IMPACT OF JIBIA DAM IRRIGATION PROJECT ON WHEAT PRODUCTION AND LIVELIHOOD OF BENEFITING FARMERS IN KATSINA STATE, NIGERIA

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER IN SCIENCE DEGREE IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY

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DECLARATION

I hereby declare that this dissertation titled "**Impact of Jibia Dam Irrigation Project on Wheat Production and Livelihood of Benefiting farmers in Katsina State, Nigeria"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation titled '**Impact of Jibia Dam Irrigation Project on Wheat Production and Livelihood of Benefiting Farmers in Katsina State, Nigeria',** by Abubakar Bindawa **SULAIMAN** meets the regulations governing the award of the Degree of Master of Science in Agricultural Extension and Rural Sociology, Ahmadu Bello University, Zaria and is approved for its contribution to scientific knowledge and literary presentation.

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This dissertation is dedicated to Almighty Allah (SWT) who created the universe and the creator of all creatures.

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Abstract

The focus of this study is Impact of Jibia Dam Irrigation Project on Wheat Production and Livelihoods of Beneficiaries in Katsina State, Nigeria. The specific objectives were to: describe socio-economic characteristics of participants and non-participants, determine the factors influencing participation of respondents in Jibia dam irrigation project on wheat production, assess the impact of Jibia dam irrigation project on the output, yield, income and livelihood of participants and non-participants and describe constraints encountered by participants in the implementation of the project in Katsina State. Multi- stage sampling was used for this study. First stage, a list of six (6) project areas (villages) as at 2013 was obtained from the programme office, three (3) villages each for two categories of farmers; participants and non- participants. Second stage, 12% of the population for the two categories of farmers; participants and non-participants were randomly selected to give a total sample size of 166. Primary data were collected from two categories of farmers; participants and non- participants of Jibia dam irrigation project through the use of structured questionnaire. Tools for analyses were descriptive statistics such as means, frequencies, percentages, multiple regression, logit regression and chow test. Results of data analysis revealed that the mean ages of participants and non- participants were 49 and 44 years respectively. The results from logit regression analysis revealed that farming experience, farm size, labour, extension contact, cooperative association were the factors that collectively influence 75% of the participation of the respondents in Jibia dam irrigation project. The results from chow test revealed that Jibia dam irrigation project had significant impact on participants output, yield, income and living standard at 1% levels of probability. Majority (25%) of the respondents ranked insufficient farm inputs such as fertilizer and agrochemical as the foremost constraints. From the result of chow test it can be concluded that the participation in Jibia irrigation project has contributed positively and significantly on the output, income, yield and standard of living of participating in wheat farming households in the study area. It was therefore recommended that the farmers could be linked –up with sources of input production through enlightenment by the Ministry of Agriculture and Rural Development so as to ensure that more farmers have access to inputs (seeds and fertilizer) through the E-wallet scheme through their cooperative societies.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The African continent in particular has very high spatial and temporal variability in rainfall compared to other continents (FAO, 2003). Across sub-Saharan Africa, water scarcity is a major factor limiting agricultural production for millions of poor dry land farmers. It has also been observed that in the semi-arid areas of the world, including Africa ,rainfall is often inadequate, thus, necessitating the need for irrigation in order to satisfy the moisture requirement of crops (Ibrahim *et al*., 2000). The impact of the inadequate rainfall has been characterized with low productivity that has persisted since the early sixties. World Bank reports put the growth rate in total food production at less than 1.5% compared to average annual population growth rate of 3% (World Bank, 2000). This has placed tremendous pressure on the farm sector and the economy at large, as limited foreign reserves have to be allocated to food importation in order to meet consumption requirements.

Agricultural is an important sector of the Nigerian economy with high potentials for employment generation, food security and poverty reduction. Agricultural sector in the 1960s provided the main source of employment, income and foreign exchange earnings for Nigeria. This was due to focused regional policies based on commodity comparative advantage (Azih, 2011). As at 1961, Nigeria was the leading exporter of groundnut with a world's share of 42%. The country also had 27% of the world's palm oil export, 18% of cocoa and 1.4% of cotton as the major West African cotton exporter (Oluigbo, 2012).

Up to the early 1970s, agriculture accounted for well over 80% of Nigeria's Gross Domestic Product (GDP) and the major value of the country's exports (Oluigbo, 2012).

Nigeria has substantial economic potential in its agricultural sector. However, despite the importance of agriculture in terms of employment creation, its potential for contributing to economic growth is far from being fully exploited (World Bank, 2000).

Wheat has, arguably become one of the most important agricultural commodities in Nigeria. This is evident in phenomenal increase in annual consumption rate in the country, which jumped from 1.0 million metric tonnes (MT) in the 1980's to 3.7 million MT. per year. This huge consumption demand for the commodity has, however, not translated into output from farms in the country (FAO, 2004). In Nigeria wheat in the past few decades has become a minor crop with an annual production of about 50,000 MT, contrasting with soaring imports that cost about N635 billion annually. Average grain yield for wheat in the country is about 2.0 tonnes per hectare, although research as shown as that this can easily tripled if proper varieties and crop management is adopted. The Lake Chad Research Institute (LCRI), in collaboration with partners has developed improved wheat varieties, among which are Rayna-28 and Borlaug with potential yields of 5 – 6 tonnes per hectare. These varieties have high yielding advantage and their adoption has remarkably improved the productivity and livelihood of wheat farmers across Nigeria and neighbouring countries and this could reduce import by half in 2015 (NAERLS ,2004). NAERLS (2004) revealed that Nigeria was able to revive the wheat sub sector in the 1980's and capable of repeating the same now. In 1987, the government of Nigeria banned the importation of wheat and implemented an Accelerated Wheat Production Program aimed at stimulating local production of wheat in Nigeria. Farmers were mobilized to produce wheat and were provided necessary inputs at subsidized rates, and equipment to boost its production. The production of wheat expanded from 50,000 MT in 1987 to 600,000 MT by 1990. Nigeria's wheat import is about 4million MT per annum and estimated to grow at an alarming rate of

five percent (5%) per annum. At this rate, the country would be importing 10million MT of wheat per annum by 2030, spending 15billion dollars annually on wheat imports alone.

1.2 Problem Statement

Nigeria is commonly viewed as an economy driven by its oil wealth, which accounts for 40 percent of its Gross Domestic Product (GDP). However, the country is broadening its agenda to boost the agricultural sector. Available statistics have shown that high population growth rate has led to increase in the demand for agricultural products in the country (Abdullahi, 1986). This problem therefore made government to import some food and raw materials in order to augment this shortage in supply. This has tremendously worsened the condition of small holder farmers in the country as well as affected food and cash crop production in the country. With about 70 percent of the country's food produced by smallholder farmers cultivating plots of land of less than 1.5 hectares, the agricultural sector accounts for 33 percent of the country's GDP (IFAD, 2011). Despite this, poverty is still a major problem in the country particularly in the rural areas where social services and infrastructure are limited. Farmers are highly dependent on rain-fed farming, with only 7% of land under irrigation (IFAD, 2011)

Ugwu and Kanu, 2012 revealed that some of the government agricultural programmes and policies aimed at increasing agricultural production especially crop production have failed to meet the objective of self-sufficiency in food production due to one reason or the other. According to Delta State Ministry of Agriculture (2004), research findings show that the reason for failure of past government sponsored agricultural development programmes were due to poor data base for policy formulation, lack of monitoring and

impact assessment. They further stated that without adequate evaluation, one cannot be sure that the objectives of a programme were achieved.

However, scholars, development practitioners and policy makers consistently overlook the differential impacts of irrigation projects between beneficiaries and non-beneficiaries inhabiting the rural communities (Omilola, 2009). Consequently, without comparing beneficiaries to non-beneficiaries the postulation that irrigation projects have direct effects where they operate does not spell out adequate counterfactual situation (the 'counterfactual' measures are what would have happened to beneficiaries in the absence of the intervention). Further, African Development Bank (1999) observed that many development projects do not achieve the full range of the expected goals, and when they do, the results are often out of time frames, as such the impact can be seen only after a lag of time following the provision of irrigation schemes. More so, the foundation of the Jibia Dam Irrigation Project (JIP) by the Sokoto Rima River Basin Development Authority (SRRBDA) was a belief by the development specialists that the problem of agriculture in the area was low technical capacity or poor technical efficiency.

Research has been earlier conducted on the effect of irrigation development project on income an income distribution (Nagogo, 2011). Its impact on the wheat production and the livelihood of the participants has not been addressed. Therefore, this study is set out to fill the research gap of examining the contribution of the JIP on wheat production and livelihoods by analyzing its different impacts between beneficiaries and non-beneficiaries in the study area. The study seeks to generate research information to address the following research questions.

i. What are the socio – economic characteristics of the wheat farmers' participants and non-participants in Jibia Dam Irrigation Project?

ii. What are the factors influencing participation of respondents in Jibia Irrigation project on wheat production?

iii. What is the impact of Jibia Irrigation project on the output and yield of participants and non- participants?

iv. What is the impact of Jibia irrigation project on the income and livelihood of participants and non- participants?

v. What are the constraints encountered by participant in the implementation of the project?

1.3 Objectives of the Study

The broad objective of the study was to examine the impact of Jibia Dam Irrigation Project on wheat production and livelihoods of participations in Jibia Local Government Area of Katsina State. The specific objectives were to:

i. describe the socio – economic characteristics of wheat farmers participating in Jibia irrigation project;

ii. determine the factors influencing participation in wheat production in Jibia Irrigation Project;

iii. determine the impact of Jibia irrigation project on output and yield of participants and non- participants ;

iv. determine the impact of Jibia Irrigation project on income and livelihood of participants and non- participants; and

v. describe the constraints encountered by participants in the implementation of the project.

1.4 Justification of the Study

Irrigation is generally considered as an effective method of increasing agricultural production. It can supply the water needed for crop growth when rain fall is limited or in more humid climates, it can bridge dry spells and reduce agricultural risks (Oosterbaan, 1985). This research could serve as a basis for the government in designing similar project such as this for other states.

