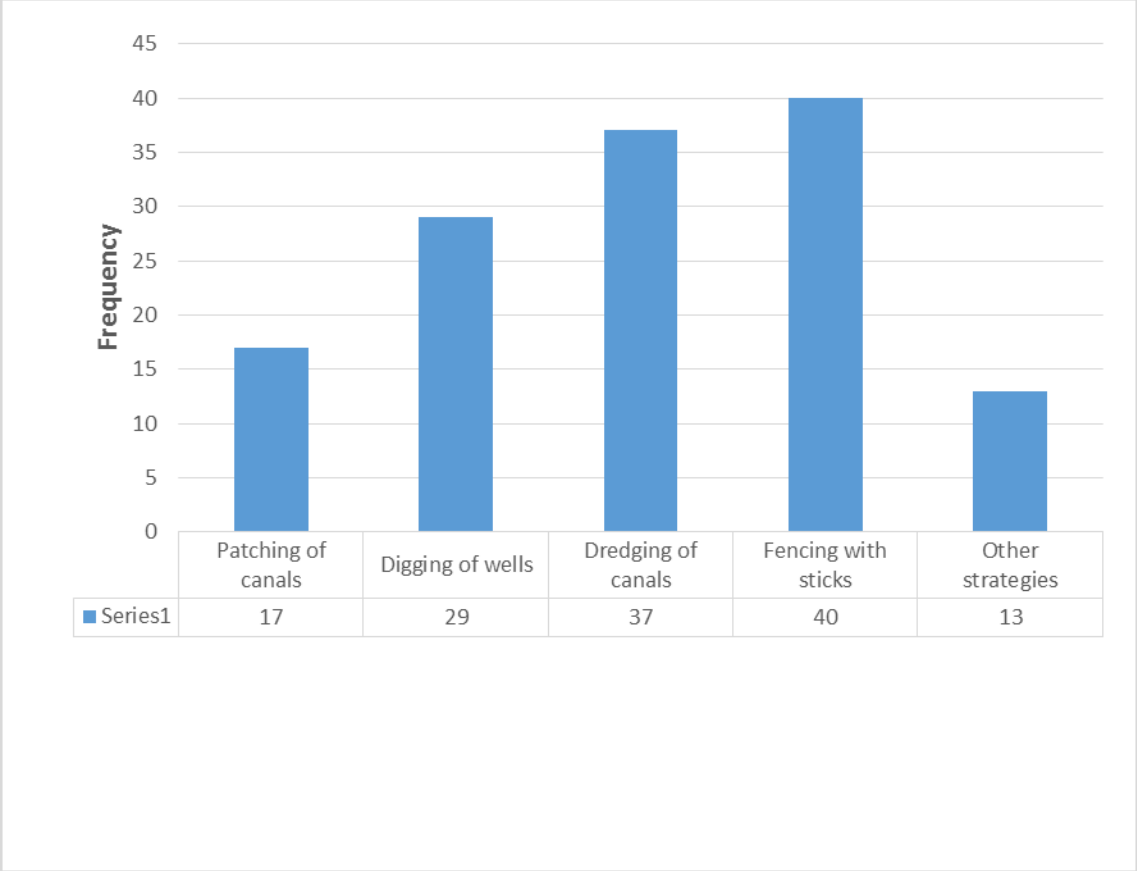


Figure 4.12: Local strategies use by irrigation farmers to mitigate challenges

Source: Field survey, 2018

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summaries key findings of the study in relation to irrigation farming, kinds of crops grown during the dry season, household income earned from crops, contribution to household food security, local management strategies, and challenges faced by irrigation farmers on selected communities in the Wa West District. On the basis of this, conclusion is drawn on Irrigation Farming as a Local Economic Development Strategy in the study area. The chapter ends with recommendations on the key findings of the study.

5.2 Summary of findings

Through the analysis, the following key findings of the study were espoused. These include: It was found that irrigation farming in the district is a male dominated activity and practice basically by traditionalist. The study established that 51% of the respondents engaged in dry season irrigational activities were men and 47.2% traditionalist. The active population between the ages of 31 - 40 constituting 35% and 69% of respondents who never attended school were engaged in irrigation farming more than literates.

Also, the kind of crops grown by farmers basically include vegetables crops particularly leafy and fruit vegetables. The researcher found out that about 42% of the respondents engaged in leafy vegetable production. This was followed by tomatoes constituting 35%.

