

**IMPACT OF HADEJIA VALLEY IRRIGATION PROJECT (HVIP) ON RURAL  
LIVELIHOODS OF BENEFICIARIES AND NON-BENEFICIARIES, IN JIGAWA  
STATE, NIGERIA**

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**ABSTRACT**

The study assessed the impact of Hadejia Valley Irrigation Project on rural livelihoods in Jigawa State, Nigeria. The major objective of this study was to examine the impact of the project on cropped area under irrigation activities of the beneficiaries in the study area. Out of a list of 7036 respondents 207 beneficiaries and 146 non-beneficiaries were selected using a multi-stage random sampling making a total of 353. Data were obtained using structured questionnaire. The results were analyzed using descriptive statistics and Spearman's rank correlation. The results showed that beneficiaries and non-beneficiaries had a mean age of 47 and 45 years, a mean household size of 15 and 21, educational levels of 8 and 7 years and off-farm income that ranged from a mean of ₦137,797.00 and ₦237,104.00. It revealed a mean of 30 and 24 years of irrigation farming experience, farm sizes of 3.2 and 2.1 hectares, ₦33,641.00 and ₦55,709.00 spent in hiring labour, farm distance of 3 and 0.9 kilometers, 5 and 3 extension visits per season, a mean of ₦52,771.00 and ₦50,205.00, ₦50,205.68 and ₦32,422.33 as credit and subsidy. Membership of cooperative associations indicated a mean of 0.8 and 0.5. The results show that linking beneficiaries' lower and middle quintiles of asset indices there was a rank order relationship and no rank order relationship connecting lower and higher; middle and higher quintiles of asset indices between the variables in the population represented in the sample. Therefore, from the results it was concluded that the Hadejia Valley Irrigation Project(HVIP) contributed to livelihoods of beneficiaries and non-beneficiaries in the study area. It was recommended that the studied homes had a mean of 15 and 21 people, therefore, the government should increase efforts in family planning through birth control.

**Key words: Irrigation, Households, beneficiaries, non-beneficiaries, rural livelihoods and Farm assistants**

**INTRODUCTION**

Water is significant to life, it is the next important resource after oxygen and this makes it indispensable in all aspects of human endeavor (Ahmadi & Moradkhani 2019; Falkenmark 2013). For this reason, it is deemed important for any meaningful sustainable development initiatives. In a drier regions of the world (like the case study at hand) Jigawa Region, rainfall unreliability and the resultant surface water insufficiencies have necessitated groundwater exploration despite huge investment (Abdulhamid 2014; Mehra *et al.*, 2016). In view of this increasing surface water resources predicament, a substantial number of people living in Sub-Saharan Africa like Jigawa Region are gradually shifting to groundwater sources for potable water supply (Kumar *et al.*,

2007). Instances were reported from many African Countries where the insufficiency of surface water has necessitated the shift to groundwater sources for fresh water supply. For example, in Ghana, Niger and Botswana, for example, groundwater accounts for 47.56%, 71.43% and 50% of their total fresh water sources, respectively (Xu & Usher 2006; Ghana Statistical service 2012; Elisante & Mazuka 2016; Nakoma *et al.*, 2016). In Nigeria, surface water quantity and quality deterioration, inadequate water supply by water providers, increased rate of population growth and, above all, the consequence of climate change has resulted in the increasing demand for freshwater resources from the negligible groundwater sources which was estimated at only 28.90% of the total fresh water of the country (Akujieze *et al.*, 2003). In the semi-arid region of the North-Western Nigeria where Jigawa Region is located, the interplay of climatic, geological and anthropogenic characteristics makes the surface water of the Jigawa Region virtually inadequate, and many people have been forced to invest and venture in to groundwater resources exploitation for both domestic and agricultural use (Dammo *et al.*, 2015; Tukur *et al.*, 2016).

Hadejia River Basin (HRB) is currently a home to nearly 15 million people, hosted and supported by the basin's water resources for their livelihoods. The basin is covered largely by semi-arid and partly by humid climates (Sobowale *et al.*, 2010). However, the combined influence of the natural and human induced factors, such as water shortages due to climatic changes, desert encroachment, increased in population expansion, rainfed and irrigation agricultural improvement, coupled with water quality deterioration due to pollution was recognized as the active cause of the widening inconsistency between demand and supply of fresh water resources in Jigawa Region (Goes, 2001). Despite the visible associated water resources complications in the region, the extent of surface water resources availability issues in the basin has not been fully acknowledged (Goes, 2001). This is indicated by the inadequate water resources availability in Jigawa Region as well as non-existence of lasting policies for fresh water resources management in Jigawa Region (Umar & Ankidawa, 2016). Indeed, synergizing water availability and demand in the face of climate variability and rising population are the major challenges of Jigawa Region in terms of water resources. The dominant drainage system in the area is River Wudil, elsewhere recognized as River Hadejia, which gets its water from River Challawa and flows north east as River Hadejia and finally into Lake Chad. The River is an important part of the Hadejia and Jama' are River System. The river basin occupies a total land area of about 637.013km<sup>2</sup> (Hadejia Jama'are River Basin Development Authority, 2004). This is part of the inland drainage system of the Chad Basin. The river being located in the northern guinea savannah initially has a wide alluvial channel with the beds lower than the beds of the streams and gully channels draining into it and without a true flood plain. It is thus termed as a storm channel.