Several programmes such as the River Basin Development Authority (RBDA) are established to address the low income status of farmers as well as the food need of Nigerians through enhanced production. Impact evaluation is a key component of management for results. Irrigation enhanced poor and small holders to achieve higher yields. The productivity of crop grown under irrigated conditions is usually substantially higher than that of the same crops under non- irrigated / rain –fed conditions. Higher productivity helps to increase returns of farmer's endowments of land and labour resources. Apart from yield improvement, higher productivity partly stems from positively higher land use intensity through irrigation (FAO, 2004). The findings of this research would provide useful information for the policy makers and assist them in formulating appropriate policies that would increase farmer's accessibility to irrigation projects.

This research would also provide information relating to weakness and strength of this project which in turn would prevent repeated failures in the design and implementation of similar projects. Furthermore, the findings of this research would contribute to the

empirical literatures especially on agriculture based projects which would serve as a planning tool both for government and non- governmental agencies.

Finally, this research work would provide information to the donor/prospective stakeholders, the government, the project managers and the farmers. The indicators would inform each of the stakeholders the trends of performance and provide an indication of the correct course of action to improve the services. The study also stands to benefit the state in her drive to ensuring self- sufficiency in food production, as it would identify those variables that require urgent attention.

1.5 Hypotheses

i. Socio–economic factors has no significant influence on respondents level of participation in Jibia dam irrigation project in the study area.

ii. Jibia dam irrigation project has no significant impact on output and yield of participants and non- participants.

iii. Jibia dam irrigation project has no significant impact on the income and livelihood of participants and non- participants.

CHAPTER TWO

LITERATURE REVIEW

2.1 An Overview of Irrigated Agriculture in Nigeria

Nigeria is located in the tropical zone of West Africa between latitude 4^{o} N and 14^{o} N and longitudes 2^{o} 2'E and 14^{o} 30'E and has a total area of 923770 Km2. The climate is semi-arid in the north and humid in the south. Except for an ultra humid strip along the coast with rainfall averages of over 2000mm/year, were it rains almost all year round, rainfall patterns are marked by distinct wet and dry seasons. Rainfall is concentrated in the period June-September. Problems associated with total annual precipitation range from deficiency in the north to distribution in time and space and the low dependability of rainfall in most other areas (AQUASTAT, 2005). Hence, the need to supplement rainfall with artificial application of water in agricultural production practices. Furthermore, Nigeria is listed by FAO among those nations that are at the moment technically unable to meet their food needs from rain fed production at a low level of inputs and appear likely to remain so even at intermediate levels of inputs at some points between 2000 and 2025 (FAO, 2000).

Irrigation farming activities in Nigeria has been effectively practiced on small-scale irrigation schemes. This is because various governments' efforts to exploit the country's large irrigation potentials through investment in the large public irrigation schemes have not been successful (FGN, 2006). The failure arise partly from the high cost of projects; that made them drag for a long time before completion while in some cases some become moribund and get abandoned and partly because most of them were conceived, designed, constructed without the input or knowledge of the intending users (farmers inclusive). Very often schemes do not meet the desire or need of the people or users.

One of the goals of irrigation farming is the provision of right amount of water at the right time for plant growth and development. Consequently, it ensures sustainable agriculture with its economic benefits. Globally, massive investments have been made in the development of irrigation scheme. In Nigeria, according to NINCID (2009), recent survey suggest that 39% of the land mass is potentially suitable for agriculture and out of this between 4.0 and 4.5 million ha (approximately 4.5 to 5.0% of the land) are judge suitable for irrigated agriculture but only 1.1 million ha can be supported fully by the water available, the remaining 3.4 million ha being Fadama. Bhattarai (2002) opined that irrigation development is like a normal good at the initial stage of development, where agrarian sector dominates over, and irrigation largely contributes to expansion of crop production and development of the nation. Like normal good, the demand for irrigation in any agrarian society increases steadily at the initial stages of development.

Bai and Molnar (2008) observed that improved availability of irrigation water in agriculture will increase crop yield thereby increasing income growth and alleviating poverty among the adopting producers. It is perhaps the recognition of the above state roles of irrigation that the Nigerian government embarked on irrigation development through River Basin authorities. For example the Jibia Dam Irrigation Project which is one of the multipurpose projects embarked upon by the Sokoto Rima River Basin Development Authority with the aim of providing farm efficiency and income through optimum water conservation and utilization practices, this include irrigation of 3500ha of land under irrigated agriculture for food security and job opportunities (SRRBDA, undated).

More so, the foundation of the Jibia Dam Irrigation Project (JIP) by the Sokoto Rima River Basin Development Authority (SRRBDA) was a belief by the development specialists that the problem of agriculture in the area was low technical capacity or poor technical efficiency.

Also, in spite of the huge investments, the results of irrigation schemes are generally far below expectations. Hence, national objectives of irrigation development (e.g. self-sufficiency in food, earnings from experts or savings from imports, higher rural incomes) are seldom realized. Although literature on the disappointing results has been multiplying since 1970, it appears that lesson learnt is not put into practice (Oosterbaan, 1985). Further, Food and Agriculture Organization (FAO) (2004) observed that many development projects do not achieve the full range of the expected goals and when they do, the results are often out of the times frames. As such, the impact can be seen only after a lag of time following the provision irrigation infrastructure. Literature has also shown that the federal government of Nigeria (FGN) and various other international donors and bilateral organizations have invested extensively in the public irrigation sector in Nigeria. However, the sector performance has not had the anticipated impact on national food security, employment opportunities and economic growth (FAO, 2004). The Jibia Irrigation Project (JIP) was commissioned in 1992. Thus it is pertinent to examine the impact of the project by comparison between the beneficiaries and non- beneficiaries especially when looking at the issue of the impact in a particular setting further than the usual project- beneficiaries paradigm.

2.2 Wheat Production in Nigeria

Wheat is an important industrial and food crop. The crop is the main raw material in the flour mills. About 85-99% of wheat flour is used in Nigeria for bread and cake.

Semovita (10%), biscuit (about 4%), pasta (below (1%), macaroni and spaghetti (below 1%). Wheat is commonly milled at 75-76% extraction rate. The offals (residues) are used in the feed- mills in compounding livestock feeds. The crop can also be processed for its starch content. Wheat contributes more calories and more protein to the world's diet than any other crop. World trade in wheat also exceeds trade in all other grains put together. The raised loaf (bread) is possible because the wheat kernel contain gluten, an elastic form protein. When leavened dough ferments, the gluten traps minute bubbles of carbon dioxide, which make the dough rise (NAERLS, 2004).

Historical reports confirmed the introduction of wheat to West Africa through Arabs. The crop gradually got into Nigeria through Sudan Lake Chad. Its production in Nigeria, was initially confined to the Chad basin, and was on a very small scale with no improved technology used and mainly made into dishes by the farmers. Since temperate varieties were mainly used, its production was confined to the cool dry season of November to March, necessitating the use of irrigation. Presently, two foremost research Institutes; the Institute for Agricultural Research, Samaru and Lake Chad Research Institute, Maiduguri are involved in wheat research. Research by these institutes concerned with economic improvement of crop yields and the maintenance of soil fertility has underlined the nutritional requirements of wheat alongside with good husbandry practices for optimum yield (NAERLS, 2004).

According to Anonymous (2006) the increasing consumption and demand for wheat in Nigeria was largely due to increase and expansion in bread and pasta industries, and for the manufacture of crackers, noodles etc. Presently, domestic wheat demand in the country is far more than local production; consequently 90-95% of wheat consumed is

imported from the United States of America. For example, the country imported 4.3 million tons of wheat in 2007 as against 3.8 million tons in 2006.

Increasing wheat production in Nigeria requires prior investigation of the crop's requirements. In places with relatively low technology as obtainable in developing countries like Nigeria, a naturally favourable environment is paramount for optimum production. Even where all production inputs could be met, the choice of appropriate genotypes is imperative. Peterson (1965) had indicated that wheat varieties with broad adaptation to climatic and soil conditions should be adopted for high productivity. Early wheat variety screening trials at Kadawa, northern Nigeria by Orakwue *et al.,* (1991) indicated that varieties with superior drought tolerance gave higher yields more especially under sub-optimal growing conditions. A more recent study by Miko *et al.,* (2006) at same location also, found differential response of two Mexican wheat varieties to the growing conditions, which was attributed to their varied reactions to applied fertilizers and adaptability to environment.

2.3 Irrigation Projects in Nigeria

2.3.1 Jibia Dam Irrigation Project

The Jibia Dam is in Jibia Local Government Area of Katsina State in the north of Nigeria. It is an earth fill structure with a geomembrane liner, with a height of 23.5m and a total length of 3660m, and has a capacity of 142million m3. The dam was designed in 1987, completed in 1991, commissioned in 1992 by General Ibrahim Badamasi Babangida and was built to support irrigation and water supply. The landscape at the dam site is sub-desertic except in the rainy season. The Gada River flows for only about four month each year with a catchment area at Jibiya of over 400km^2. Due to the loose sandy nature of the surface soil, a flexible impervious liner

was used that could adapt to settling or deformation of the embankment (FAO, 2004). Dry season farming is one of the activities carried out by the Jibia dam irrigation project, with the available land, water and irrigation structure and all facilities, the project is able to cultivate an average of 1500ha to 2000ha out of the 3500ha cultivation area yearly. This is usually achieved by the Federal Government through the authorities of Sokoto Rima River Basin Development Authority (SRRBDA) and the Katsina State Government. Various crops such as wheat, cowpea, maize, groundnut, cassava and assorted vegetables are grown yearly (SRRBDA, undated).

The SRRBDA covers Sokoto, Katsina, Kebbi and Zamfara States of Nigeria. Many large-scale Irrigation projects were created under the SRRBDA, including the Jibia, Bakalori, Zauro Polder and Goronyo Irrigation Projects. It is basically assigned with the development of both the surface and underground water resources for multipurpose uses and also the control of floods and soil erosion in its area of jurisdiction (SRRBDA, 2013).

Jibia Irrigation Project (JIP), like others in Nigeria, is aimed at boosting agricultural productivity of the country. The objective is to improve the standard of living of the people, through the creation of job opportunities, food production and increased income (SRRBDA, 1992). Before the establishment of the project, crop production in the area was mostly limited to the rainy season relying on rainfall for moisture supply. A lot of damage to crop production had been caused by recurring droughts. This became a serious threat, sometimes significantly reducing the farm production. Although small-scale irrigation practices had been undertaken during the period, mostly along streams and river-banks as well as other fadama areas, the output obtained from these practices

relatively small. This implies that, before the establishment of JIP, agricultural resources in the area were not efficiently utilized.