Additionally, the motive of most irrigation farmers was to earn income to support households' incomes. The study revealed 72% of the respondents engaged in season irrigation purposely for income. Farmers earned varying levels of income subject to their yield. Farmers (39%) revealed they earned less that GH¢100 and 33% also earned between GH¢100 - 200.

However, there were challenges peculiar to each community's irrigation sight. Unfence site were challenged with lack of fencing to protect against animal destruction of crops. An established 81% of respondents reported this issue. Lack of access to inputs and equipment to facilitated production was revealed across communities. The study found 78% affirmed this challenge.

A quantum of crops produced were consumed by respondents' households. The study had 100% affirmation of consuming produce from irrigation farming. The irrigation activities contributed generally to improve household food security. The study revealed reports of varied levels of improvements; 51% reported of slight improvement; 18% moderate and 13% highly improved. Also, the produce from the irrigation sustain the households up to different period contributing food access and availability in such households within a period.

5.3 Conclusion

From the study, it can be concluded that most common contribution of irrigation farming was the income generation for households. However, very few of the farmers were found to earn significant level of income. It can also be concluded that irrigation farming

supplement household's food nutrients during the dry season and contributed to food access and availability.

The main crop grown was basically leafy vegetables with tomatoes. Irrigation in the district is basically an activity for the traditionalist, men, and this dominated by the illiterate population. Access to irrigation inputs and equipment was the main challenge faced by farmers in the various communities. The management of the facilities solely rest on the communities' chiefs and elders.

Overall, irrigation activities in the District create avenue for employment opportunities for people, hence contributes to the local economic development of Wa West.

5.4 Recommendations

Based on the findings of the study, the following recommendations are suggested for the improvement of irrigation activities in the Wa West District:

Irrigation creates employment opportunities, therefore, there is the need for government to construct dugouts and mechanized irrigation dams in the District to enable more people particularly the youth to engage in dry season farming.

Development partners particularly Non-Governmental Organizations and other abled organizations should help build communities' capacity and also help create awareness with the view of empowering the people to fully utilize the available water bodies to produce more during the dry season to support their families. Particularly, this call falls in line with the government one-district one-dam policy.

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APPENDIX

QUESTIONNAIRES

Topic: An Assessment of Irrigation Farming as a Local Economic Development Strategy in the Wa West District, Upper West, Region.

Introduction: This questionnaire is part of a study for an Assessment of Irrigation Farming as a Local Economic Development Strategy in the Wa West District, Upper West, Region. This research is conducted for purely academic purposes and your responses are strictly confidential. Please kindly specify your preference among the options provided for **each question/statement by ticking the appropriate box**. Please fill in the spaces provided when options are not provided. I urge you to feel free to express your views. Thank you for your assistance**.**

Background Characteristics of Respondents

1. Sex: (a) Male [ ] (b) Female [ ]
2. Age of Respondents:
   (a) 20 and below [ ] (b) 21-30 [ ] (c) 31-40 [ ]
   (d) 41-50 [ ] (e) 51+ [ ] (f) Others Specify:……..

3. Educational attainment:
   (a) None [ ] (b) Primary [ ] (c) JHS [ ]
   (d) SHS [ ] (e) Tertiary [ ] (f) Others Specify…….

4. Religious background of the respondent:
   (a) Traditional [ ] (b) Islamic [ ]
   (c) Christianity [ ] (d) others specify……..

Irrigation and Crops Grown

5. What is the major vegetable crop you cultivate or grow?

   (a) Tomatoes [ ] (b) Okro [ ] (c) Pepper [ ]

   (d) Leafy vegetables [ ] (e) Others Specify:……..

6. Why do you grow these crop?

   (a) For income [ ] (b) Household consumption [ ]

   (c) Good production [ ] (d) Can easily access the seeds [ ]

   (e) Easier to cultivate [ ]

7. What other crops do you cultivate or grow a part from the major crops you grow?

   …….

8. How would you describe the yield of the crops (a) Very good [ ] (b) Good [ ]

   (c) Average [ ] (d) Bad [ ] (e) Others specify:……..