2.3.2 Bakalori Irrigation Dam

Bakalori is the name of rural community in Sokoto State in North Western Nigeria. Sokoto State was one of the largest states in Nigeria until Kebbi and Zamfara States were carved out in 1991 and 1997 respectively (Mohammed, 2002). Given the abundant water resources in the country and its potential for increasing agricultural production in Nigeria, Federal Government of Nigeria established Sokoto Rima River Basin Development Authority (SRRBDA) to mitigate effects of persistent dry spells in the area, that results from too short rainy season that occur in the area. It was against this background that the Bakalori Irrigation Project was commissioned in 1983. The original goal of the Bakalori Irrigation Project was to supply irrigation water to the estimated population of about forty to fifty thousand farm families in the project area. Construction work for Bakalori Irrigation Dam started on 5th June, 1975 and was substantially completed and commissioned on 9th April, 1983 (Mohammed, 2002).

Bakalori reservoir is being fed by Rivers N'kaba and Tarka within Niger and join River Rima after entering Nigeria. The reservoir has a capacity of 450 million M^3 lake area and length of 8000 Ha and 19 Km and a spillway discharge of 1650 M^3 /S at the time of construction in 1979. The dam had 450 million cubic meters water storage capacity, was substantially completed by 1983 but its current capacity is estimated at 351,010,027 m^3 in 2013 (SRRBDA, 1992; Enplan Group, Nigeria, 2013; USAID, 2010; FAO, 2004). The Bakalori Irrigation Project covers three local government areas: Talata Mafara, Bakura, and Maradun, commanding 23000 hectares; 65% irrigated by sprinkler system (15000 ha.) while the gravity fed surface irrigation is used in the remaining 8000 ha

hosting more than 22000 farmers located 110 Km south east from Sokoto city. Presently the irrigation area under gravity is 7039 ha for surface and converted sprinkler areas, while the non-irrigable area is 15961 ha which mainly sprinkler is and some surface area (Enplan Group, Nigeria, 2013; USAID, 2010; Kebbeh *et al*., 2003). There are 3 piezometric towers and 24 pumping stations which has depreciated to a state of disrepair over the last 20 years; about 3000 ha of the sprinkler irrigation scheme have been converted to surface irrigation through the provision of tube wells and intentional opening of line canals. Therefore, a large section of the secondary canals needs rehabilitation (USAID, 2010; Kebbeh *et al*., 2003).

Several setbacks within the system were observed, among which are: complete non-functioning of the hydroelectric power station at the dam, failed sprinkler system originally covering 15000 hectares of which 3000 ha is now converted to surface irrigation through the use of tube wells. The failed dyke close to the rice area needs urgent intervention, de-silting of the drainage ditches across gravity fed areas needs to be done, because it has made the drainage ditches indistinguishable from adjacent farm lands; hence farmers now use drainage section for farming operations which was not the primary purpose which was rather to remove excess water from the system. Over-land flow is now a common site which is detrimental crop yield, keeping root zone too-moist for optimum performance (USAID, 2010).

Irrigation projects can fail if sediment load of water supply is higher than the capacity of irrigation canals to transport sediment; also siltation in canals shortens the active life mostly in tertiary canals as observed in the project. The gates of Bakalori Irrigation Project and some sections of the secondary canals need to be rehabilitated. The drainage ditches are filled with sediments in specific areas around the system, hence increasing

the salinity level of surrounding farmlands was the cry of farmers during consultation with them. The dam reservoir and irrigation works have suffered from lack of maintenance and currently there may be some degree of siltation of the reservoir, poor drained areas within the command area; because of this development, the World Bank proposes to fund the rehabilitation of Bakalori Irrigation Project (BIP), which has to be subjected to established environmental procedures (USAID, 2010).

2.3.3 Kano River Irrigation Project (KRIP).

The Kano River Irrigation Project (KRIP) is, based on scaling land project in Nigeria, a large scale Agricultural (Irrigation) Project. The Kano River Irrigation Project (KRIP) began as far back as 1969 with the construction of Bagauda Dam by former governor of Kano State, Late Alhaji Audu Bako. This Started at Kadawa Irrigation Project Scheme, the precursor of the KRIP. The Government quickly followed the Bagauda Dam with a much bigger dam, the Tiga Dam between 1970 and 1973 with the primary purpose of boosting agricultural production through irrigation to enhance self–reliance in food production. (Shariff, 2009).

According to the people's Daily (2011), the first phase of the project (which was designed in Phases), is the oldest large and functioning irrigation scheme in Nigeria, with a capacity of 22 hectares and capable of producing 82,000 tons of associated farm produce; if utilized optimally. So far, there is about 16 hectares land in use. The control of the project was now shifted from the Kano State Government to the Federal Government of Nigeria as a project under Hadejia – Jama'are River Basin Development Authority (HJRBDA).The main goals of KRIP are improvement of food security and effective management of water resources for the development of socio-economic

activities of the people within the basin other objectives that are either independent aim to achieve the goal (s) above are:-

i. Provision of water resources for domestic, industrial and recreational uses.

ii. Provision of employment in both agriculture and agro- industries.

iii. Facilitation of fisheries and hydro-electric power generation.

iv. Improvement of the standard of living of the basin's inhabitants.

v. Source of income to the government.

vi. Flood control in the Hadejia valley.

vii. To support large scale crop production to meet the steadily increasing population.

KRP is meant to be a large scale agricultural project with focus on irrigation. This major irrigation scheme is planned to cover 66,000 ha. KRP is sub divided into categories, for now only 22,000 ha or KRP 1 is being developed. The project is dependent on Tiga Dam, Bagauda Dam, and Challawa Dam and the floodplains around them. The development of KRP has changed the economic conditions of many local people who are actively engaged in irrigation activities. Various cash crops are produced under the KRP irrigation projects. These include tomato, pepper, rice, wheat, corn, okra and many others grown for local consumption. The produce are mainly sent to local markets in Kano and too many places in southern Nigeria (UNEP, 2012).

KRP is challenged for causing landscape desiccation in the Lake Chad basin through impounding of water in dams. Release of water from dams also causes flooding downstream. KRP cannot be a success considering the fact that since its commencement in 1960s/1970s even the KRP 1 is yet to be fully developed. Another challenge is land tenure, the way and manner land is managed is not transparent. Management of water is also one of the challenges plaguing efficiency and sustainability of the KRP. Pollution

is also a critical ecological challenge. The major source of pollution are agrochemical overdose and industrial effluents (Dan'azumi and Bichi, 2010).

2.4 Socio Economic Characteristics of Farmers Participating in Agricultural Projects

Bamidele *et al.,* (2010) reported that education is known to facilitate farmer's understanding and the use of improved crop production practices. About three-quarters of the respondents had not had any form of formal education. However, the remaining respondents have had one form of formal education or the other, at least primary school education. Also about half of the respondents have households that comprised of between 1-5 members, while the other half of the respondents have households that consist of over 5 members. The average household sizes are made up of 8 members with a coefficient of variation of 0.51.

The income receipt of farm household to a large extent affects the farmers' ability to pay for irrigation facilities. As household income increases the household becomes more capacitated to pay for irrigation facilities. Bamidele *et al*., (2010) further reported that more than half of the respondents earned about N20, 000.00 monthly from their crop harvest sales during the 2007 cropping season.

The rest of the respondent earned about N40, 000 as monthly income during the cropping season. His result implies that farmers' receipts from their farming activities are reasonably fair. A study in Ghana (Ahmadu *et al*., 2012), indicates that farmer participating in irrigation project had same type of formal education and not all of them were illiterate. Most of the farmers fall between the ages of 35 to 45 years. Adekunle *et al.,* (2005), in Katsina project reported that most farmers were male and involved in mixed farming. They indicated that, farmers belong to some category of organizations

and more participant get hygienic source of water than non-participants. Literatures have shown that, these socio-economic characteristics of farmers influenced the adoption of innovations in project implementation. Evidence of this could be traced in Banjo *et al.,* (2003). Such characteristics according to Jibowo (1980) and Deji (2005), affect agricultural productivity. It is evident that the socio economic characteristics of farmers play important role in agricultural development.

2.5 Factors Influencing Farmer's Participation in Agricultural Projects

Participation means that people are closely involved in the economic; social, cultural, and political process that affects their lives (UNHDR, 2000). Several studies indicated that there is a long history of participation in agricultural development and a wide range of development agencies that have attempted to involve people in some aspect of planning and implementation. Participation is an active course of action by which a beneficiary or stakeholder influences the direction and implementation of a project with a vision to enhance pleasure (Paul, 1987). Cohen and Manion (1980), consider participation as the systematic involvement of a significant number of persons on situation of actions which indeed brings community development. Ahmadu *et al.,* (2012), strongly recommended the active participation of community members to achieve sustainable rural development.

Reforms in the water management sector by forming Water Users Association gradually replace traditional forms of collective management in China that leads to sufficient water saving during the unusual reduction in water (Wang *et al.,* 2005). In addition, rural communities can easily avoid the problems related to irrigation through cooperation and active participation and achieve self-reliance (Nitising, 2012). Enhanced community participation has the ability to improve overall water

management, including conflict resolutions (Jansky and Juha, 2006). The majority of farmers realized that their participation in a watershed group made them aware and understands the issues related to watershed and at the same time they rated their groups advantaged than government guided groups in tackling the issues of conflict (Dakins, *et al.*, 2005).

It was reviewed however that some of the socio-economic determinants have strong relationships with participation to place it dynamic. In a study, where the farmers were involved in cleaning of irrigation channels, concluded that the participation level was associated with plot size while the farmers of larger plots were particularly active in water management (Nakano and Keijiro, 2011). Participation positively communicates to intra-personal empowerment across earnings levels, but optimistically related to interactional empowerment only for the low-income individuals (Speer, *et al.,* 2013). In Nepal, the participation of farmers is influenced by the education level and amount of trainings, while farm size and gross farm income are dominant economic variables influencing participation (Ganesh and Surendra, 2005).

On the other hand, Saidu, *et al.,* (2014), conducted a study in Kano State of Nigeria and divulge that education add negatively to the participation in decision making process as majority of the educated people look for better job opportunities rather to involve in agricultural activities. However, Oladele, (2012), claimed that age and education level play a vital role in participation. Arun, *et al.,* (2012), reported that the participation increases as farm size increases. Shamiyulla and Ramu (2010) argued that farmers literacy level, living standard and economic factors also contribute to the success of Participatory Irrigation Management (PIM).

Aworti, (2012) conducted a study in Africa and Latin America and concluded that income levels and housing categories have positive relationships with factors influencing community participation and supervision. Levels of participation in social and civic community life are significantly influenced by individual socio-economic status and other demographic characteristics (Bauma, *et al.*, 2000).

2.6 Impact of Irrigation Projects on Output, Income and Livelihood of the People

Irrigation has been shown to improve crop productivity, enable households to grow higher valued crops, lead to higher income and wage rates for the family labor, benefit the poor a landless through increases food availability, and lower food prices (Hussain and Munir, 2003). An empirical study by Tesfaye *et al.*, (2008) on their study on Filtino and Godino irrigation schemes in Ethiopia found access to small scale irrigation leads to increased and stable production, income and consumption. The adoption of treadle pump irrigation improved the poverty status of households and prevented households from falling into poverty (Mangisoni, 2008). Drip irrigation has been proved to increased production of crops, reduced water consumption and environmental problems such as soil salinization and fertilizer run-off (Narayanamoorty, 2004).

Analysis of household data from 13 villages in Northern Mali shows increases in total household consumption, agricultural production, caloric and protein intakes, and savings, for households with access to irrigation (Dillon, 2008). In addition to increased production, irrigation reduces the variance of production levels from rainfall shock. The analysis by Dillon also showed evidence of secondary effects of access irrigation. Access to irrigation increased informal sharing of food between households within villages. These additional secondary effects may not be captured by project evaluations if only producer household consumption levels are evaluated.

2.7 Constraints Faced by Beneficiaries of Agricultural and Rural Development Projects

In Nigeria like other places, project implementation has been characterized by many impediments; the most important mentioned was the top down approach in which the rural farmers were not involved in the concept, planning and monitoring, which often lead to massive failures in the project implementation. Other factors that militate against project implementation (Wallace, 1979), include lack of understanding the socio-economic and socio-cultural and religious factors of the beneficiary' communities. In another study (Omokore.,2008) also reported policy inconsistency, lack of political support, shift in approaches by successive governments, lack of effective institutional arrangements for implementation and lack of qualified manpower to provide effective leadership were identified as the major impediments.

In the study of farmers, Edi *et al.*, (2007), have shown that labour intensive farming types and high dependency of household income on farming activity constrained farmers' participation, whereas previous experiences, easy access to implements, environmentally friendly farm practices and adequate compensation of extra cost encourage participation. Tarfa (1990), noted that fertilizer, water availability, capital, high cost of pond, labour, tractor, pest and diseases, marketing and prices were constraints to dry season irrigation farming.

Food and Agricultural Organization (1997), pointed out that many sub-saharan countries have realized the critical role of irrigation in food production, but a number of constraints have been responsible for a relatively slow rate of irrigation development in this region. The constraints include; relatively high cost of irrigation development, inadequate physical infrastructure and markets, poor investments in irrigation, lack of

access to improved irrigation technologies, lack of cheap and readily available water supplies.

2.8 Theoretical Framework

This study was guided by the theory of social change, concept of participation and the impact assessment perspectives.

2.8.1 The social change theory

Ekong (2003), defined social change as the modifications in human attitudes and behaviour pattern as a result of education (such as extension activities). Changes do occur daily in the social system which affect the behaviour of people, and social change theorists believe that for change to take place, societies have to move from traditional ways of doing things to modern ways. Social change may be planned or unplanned (i.e. accident). Planned change entails the direct human intervention in the shaping and direction of change towards some predefined goals. Change may also be total or segmental in its coverage. Total change is that which covers a wide range of activities and may lead to a complete transformation of a people's way of life or their social institutions. Segmented change as the name implies covers only a particular portion and may not call for a total transformation of the system.

Theories of social change have, in general, been concerned with the explanation of (a) the source of social change (b) the time span of change and (c) the effect of change on the changing unit. Social changes impinge on the society as well as on the individual. At the individual level the academics emphasis or concern has been on (a) how the individual learns of innovations; (b) his motivation to change; (c) how he adjust the change and (d) the societal and personal factors impeding social changes. Social change is an ever present phenomenon in any society it is the essence of human existence,

development and growth (Robinson, 1982), Moore (1989) sees social changes as the significant alteration of social structure in the society. In the same light Rogers (1982), posits that social change as the process through which significant alteration occurs in structure and function of the society.

The theory would help to provide the frame work for the understanding of the social changes such as (increase in income, output, yield and livelihood) that have taken place in the life of irrigation farmers.

2.8.2 Theory of participation

Participation is the active engagement of the minds, hearts, and energy of people in the process of their own feeling and development. Because of the nature of what development really is, unless there is meaningful and effective participation, there is no development (Bopp and Bopp, 2006). In the past, participation was used to describe an outsider's engagement with a community; it becomes a term infused with community empowerment, rather than with community need and concession. Adopting this view, along with the teachings of Freire (2006), participation becomes a theory driven mechanism in which local communities and outsiders come together, as participants, to achieve community defined goals.

Participatory development provides a mechanism in which genuine dialogue and action within a local community and between a local community and outside researchers/ practitioners can occur. The relationship between local community members and outsiders is important to human development in general as Freire (2006) professed. Therefore, the rural people should be consulted as they, more than anyone, know the extent of their situation. Consequently, decision making should be decentralized allowing the community to decide the best strategy for local development.

2.8.3 The impact assessment perspective

Impact studies is of great importance in agricultural research because it is used to identify alternatives technologies that would address the major production constraints while at the same time taking into consideration farmers preferences and farming condition (Alene, *et al.*, 2006). However in using impact assessment as accountability exercises to justify past programme activities, impacts should be evaluated in terms of all the goals and objectives that were set when the project activity or programme was established (IAEG, 1999).

The term "impact" refers to the broad, long –term economic, social and environmental effects resulting from research (IAEG, 1999). The impact of a programme can be seen in relation to what the programme actually do to the people who participate in them. It is the actual programme outcomes in relation to the desire outcome, in determining the impact of social interventions.

Food and Agricultural organization (1997) gave the following as some of the benefits of irrigation: increased income that was translated into increased expenditure, investment, construction and trade, backward and forward linkages: traders were reportedly coming to purchase irrigation produce and in turn sell cloth, jewellery and other consumer items and increased material wealth. At the village level, this was in the form of construction of a large mosque built through farmer's donations and an improvement of the village clinic. At household level, increased wealth could be seen in 55 houses built in the village, fourteen with corrugated metal roofing.

Impact assessment is a criteria component of agricultural research in that it helps to define priorities of research and facilitate resources allocation among programs, guide researchers and those involved in technology transfer to have a better understanding of

the way new technologies are adopted and diffused into farming communities and show evidence that client benefits from the research products (Manyong *et al.*, 2001).

Awa (1986) noted that the design for measuring agricultural development efforts must not be at variance with the programmes initiation and implementation strategies. In conducting impact assessment, researchers often use "with" and "without" impact method, while others use "before" and "after" method. The "with" and "without" approach to impact study involves the study of population, villages or communities that benefited or did not benefit from the execution of a project. Though this method, the researcher is able to find out the difference between the beneficiaries and non – beneficiaries, or participants and non-participants.

For the purpose of this study, the "with" and "without" method of impact assessment will be used to give a much proper assessment of the impact of Jibia dam irrigation project on the livelihood of the people. This perspective will help to determine the quality of services provided by Jibia irrigation project on the livelihood of the farmers.

2.9 Review of Analytical Tools

2.9.1 Descriptive statistics

Descriptive statistics is a phase of statistics that seek to describe and analyse a give group without drawing any conclusions or inferences about a larger group. Descriptive statistics is the term given to the analysis of data that helps describe, show or summarise and characterise data in a meaningful way, such that, for example patterns might emerge from the data and allows simpler interpretation of the data. Some tools to use here include mean, frequency distribution and percentage.

2.9.2 Chow test

The Chow Test is a test that determines if the coefficients from two regression analyses are the same. However, three different linear regressions were carried out comprising of the pooled samples of participants and non-participants, and separate linear regression for participants and non-participants respectively. The residual sum of square of each of the three regressions was used to compute the chow test. The decision rule was that if Chow F-statistics is greater than that of F-table, there is impact of project on crop production and structural differences between the participants and non-participants in terms of output, income, level of living if otherwise there is no impact of project.

2.10 Conceptual Framework

Conceptual frame work is a construction that shows the relationship existing among variables and most often these relationships are depicted schematically and mathematically. A conceptual frame work is simply an attempt to classify the major element of an entity or phenomenon with regards to their functions and inter – relationships in order to observe more closely causal relationships.