Irrigation and Income

9. What quantity of crops (major) did you harvest during the last farming season?

   (a) Tomatoes (basin) i. less 1, ii. 1-2 ii. 2-3 iv. 3 and above

   (b) Pepper (bags/basin) i. less 1, ii. 1– 2, iii. 2–3 iv. 3 and above

   (c) Okro (basin) i. less 1 ii. 1-2 iii. 2-3 iv. 3 and above

   (d) Others (Specify):……

10. What quantity did you sell after harvest?.....

    …….

11. How much income did you earn from the sale of the crops?

    (a) Less than GHS100 [ ] (b) GHS200 – 301 [ ]

    (c) GHS301 – 400 [ ] (d) Above GHS401 [ ]

12. What did you use the income for?

    (a) Buy Agric inputs [ ] (b) Buy food stuff [ ]

    (c) Pay children's school fees [ ] (d) Pay Health bills [ ]

    (d) Improve life of household [ ]

13. Where do you sell your produce? (a) Nearby local market [ ] (b) Farm gate [ ] (c) In Community [ ] (d) To Institution [ ] (e) Others (Specify):…….
14. Rate the income you get during the normal farming season against what you get from the irrigation activities?
    (a) Very High [ ] (b) High [ ] (c) Low [ ] (d) Very Low [ ]
15. How do you finance your production?
    (a) Self-finance [ ] (b) Loans [ ] (c) NGOs [ ]
    (d) Farmer support groups [ ] (e) Others (Specify)…….

Irrigation and Food Security

16. Do you consume some of the crops after harvest? (a) Yes [ ] (b) No [ ]
17. If Yes to question (16) explain why don't you consume after harvesting your produce?.....……..……
    ……
18. If No to question (16) explain why don't you consume your produce?..... .....……...
    ……
19. To what extend does the irrigation farming contribute to improve food security in your household? (a) High improved [ ] (b) Moderately improved [ ]
    (c) Slightly improved [ ] (d) Not improved [ ]
20. How long does your farm produce sustain the household?
    (a) 1-3months [ ] (b) 4-6months [ ] (c) 7-9months [ ]
    (d) 10–12months [ ] (e) Others specify:…….……
21. Has there been a situation where you have to resort to other family members to sustain your household? (a) Yes [ ] (b) No [ ]
22. Which of the following local strategies have you employed in storing your produce?
    (a) Drying [ ] (b) Storage by smoke [ ] (c) Storage by Granary [ ]
    (d) Open air displace to avoid rottening [ ] (e) Other (Specify):……..

23. How would you rate these local storage strategies and methods?

Local strategies/method	Rating		
	Very effective	Effective	Not effective
Drying			
Storage by smoke			
Storage by granary			
Open air displace to avoid rottening			
Others			

Management of Irrigation Facility

24. Who is responsible for the management of the irrigation facility?

(a) Chief/community elders [ ] (b) District Assemble/MOFA [ ]

(c) NGOs [ ] (d) Assemble man [ ]

(e) Farmers [ ] (f) Individuals

(g) Others (Specify):……....

25. How do you contribute to the Management of the facility?

(a) Labour support [ ] (b) Financial contribution [ ]

(c) Attend meetings [ ] (d) Planting of trees [ ]

26. What do you think can be done to improve the management of the facility?

(a) Cooperation [ ] (b) Adopt best farming practice [ ]

(c) Maintenance culture [ ] (d) Others (Specify):……

27. Have you ever received any training from the Irrigation Authority?

(a) Yes [ ] (b) No [ ]

28. If Yes to question (27) what kind of training have you received?.....……

……

Irrigation and Challenges face by Irrigation Farmers

29. What major challenges you face as an irrigation farmer?

(a) Fencing of the area [ ] (b) Acquisition of land [ ]

(c) Breaking down canals [ ] (d) Shortage of water [ ]

(b) Lack of inputs/Equipment [ ] (f) Type of crop to farm [ ]

30. What local strategies do you apply to deal with this challenge?

(a) Patching of the broken canals [ ] (b) Digging of well for water [ ]

(c) Dredge of canals for inlet and outlet flow [ ] (d) Fencing with stock/sticks [ ]

(e) Others (Specify)……..…...

31. What do you think can be done to reduce this challenge?.....……

……

32. Comparing the produce for the last three seasons will you say you are doing well?

(a) Very well [ ] (b) Moderately well [ ] (c) Well [ ] (d) Not doing well [ ]

33. Please explain your answer in question (32) above?……

……..……..……

Thank You for your time and support