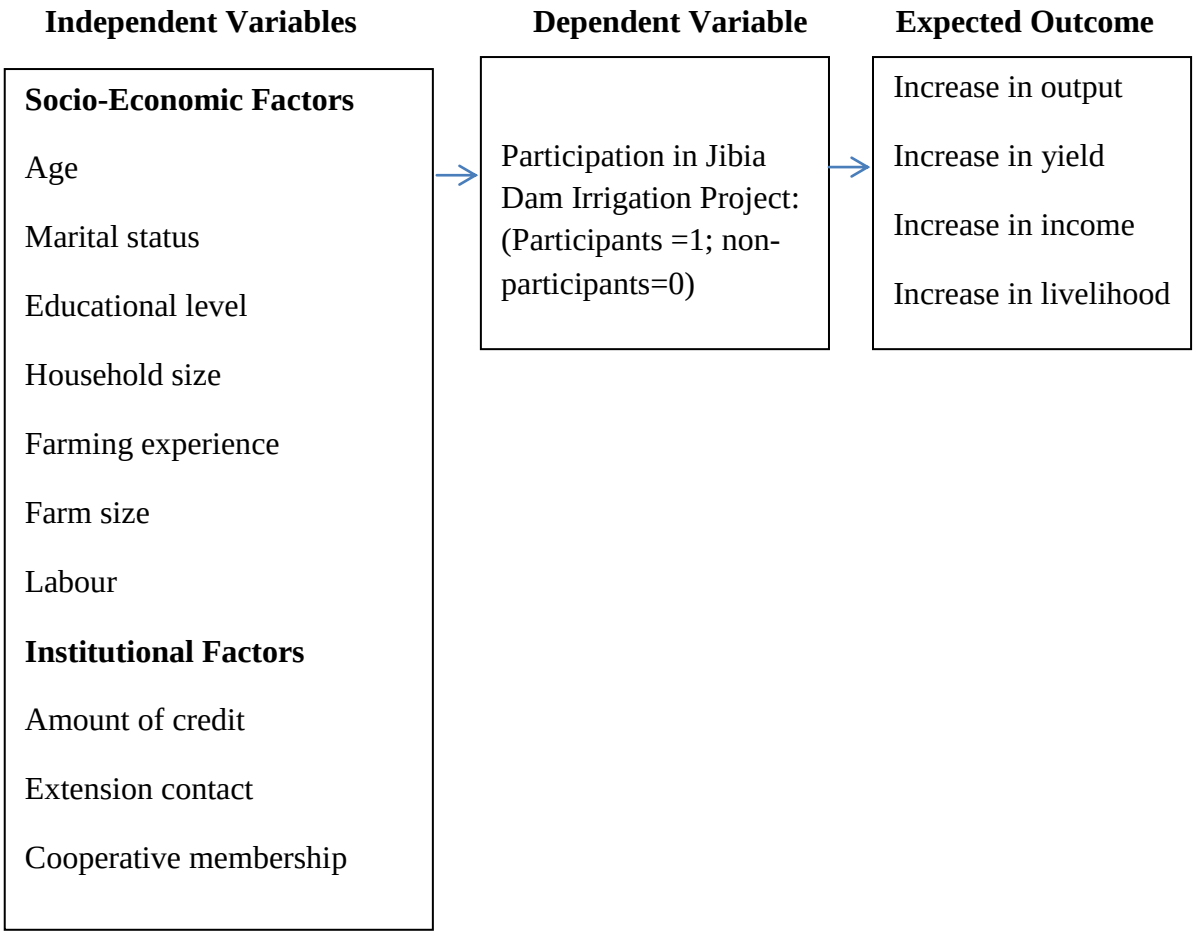

Figure 1: Conceptual Model for Impact of Jibia Dam Irrigation Project on Wheat Production and Livelihood of participant and non- participant.

CHAPTER THREE

METHODLOGY

3.1 The study Area

The study was conducted in Katsina State of Nigeria one of the 36 States in Nigeria. It was created on the 23rd September, 1987 and carved out from the former Kaduna State. Katsina State has the total land size of 23,938 Square Kilometers located between longitudes 11^0 and 13^0 East, and latitudes 6^0 and 9^0 north with a projected population of 7,452,629 in 2014 at a growth rate of 3.2% per annum (NPC, 2012). It is situated within the Sahel- Sudan agro ecological zone of Nigeria and borders with Zamfara State in the western part, Kaduna State in the southern part, Kano and Jigawa States in the eastern part and Niger Republic in the northern part. It is made up of 34 local Government Areas (LGAs). The people in the study area are predominantly farmers. They grow rainfed crops such as millet, sorghum, groundnut, cowpea and sesame and irrigated crop such as wheat, cowpea, maize, groundnut, cassava, and assorted vegetables. They also rear animal such as cattle, goat, sheep and fowl (KTARDA, 2010).This study was conducted at Jibia Dam Irrigation Project in Jibia Local Government Areas of Katsina State. Jibia Local Government Area is bordered by Katsina and Batsari Local Governments Areas to the south, Kaita LGA to the east, Zurmi LGA in Zamfara State to the west and Maradi in Niger republic to the north. The Jibia irrigation project is located at latitude 13^0 04' 18"N and longitude 07^0 15'06" E. the dam was commissioned in 1992 and irrigation activities started in the same year. It was built across the flood plains of Gada river flows for only about four months each year, with a catchment area at Jibia of over 400 km^2. The Dam is located at 5.5km from Jibia town in Jibia local Government Area of Katsina State.

The reservoir was therefore, intended to provide control facilities for downstream irrigation of an area of 1,500ha to 2,000ha yearly. A number of communities are located downstream of the scheme and these communities depend on water from the drainage channels in the scheme for their domestic need. Rainfall is strongly seasonal and occurs between June and September with the peak rainfall occurring in September. The annual rainfall ranged between 900 and 1100mm.The dry season last between October and May. Wheat is one of the major cultivated crop in the study area (KTARDA, 2010).

3.2 Sampling Procedure and Sample Size

The Jibia Irrigation Project is under Sokoto Rima River Basin Development Authority (SRRBDA) owned by the Federal Government of Nigeria. Multi- stage sampling was used for this study. From the reconnaissance survey conducted, a list of six (6) project areas (villages) as at 2013 was obtained from the programme office, namely; Jibia, Lankwasau, Jibiyan Maje, Mai Kwari, Garin Sama and Gurbin Magarya. Three villages (3) were purposively selected based on the intensity of wheat production; these are Jibia, Lankwasau, and Gurbin Magarya with 262, 222, and 183 participants respectively. Twelve percent (12%) of the population (667) of participants was randomly selected using the balloting method. This gave a sample size of eighty (80) participating farmers (Table 3.1).

In order to effectively study the impact of Jibia Irrigation Project on participants, non-participants were used as a control group for comparative analysis. Dan'arau, Bugaje and Kukar Babanginda with 235, 218, and 268 respectively were purposively selected out of the six (6) non-project areas based on the intensity of wheat production. Twelve percent (12%) of the population (721) were randomly selected using the balloting method to give a sample size of eighty six (86) respondents (non- participants) as shown

in Table 3.1. A total of one hundred and sixty six (166) respondents were interviewed as sample size for this study.

Table 3.1: Distribution of Respondents in the Study Area

Selected Villages	Population	Sample size (12%)
Participants		
Gurbin Magarya	183	22
Jibia	262	31
Lankwasau	222	27
Total	666	80
Non-Participants		
Bugaje	218	26
Dan'arau	235	28
Kukar Babangida	268	32
Total	721	86

Source: Jibia Irrigation Project, 2014

3.3 Method of Data Collection

The primary data were collected through the use of pretested and validated questionnaire administered to both participants and non-participants of wheat farmers in the study area. The data collected was based on 2014 cropping season and was collected with the aid of structured questionnaire. The information collected includes socio-economic characteristic as well as living condition of both participating and non-participating wheat farmers, the impact of irrigation project on the output and yield of the participating and non- participating farmers, impact of the project on income and the constraints encountered in the implementation of the irrigation project in the study area.

3.4 Analytical Technique

The study was analyzed using both descriptive and inferential statistics; the descriptive statistics involved the use of mean, frequency distribution tables, percentages while the inferential statistics involved the use of logit regression, and chow test statistics.

Objectives i and v.

That is to describe the socio – economic characteristics of wheat farmers participating in Jibia irrigation project and identify constraints encountered by participants in the implementation of the project. These objectives were achieved using descriptive statistics such as frequency distribution tables, percentages, means and standard deviation.

Objective ii.

That is to determine the factors influencing participation of respondents in wheat production in Jibia Irrigation Project. Logit regression analysis was used to achieve objective two (ii)

Objectives iii and iv.

That is to determine the impact of Jibia irrigation project on output and yield of participants and non- participants and determine the impact of Jibia Irrigation project on income and livelihood of participants and non- participants was achieved using chow test.

Hypotheses testing.

Logit regression analysis was employed to test hypothesis i and chow test were employed to test the hypotheses ii and iii.

3.5 Model Specifications

3.5.1 Logit regression model

Logit regression model was used to achieve objective ii and test hypothesis i. The probability of a farmer participating in Jibia irrigation project was determined by an underlying response variable that captures the true economic status of a farmer. The

underlying response variable y* in the case of binary choice is defined by the multivariate logit regression relation:

$y^* = \Sigma x_i \beta_j + \mu$ 1

where:

$\beta_j = \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10;}$ and

$X_i = X_{i1}, X_{i2}, X_{i3}, X_{i4}, X_{i5}, X_{i6}, X_{i7}, X_{i8}, X_{i9}, X_{i10.}$

The relevant logistic expressions are given as:

Prob (y* =1) =1-F* $(\Sigma xi\beta j) = \frac{e^{\Sigma xi\beta j}}{1+e^{\Sigma xi\beta j}}$ 2

Prob (y* =0) =F* $(\Sigma xi\beta j) = \frac{e^{-\Sigma xi\beta j}}{1+e^{\Sigma xi\beta j}} = \frac{1}{1+e^{\Sigma xi\beta j}}$ 3

Where:

F = the cumulative distribution function for μ_i

Prob $(Y_i = 0/\beta_j X_i) = F(-\Sigma xi\beta j)$

Prob $(Y_i = 1/\beta_j X_i) = 1\text{-}F(-\Sigma xi\beta j)$

The likelihood function is given by;

$L = \Pi \{F(-\Sigma xi\beta j)\} \Pi \{1\text{-}F(-\Sigma xi\beta j)\}$ 4

$y_i=0$ $y_i=1$

while the log likelihood function for the expression is:

$H(\beta) = \log L(\beta) = \sum_{i=0}^{n} yi \log$

$1\text{-}F[(-\sum X_i \text{ '}\beta_i) + (1\text{-}y)\log F(-\sum X_i \text{ '}\beta_i)]$

Where:

Y = Farmer Participating in Jibia irrigation Project (binary variable 1=participants; 0= non-participants)

μ_i = a logistic cumulative distribution in F

X_1 = Age in years

X_2 = Marital Status (Married=1, Single=0)

X_3 = Education Level (years of formal education)

X_4= Household size (number)

X_5 = Farming experience (years)

X_6 = Farm size (ha)

X_7 = Labour (man/day)

X_8 = Amount of credit (Naira)

X_9 = extension contact (2014)

X_{10} = Membership to Cooperative association (years)

β_i = The coefficients for the respective variables in the logit function

The probability of a household participating in jibia dam irrigation project and the corresponding change in probability due to unit change in a variable X_1 are given as:

prob ($y_i = 1/\beta X_i = \frac{e^{\mp}}{1+e^{\mp}}$)

e = error term

3.5.2 Chow test statistics

Impact of Jibia irrigation project on wheat production, output, yield income and livelihoods of the participant and non-participants was achieved using Chow-test statistic. A Chow test is a particular test for structural change; an econometric test to determine whether the coefficients in a regression model are the same in separate sub-samples. Standard F- test for the equality of two sets of coefficients in linear regression models" is called a Chow test. Dougherty (2007) stated that chow-test statistics is often

used in programme evaluation to determine whether the programme has impacts on different sub-group of the population. It requires the sum of squared residuals from three regressions, one from each sample group and one for the pooled data. If the F-chow is greater than the F-table, then there was programme impact on the participants otherwise no impact. This is expressed mathematically as:

$$F = \frac{(RSSR - SSR1 - SSR2)/k}{(SSR1 + SSR2)/n - 2k} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

Where;

RSSR = the sum of squared residuals from a linear regression in which b_1 and b_2 are assumed to be the same, b has dimension k, and there are n observations in total.

SSR_1 = the sum of squared residuals from a linear regression of sample 1.

SSR_2 = the sum of squared residuals from a linear regression of sample 2.

The total number of observation is $n = n_1 + n_2$ and the number of parameters is k.

3.6. Operationalization and Measurements of Variables

3.6.1 Independent variables

The independent variables for this study are socio-economic factors maize farmers.

These are:

Age: This is the number of years an individual has spent from birth to the time of the study. It was measured in years. It was expected that respondents' age would have negative influence on participation in Jibia Irrigation Project. The reason is that older farmers seem to be less inclined to participate in agricultural programmes than younger ones (Nxumalo and Oladele, 2013).

Marital Status: This is the act of being married or single. It was measured as single=1 and married =2

Education level: This is the capacity of an individual to acquire education and ability to read and write. It was measured as the number of years of schooling. It is expected that education would be positively associated with participation in Jibia Irrigation Project. Level of education has been found to affect the acceptance and use of recommended farm practices (Atala, 1980).

Household Size: This is the number of people in one household. It was measured as the total number of people in the respondent's household was the respondent's score. This variable is expected to have positive or negative relationship with participation in Jibia Irrigation Project. Adegbite *et al.*, 2007 that the larger the household size, the higher the likelihood of sustainable labour efficiency on farmers' farm, given the constant labour supply.

Farm Size: This refers to the total land area under wheat cultivation and it was measured in hectares. It is expected that farmers with large farm sizes would have the tendency to participate in project to improve their output, yield, income and livelihoods. The expected sign of the coefficient on farm size is positive. Farm size is expected to have a significant effect on yield (Igbokwe, 2000).

Farming experience: This refers to the actual number of years put in farming activities. It is expected that farming experience will have a positive influence on participation in Jibia Irrigation Project. It is expected that farmers will gain more experience as they spend more years in farming activities.

Labour: This is the effort or strength exerted to accomplish work done. It could be family or hired labour and it was measured in man-hour per day.

Membership of Association: Co-operative groups are organized for the promotion of special interests or meet certain needs that cannot be achieved by the individual efforts, It is assumed that the more the number of years a respondent belongs to social organizations, the more he/she is exposed to knowledge in different subjects, hence the more he/she is likely to participate in Jibia Irrigation Project. It was measured as the number of years a respondent belongs association.

Extension contact: This is a meeting the respondent has with the extension official. It was measured by the number of visits or contact with extension workers of the Jibia irrigation project. Farmers contact with agricultural extension agent has been reported to improved adoption of technologies (Smith *et al.,* 1994).

Access to credit: This represent farmer access to loan received either in cash or in kind for the purpose of wheat production in 2014. It was measured as the total amount of money borrowed from the Jibia irrigation project credit scheme. Credit support has shown to influence adoption improved wheat technologies under irrigation project. It is expected that the amount of credit received would positively influence the participation in Jibia Irrigation Project.

3.6.2 Dependent variable

Level of participation in Jibia Irrigation Project: The dependent variable is participation. It is the involvement of wheat farmers into Jibia Irrigation Dam. This was measured as either participating or non-participating. It was scored 1 for participation and 0 for non- participation in the project.

3.6.3 Expected outcome

The expected outcome are farmer benefit in terms of change in farm output, change in farm income and improved standard living resulting from the project activities.

Output: This refers to the total quantity of wheat produce obtained by a farmer within the season of the study. It was measured as the number of kilograms obtained by individual farmer.

Yield: This was measured as total output of wheat in Kg divided by the total hectares.

Income: This refers to the total money received by farmer from wheat production minus the cost of production. It was measured by monetary value (naira).

Livelihood: This refers to well-being of the farmers or relating to quality of living. It was measured by the ownership and usage of assets possessed by the farmer example freezer, motorized pump, sprayer, automobile, television, radio, house, farmland, health status, personal mobility, access to safe drinking water and different types of animals such as cattle, goat, sheep and poultry was computed in a monetary value for an individual farmer to determine his/ her livelihood. However, material possessions of farmers as well as general expenditure were used as indicators of level of living. The total value of assets possessed by a farmer at present were estimated and was converted to Naira value. The farmers with value of assets equivalent to the average (and above) of the total were scored 1 (high), while those with the total value of assets less than the average were scored 0, (low).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Respondents

In this section the socio-economic characteristics of participants and non- participants of Jibia wheat irrigation project was provided. These includes age, marital status; education, household size, farming experience and farm size as shown in Table 4.1.

4.1.1 Age distribution

The result in Table 4.1 revealed that majority (82%) of the participants while approximately 83% of the non-participants were between the ages of 36-57years. The mean ages for participants and non- participants were 49 and 44 years respectively. This implies that majority of respondents are still within a productive and active working age range, hence their ability to participate or produce to earn some income from farming and non-farming activities. This finding concurred with the findings of Bzugu *et al.,* (2005) who revealed that productive and active persons participates more in agricultural and community development activities such as Jibia irrigation project.

4.1.2 Marital Status distribution

Results from the study also revealed that 100% of the participants while 99% of the non-participants were married. This may contribute to the labour requirements on the farms as most of the farm operations are labour intensive. Thus, wives and children can serve as cheap source of labour which may lead to increase in their farm size, adoption of innovations and the overall level of farm productivity.

4.1.3 **Educational level**

It was found that 24% of the participants had secondary education while 28% of the non-participants had secondary education. Approximately 49% of the participants had primary education while 44% of the non-participants had primary education. Approximately 19% of the participants and none of the non-participants had tertiary education. Majority (92%) of the participants had some form of educational level of qualification while 72% of the non- participants had some form of educational level of qualification. This might be because most of those who understand the value of Jibia irrigation project and join them were those who had a certain level of education and some civil servants. The educational background would no doubt help in decision making especially in terms of meaningful managerial decisions, leadership and investments. This result concurred with the finding of Idrisa *et al.,* (2007) who reported that about 41% of the respondents had attained up to secondary school level of education, while 4% had tertiary education.

4.1.4 **Household size**

Majority (93%) of participants had between 3-16 household sizes while 100% of the non-participants had between 3-16 household sizes with the mean household size of 12 and 6 household sizes, respectively. The implication is that the relatively large household size may likely enhance the family labour supply on the farms, hence supporting favorably, productive capacities of the farmers already enhanced by their age. This corroborate with the findings of Adegbite *et al.,* 2007 that the larger the household size, the higher the likelihood of sustainable labour efficiency on farmers' farm, given the constant labour supply.

4.1.5 **Farming experience**

It was found that majority (89%) of the participants had between 2-23 years of farming experience while approximately 100% of the non-participants had between 2-23 years of farming experience with the mean farming experience of 13 and 6 years, respectively. Farming experience is used as a measure of management ability, the more experience the farmer is, the more his ability to make farm decision. This result showed that most of the respondents had long years of farming experience, implying that such farmers are likely to make decisions that would increase their output and income. This finding agrees with the findings of kebbeh *et al*., (2003) which found an average of 21 years of farmers' experience in rice farming in Kaduna and Niger States of Nigeria.

4.1.6 **Farm size**

The result in Table 4.1 revealed that majority (91%) of the participants had 1.0-3.9 hectare of the same farmland while about 100% of the non-participants had 1.0-1.9 of farmland. The mean farm size for participants and non-participants were 2 and 1 hectares respectively. This implies that farmers in the study area are purely small scale farmers based on the Ojuekaiye (2001), classification of farms with a 0.1 hectares and 5.9 hectares as small-scale.

Table 4.1: Socio-Economic Characteristics of Wheat Farmers

Characteristics	Participants			Non-Participants		
	Frequency	Percentage Mean		Frequency	Percentage Mean	
Age						
25-35	4	5		11	13	
36-46	26	33		42	49	
47-57	39	49		29	34	
58-68	11	14	49	4	5	44
Marital Status						
Married	80	100		85	99	
Single	0	0		1	1	
Education						
No Formal	7	9		24	28	
Primary	39	49		38	44	
Secondary	19	24		24	28	
Tertiary	15	19		-	-	
Household Size						
3-9	22	28		78	91	
10-16	52	65		8	9	
17-23	2	3		-	-	
24-30	2	3		-	-	
31-37	2	3	12	-	-	6
Farming Experience						
2-12	49	61		86	100	
13-23	22	28		-	-	
24-34	8	10		-	-	
35-45	1	1	9	-	-	6
Farm Size						
1.0-1.9	32	40		86	100	
2.0-2.9	26	33		-	-	
3.0-3.9	14	18		-	-	
4.0-4.9	5	6		-	-	
5.0-5.9	3	4		-	-	
6.0 And Above	0	0	2	-	-	1
Total	80	100		86	100	

4.2 Factors Influencing Participation of Respondents in wheat production in Jibia Irrigation Project on Wheat Production

The maximum likelihood estimates for the logit model are presented in Table 4.2. The model has a high negative Log likelihood of -114.95; this shows that the explanatory variables in the estimated logit model significantly explained the likelihood of a respondent participating in Jibia irrigation project. The results show that pseudo R^2 is 0.75 and it is significant at 1% level of probability. The estimated percentage correct prediction was 51.81%, which shows that the model predictions are correct in 51.8% of the cases, and hence is reliable. Five of the ten factors tested were the factors that the participation of farmers in Jibia Irrigation Project in the study area.

Coefficient obtained for farming experience was significant at 10% and had positive influence on the participation in Jibia irrigation project. Farming experience increases the probability of participating in commercial agricultural development project by 37%. The positive signs implied that as farming experience increases, the tendency of the respondents to participate in the project increases (Bonabana-Wabbi and Taylor, 2008). It is probable that past experience, with good performance may encourage increased participation in the project. In addition, these farmers had acquired encouraging return from the new practices and thus would continue with it anticipating continued benefits.

Coefficient obtained for farm size was significant at 1% and had positive influence on the participation in Jibia irrigation project. This implies that farm size significantly affected participation in Jibia irrigation project. Farm size increased the probability of participating in Jibia irrigation project by 9.3%.

Coefficient obtained for labour was significant at 5% and had negative influence on the participation in Jibia irrigation project. This implies that labour negatively affect participation in Jibia irrigation project. Labour decreases the probability of participating in Jibia irrigation project by 19%. This disagrees with the study by Umoh (2006) which shows the importance of labour in farming, particularly in developing countries where mechanization is rare on small scale farms.

Coefficient obtained for extension contact was significant at 1% and had positive influence on the participation in Jibia irrigation project. This implies that extension contact significantly affected participation in Jibia irrigation project. Extension contact increases the probability of participating in Jibia irrigation project by 28%. This result is in consonance with that of Onyenweaku *et al.,* (2005) that revealed that there is a positive relationship between extension contact and technical efficiency in yam production in Nasarawa state, Nigeria.

Coefficient for cooperative association was significant at 1% and had positive influence on the participation in Jibia irrigation project. This implies that respondents' membership of association significantly affected participation in Jibia irrigation project. Membership of an association tend to increase the probability of participating in commercial agriculture development project by 6.9%. Thus, farmers who viewed belonging cooperative in good light were more likely to participate while those who see little or no benefit in belonging to cooperative were not. This tends to explain individual farmers' choice of association, one which could be based on awareness of the importance of the association. Membership of professional organizations identified market and technology information as one of the benefits they obtain (Nzomi, *et al.*, 2007). Acquisition of information about a new technology demystifies and makes it

more available to farmers. Information reduces the uncertainty about a technology's performance, hence may change individual's assessment of policy objections to objectives over time (Caswell *et al.*, 2001). Exposures to information about new technology significantly affect farmer's choice about it. However, promotion of the farmers' organizations and reinforcing capacities of the producers will enhance access to improved services. This has implication for extension organizations to encourage farmers to form groups to enable them gain access to resources and improved farm inputs (Issa *et al.*, 2013; Iheke, 2010).

Table 4.2: Factors Influencing Participation of Respondents in Jibia Irrigation Project on Wheat Production

Variable	Coefficient	Standard Error	T-Value	Marginal Effect
Constant	-8.3155	3.45E+05	-2.41E-05	-3.5728
Age	8.28E-03	1.26E-02	0.65833	0.3816
Marital Status	6.4852	3.45E+05	1.88E-05	6.4458
Education	2.45E-02	2.18E-02	1.1239	0.1874
Household Size	4.32E-02	2.73E-02	1.5823	0.3928
Farming Experience	4.00E-02*	2.29E-02	1.7482	0.3726
Farm Size	0.74142***	0.10633	6.9726	0.0933
Labour	-3.01E-03**	1.47E-03	-2.0546	-0.1901
Amount Of Credit	1.16E-07	4.69E-07	0.24776	0.0103
Extension Contact	9.38E-02***	2.02E-02	4.6434	0.2787
Cooperative	0.12508***	2.23E-02	5.6077	0.0691
Number Of Observation	166			
Pseudo R^2	0.75			
P-Value	0.00000			
Log Likelihood	-114.95			
Overall % Prediction	51.81%			

***P<0.01, **P<0.05 and *P<0.10 levels of probability

Test of Hypothesis i

The null hypothesis (H_{o1}) which stated that socio-economic factors has no significant influence on their level of participation in Jibia Irrigation Project was tested using the result of logit regression analysis. Based on the result in Table 4.2 the null hypothesis was rejected because five variables had coefficients that were significant (farming experience (10%), farm size (1%), labour (5%), extension contact (1%) and cooperative association (1%) levels of probability.

4.3 Impact of Jibia irrigation project on output of the participants and non-participants

The impact of Jibia irrigation project on the wheat output of the participants and non-participants in the study area was achieved using chow test statistics. The result from Table 4.3 revealed that the Chow F calculated was 3.47, while F table value at 9 degree of freedom with sample size of 166 was 1.94 at 5% level of probability implying a significant impact of Jibia irrigation project on the wheat output in the study area since the F calculated was greater than the F table. Hence, the null hypothesis was rejected which states that there is no significant impact of Jibia irrigation project on the output of the participating farmers in the study area and accept the alternative hypothesis. This means that Jibia irrigation project had positive impact on the output of the participants in the study areas and significant at (P<0.01) level of probability. This agrees with the findings of Musa (2004) and Ahmed (2010) who reported that the participation in irrigation project significantly improved the living conditions of the beneficiaries through increased crop output.

Table 4.3: Impact of Jibia Irrigation Project on output of the participants and non-participants

Group Sample	R^2	Residual Sum of Square	N	K	F-Cal	F-Tab	Z-value
Pooled	0.11	5510000000	166	10	3.47	1.94	6.09***
Group 1	0.51	4450000000	80				
Group 2	0.58	1536115	86				

Group 1 = Participants Group 2= Non-participants
*R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters.****P<0.01

4.3.1 **Impact of Jibia irrigation project on yield of the participants and non-participants**

The impact of Jibia irrigation project on the wheat yield of the participants and non-participants in the study area was achieved using chow test statistics. The result from Table 4.4 revealed that the Chow F calculated was 4.39, while F table value at 9 degree of freedom with sample size of 166 was 1.94 at 5% level of probability implying a significant impact of Jibia irrigation project on the wheat yield in the study area since the F calculated was greater than the F table. Hence, the null hypothesis was rejected which states that there is no significant impact of Jibia irrigation project on the yield of the participating farmers in the study area and accept the alternative hypothesis. This means that Jibia irrigation project had positive impact on the yield of the participants in the study areas and significant at (P<0.01) level of probability .This result is consistent with the findings of Ezeh (2004) and Nkonya *et al.,* (2008) who reported that Fadama project beneficiaries were better off than their non-beneficiary counter-part in terms of productivity.

Table 4.4: Impact of Jibia Irrigation Project on yield of the participants and non-participants

Group Sample	**R^2**	**Residual Sum of Square**	**N**	**K**	**F-Cal**	**F-Tab**	**Z-value**
Pooled	0.42	2060000000	166	10	4.39	1.94	4.44***
Group 1	0.77	1580000000	80				
Group 2	0.26	3609091	86				

Group 1 = Participants Group 2= Non-participants
R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters. ***P<0.01

4.4 Impact of Jibia irrigation project on income of the participants and non-participants

The impact of Jibia irrigation project on the wheat income of the participants and non-participants in the study area was achieved using chow test statistics. The result from Table 4.5 revealed that the Chow F calculated was 2.54, while F table value at 9 degree of freedom with sample size of 166 was 1.94 at 5% level of probability implying a significant impact of Jibia irrigation project on the wheat income in the study area since the F calculated was greater than the F table. Hence, the null hypothesis was rejected which states that there is no significant impact of Jibia irrigation project on the income of the participating farmers in the study area and accept the alternative hypothesis. This means that Jibia irrigation project had positive impact on the income of the participants in the study areas and significant at (P<0.01) level of probability. This agrees with the findings of Musa (2011) and Ahmed (2010) who reported that the participation in irrigation project significantly improved the living conditions of the beneficiaries through increased farm income.

Table 4.5: Impact of Jibia Irrigation Project on income of the participants and non-participants

Group Sample	R^2	Residual Sum of Square	N	K	F-Cal	F-Tab	Z-value
Pooled	0.24	31800000000000	166	10	2.54	1.94	6.54***
Group 1	0.61	27000000000000	80				
Group 2	0.17	1760000000000	86				

Group 1 = Participants Group 2= Non-participants
R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters. ***P<0.01

4.4.1 Impact of Jibia irrigation project on living standard of the participants and non-participants

The impact of Jibia irrigation project on the living standard of the participants and non-participants in the study area was achieved using chow test statistics. Assets were used as proxy for living standard. The result from Table 4.6 revealed that the Chow F calculated was 2.54, while F table value at 9 degree of freedom with sample size of 166 was 1.94 at 5% level of probability implying a significant impact of Jibia irrigation project on the living standard in the study area since the F calculated was greater than the F table. Hence, the null hypothesis was rejected which states that there is no significant impact of Jibia irrigation project on the living standard of the participating farmers in the study area and accept the alternative hypothesis. This means that Jibia irrigation project had positive impact on the living standard of the participants in the study areas and significant at (P<0.01) level of probability. This finding his in tandem with the findings of Bellon *et al*. (2003) and Musa (2011) who compared level of living between treatment and control groups and found that beneficiaries had better family nutrition, clothing, housing, consumer durables, good drinking water and water pumps than the non-beneficiaries

Table 4.6: Impact of Jibia Irrigation Project on level of living of the participants and non- participants

Group Sample	R^2	Residual Sum Of Square	N	K	F-Cal	F-Tab	Z-value
Pooled	0.41	125000000000000	166	10	1.22	1.94	
						9.67***	
Group 1	0.71	115000000000000	80				
Group 2	0.63	3880000000	86				

Group 1 = Participants Group 2= Non-participants
R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters. ***P<0.01

4.5 Constraints Encountered by participant in the Implementation of the Project

The constraints encountered by participant are presented in Table 9. It was found that about 25% of the respondents ranked insufficient inputs as the major constraints. This finding is in line with Ekong (2003) who opined that most farmers have little or no access to improved seeds and continues to recycle seeds that have become exhausted after generations of cultivation. About 21% of the respondents ranked pests and disease as the second most important constraints. Also, about 16% and 14% of the respondent's ranked Inadequacy of capital and inaccessibility to market information as third and fourth constraints respectively, Credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. It agrees with findings of Nasiru, (2010) who noted that access to micro-credit could have prospect in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities. While, Inadequacy of the training opportunity and poor marketing channel was ranked by 13% and 7% of the respondents as fifth and sixth constraints respectively. Finally, about 3% and 1% of the respondents ranked poor power supply and high cost of labour as seventh and eighth respectively.

Table 4.7: Constraints Encountered by participant in the Implementation of the Project

Constraints	**Frequency**	**Percentage**	**Rank**
Insufficient Inputs	161	25	1st
Pests and Disease	134	21	2nd
Inadequacy of capital	102	16	3rd
Inaccessibility to market information	90	14	4th
Inadequacy of Training Opportunity	82	13	5th
Poor Marketing Channel	45	7	6th
Poor Power Supply	21	3	7th
High Cost of Labour	5	1	8th

Multiple Response Allowed*

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study was designed to analyze the impact of Jibia dam irrigation project on wheat production and livelihood of benefitting farmers in Katsina State, Nigeria. Multi- stage sampling was used for this study. First stage, a list of six (6) project areas (villages) as at 2013 was obtained from the programme office, three (3) villages each for two categories of farmers; participants and non- participants. Second stage, 12% of the population for the two categories of farmers; participants and non- participants were randomly selected to give a total sample size of 166. The data for analysis was based on 2014 cropping season and were collected through the use of a structured questionnaire and were analyzed using descriptive statistics (frequency distribution, percentage and mean) and inferential statistics (logit regression model and chow test).

The socio-economic characteristics of the respondents revealed that the mean ages of participants and non- participants were 49 and 44 years respectively. Majority about 92% and 72% of participants and non- participants did have formal education especially primary and secondary education, majority about 89% and 100% of participants and non- participants had 2-23 years of farming experience. While, majority (about 91%) and 100% of participants and non- participants fall within small holder farmer.

The result of the logit regression analysis revealed that farming experience, farm size, labour, extension contact and cooperative societies were the factors that collectively influence 75% of the participation of respondents in Jibia irrigation project.

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The results from chow test shows that Jibia irrigation project had a positive impact on output, yield, income and living standard of participants since the F-calculated is greater than the F-tabulated and significant at 1% levels of probability.

Insufficient inputs were ranked as the foremost constraints encountered by participants of Jibia project. Other constraints include pests and disease, inadequacy of capital, inaccessibility to market information, inadequacy of training opportunity, poor marketing channel, poor power supply and high cost of labour.

5.2 Conclusions

It can be concluded that the Participation in Jibia irrigation project had a positive impact on the output, yield, income and living standard of participants at 1% levels of probability. It implies that Jibia Irrigation Project is an effective tool for improving the respondents' living standard.

It can be concluded that farming experience, farm size, labour, extension contact and membership of association were the significant factors influencing the participation 75% of respondents in Jibia irrigation project, based on this result the null hypothesis is rejected. Finally, insufficient inputs was the foremost constraints that limits the effective participation in Jibia project in the study area.

5.3 Recommendations

Based on the findings, the following recommendations were made:

i. It was found that the amount of credit was not significantly related to the level of participation of respondents in Jibia irrigation project. It is therefore recommended that government and other stakeholders' efforts should be directed towards policies and programmes that will further enhance those factors

that increase farmers' decision to use agricultural credit. Thus, in collaboration with the financial institutions especially the Bank of Agriculture and commercial banks, awareness and education on credit sourcing and management should be incorporated in their package for outreach to the farming folks. Policy arrangement to enable poor farmers, without appropriate landed properties for collateral, to access funds for farming activities should be put in place.

ii. Education was also found not significantly related with the level of participation of respondents in Jibia irrigation project. It is therefore recommended that extension agency, cooperative societies and research institutes as well as appropriate organs should educate and disseminate agro-allied information and raising awareness among the respondents.

iii. Since Jibia irrigation project had a positive and significant impact on participants output, yield, income and living standard, it was recommended that the project be extended to other villages through sensitization of farmers on the benefits of Jibia irrigation project by the extension workers in the study area.

iv. Majority of the respondents complained of insufficient farm input such as fertilizers and agrochemical as one of the foremost constraints encountered by participants in the implementation of the project. The farmers could be linked – up with sources of input production through enlightenment by the Ministry of Agriculture and Rural Development so as to ensure that more farmers have access to inputs (seeds and fertilizer) through the E-wallet scheme through their cooperative societies. This will enable the groups to buy inputs at factory cost thereby helping to reduce cost of production.

5.4 Contribution to Knowledge

i. The result of the logit regression analysis revealed that farming experience, farm size, labour, extension contact and cooperative societies were the factors that collectively influence 75% of the participation of the respondents in Jibia irrigation project.

ii. Chow test results shows that Jibia irrigation project had a positive impact on output, yield, income and living standard of participants and a significant difference between participants and non-participants at 1% levels of probability. The results indicate that the project had a positive impact on participants' output, yield, income and living standard. This means that Jibia Irrigation Project is an effective tool for improving the respondents' living standard.

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Appendix I: Research Questionnaire

Dear Respondent,

I am a postgraduate student of the Department Agricultural Economics and Rural Sociology, Faculty of Agricultural Science Ahmadu Bello University Zaria, conducting a research on ‘‘Impact of Jibia Dam Irrigation Project on Wheat Production and Livelihoods of Participants in Katsina State’’. I hereby seek for your kind gesture to help me fill this questionnaire in order to make the research a successful one. Be assured that all information supplied will be confidentially treated.

Village/Community…….L.G.A

…….

SECTION A; SOCIO-ECONOMIC VARIABLE

1. Name of farmer……

2. Sex: Male ( ) Female ( )

3. Age (years)……

4. Marital status: Married ( ) Single ( )

5. Highest level of Education:

(a) No Formal Education ( ) (b) Primary school Education ( ) (years)…… (c) Secondary School Education ( ) (years)…… (d) Tertiary Education ( ) (years)……

6. What is the size of your household size.....?

7. What is your major occupation? (a)Farming ( ) (b) Trading ( ) (c) Civil servant ( ) (d)Others (Specify): ……

8. Kindly give the estimate of your annual income…….Naira.

9. How long have you been in wheat farming? (Years of experience)……

10. Do you belong to any co-operative/Association? Yes ( ) No ( )

11. If yes, (Years of participation) ----------

12. What benefit did you derive as a member?

13. What is your major source of capital for wheat farming? a .Personal savings ( )

b. credit (borrow) ( ) c. Friends and family ( )

d. Money Lenders (Borrow) ( )

14. If you borrow, what were the sources of the credit? a. commercial bank( )

b. Bank of Agriculture ( ) c. Cooperative Society ( ) d. Money Lenders ( ) e. Friends and Family ( ) f. Others (specify)……

15. How much did you borrow to finance last production? (Fill for the source you indicated in Q .12

SOURCE OF LOAN	AMOUNT(₦)	INTEREST RATE (%)
Commercial Bank		
Bank of Agriculture		
Cooperative Societies		
Money Lenders		
Friends And Family		
Others (Specify)		

16. Have you been visited by an extension agent? Yes ( ) No ( )

17. If Yes, How many times in last one year.....?

18. What activities did the agent teach you? .....

19. Of what benefit were the techniques learnt to you to the success of your farm?

.....

20. Have you been trained on wheat farming? Yes ( ) No ( )

21. If yes, which organization conducted the training……..?

22. Was the training beneficial to you?

a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )

23. Do you have access to credit (a) Yes ( ) (b) No

24. If yes indicate from which source and the amount given

(a) Agricultural bank (NACRDB) ₦.....

(b) Commercial bank ₦.....

(c) Cooperative ₦.....

(d) Friend / Relatives ₦.....

(e) Others specify..... ₦.....

25. In what form did you receive the credit?

(a) In form of cash [ ]

(b) Inform of farm inputs [ ]

(c) Others (specify) [ ]……..

26. If it is inform of cash indicate the amount obtained ₦……

27. If it is inform of input indicate the quantity ……..kg

SECTION B: INFORMATION ON PARTICIPATION IN JIBIA DAM IRRIGATION PROJECT AND RECOMMENDED WHEAT PRODUCTION PRACTICES

28. Did you participate in the project? Yes ( ), No ( )

29. If yes, what benefits do you derived…….?

30. If no, why……

31. What is/are the recommended wheat productions practiced in the study area?

List them:

(i)……

(ii)……

(iii)……

(iv)……

(v)……

(vi)……

(vii)……

(viii)……

SECTION C: INFORMATION ON INPUTS

32. Labour input (2013)

Plot No	Hire Labour		Family Labour	
	No of people	No of Hours	No of people	No of Hours
1				
2				
3				

33. How did you acquire your land? *(Tick below)*

Plot	**Mode of Acquisition**				
	(a) Inheritance	(b) Lease	(c) Borrowed	(d) Gift	(e) Purchased
1					
2					
3					

SECTION D: INFORMATION ON PRODUCTION

34. Farm size (Ha)

(i) How many wheat farm plots do you have? ..... Indicate and the size in the table below.

Plot NO	Plot Size (Ha)
1	
2	
3	

35. Output of wheat produced (2013)

Plot No	No. of output produced(Kg)	Total Quantity sold(₦)
1		
2		
3		

36. Where do you sell your produce?

a. Farm gate ( ) b. Rural market ( ) c. Urban market ( )

37. When do you sell your produce?

a. immediately after harvesting ( ) b. Few months after harvest ( ) c. Off season ( )

38. Give total income from other sources of income? …….. Naira

SECTION E: INFORMATION ON LIVELIHOOD

39. Give a list of your household items and/or properties…….

(a)Household Assets

Assets	Total number owned (2013)	Estimated monetary value(₦) in 2013
Cell phone		
Video		
Radio		
Television		
Keke NAPEP		
Car		
Motor cycle		
Bicycle		
Wheel barrow		
Hoes		
Machets'/cutlasses		
Axes		
Spade/Shovel		
Sprayers		
Others(specify): …… …… ……		

(b) Livestock Assets

Livestock Type	**Total number owned in 2013**	**Estimated monetary value (₦) in 2013**
Bull		
Cows		
Goats		
Sheep		
Ducks		
Chickens		
Turkey		
Pigs		
Rabbits		
Dog		
Others (specify): **…….** **……**		

(c) What type of dwelling house does the household live in?

(a).Roofing materials of household's main residents	Thatch, wood, zinc, concrete, tiles.
(b).Walls materials of the household's main residents.	Mud, cement, bricks, stone.
(c). Floor materials of household's main resident	Mud, concrete, cement, tiles.
(d).Number of rooms excluding Kitchen and bathrooms	
Estimated value of household residential buildings as at 2011.	Naira…….

SECTION F: INFORMATION ON CONSTRAINTS

40. What are the constraints encountered by beneficiaries in the implementation of the project?

(i)…….

(ii)……

(iii)……

(iv)……

(v)…….

(vi)……

(vii)……

(viii) Others (specify)……..

41. Suggest ways in which the above constraints can be reduced for participants in the Jibia Dam Irrigation Project in Kaduna State

(i)……

(ii)……..

(iii)……..

(iv)…….

(v)…….

Thank you for your cooperation