### **THEORETICAL UNDERPINNING**

The Sustainable Livelihoods Frame Work (SLF) was chosen as the theoretical framework for this research. The paradigm indicated that people's livelihoods are the consequence of a complex interaction of several circumstances that influence their choice of occupation. The Sustainable Livelihoods Framework (SLF) demonstrates that the livelihoods strategy chosen and endowment

of livelihoods assets in a specific institutional and vulnerability situation are dependent on households are dependent on livelihoods assets.

The assets pentagon is at the heart of Sustainable Livelihoods Framework (SLF). Human capital, social capital, physical capital, financial capital and natural capital are the five types of assets divided by this pentagon. The interconnectedness of these five categories of capitals are the key factors of livelihoods options. The quantity and quality of human capital owned by households are both included in pentagon. The quantity of workers available to a household is typically defined in terms of total workers, whereas, the quality of those workers is determined by their degree of education, skill level, and overall health. High-paying livelihood methods can help households with higher human capital quality (Rakodi, 1999). The gift of nature is natural capital, land, forests, biodiversity, wildlife, rivers and other natural resources are all parts of it (Hawken *et al.*, 1999). No manufacturing process can ever be carried out without the usage of natural capital.

Physical capital, on the other hand, is made up of manufactured commodities that are required for the production of other goods. Physical capital includes things like; bridges, roads, irrigation channels and shelter. Households can diversify their livelihoods strategies and engage in high-paying livelihoods strategies with better infrastructure (Scoones, 2000). Financial capital can comprise credit, savings and cash, among others things (DFID, 2000). The existence of banking institutions and livestock are two highly important financial assets for the rural community. Livestock ownership provides a safety net for rural residents and can be utilized in the event of a disaster.

Norms and networks of mutual benefit, as well as trust ties, make up social capital (Putnam, 1993). It comprises of social networks, family and volunteer organizations (Ballet *et al.*, 2007). “Livelihoods Strategies” is another key phrase in Sustainable Livelihoods Framework (SLF).

## **METHODOLOGY**

### **Study Area:**

The research was carried out in the two Local Government Areas (LGAs); Auyo and Kirikasamma, including eight villages (8) (the sectors) in Auyo: Adaha, Ayama, Gamsarka, Ganuwar Kuka, Marina, Yamidi and Zumoni. Another eight (8) villages in Kirikasamma were chosen to act as a control group: Madachi, Jiyan, Masama, Baturiya, Turabu, Sugum, Sunkuye and Fandum. The settlements were located between 1100 and 1300 degrees north latitude and 800 degrees east latitude, and the climate in the research area was characterized by relatively wide and rapid fluctuations in temperature and humidity. In an area that is known for being dry, humidity levels can reach up to 100% at times. The daily minimum and maximum temperatures were relatively 15.100 and 33.100 degrees Celcius.

The State’s estimated population is over 4, 361, 002, 929 people (NPC, 2006). Auyo’s Local Government Area has a population of 132, 001 people, whereas Kirikasamma’s population is 191, 523 people (NPC, 2006). Small-scale farmers use family labour, capital and management to produce the majority of agricultural products in the state, which has a landmass of roughly 22, 410 Sq/km. Millet, sorghum, rice, wheat, cowpea, groundnut, maize, sesame, vegetables and

cotton are among the major crops farmed in the area. Cattles, Sheep, goats and poultry are among the animals raised. Mixed cropping is the predominant cropping pattern in the area, with only few farmers practicing solitary cropping. Millet/Sorghum, Millet/Cowpea and Millet/Groundnuts are the most common crop combinations in the study area. Agriculture in the State, as in other peasant settings, is marked by low levels of productivity due to use of manual tools, little credit, a high level risk (drought, flood, pest and diseases) and illiteracy among others.

**Sampling Procedure and Sampling Size**

The Hadejia Valley Irrigation Project (HVIP) is run by the Hadejia-Jama’are River Basin Development Authority (HJRBD), which is controlled by Nigeria’s Federal Government and provides irrigation water to the sector areas via a barrage at Gamsarka. In the non-sectors areas, private irrigation systems (where farmers employ tube wells) were used as a control for the study. The Hadejia emirate in Jigawa State contains eight (8) Local Government Areas namely: Auyo, Birniwa, Hadejia, Kafin-Hausa, Malam-Madori, Kirikasamma, Guri respectively: Guri, Auyo and Kirikasamma Local Government Areas were chosen for the field study, which constitutes the first stratum.

These were chosen because according to Omonona (2009), whereas Auyo Local Government Area has the Hadejia Valley Irrigation Project (HVIP) developed irrigable areas (known as “sectors”), Kirikasamma Local Government Area has 80% of dry-season irrigation activity in the Hadejia emirate. The village level was the second stratum of the sample technique. A fast tour of all the communities in Auyo and Kirikasamma Local Government Areas was conducted in order to get a general sense of the current status in terms of irrigation technology use. Adaha, Auyo, Ayama, Gamsarka, Ganuwar Kuka, Gatafa, Marina and Yamidi were among the sixteen (16) villages chosen for the study, eight (8) of which were from Auyo Local Government Area. Similarly, eight (8) private in Kirikasamma Local Government Area (Along the tributaries of the rivers) Hadejia and Kafin-Hausa were chosen as non-project areas: Fandum, Ganji, Jiyan, Kubayo, Malinta, Matarar Galadima, Tage and Turabu (non-sector). The sixteen (16) settlements were all located in the same geographical areas. The main survey, which included in-depth data collection in 2019, came in third place in the field work component. Because of the multi-stage random sampling strategy used in this study, which necessitates larger samples than a single design, proportionate random sampling of beneficiaries (207) and non-beneficiaries were interviewed as part of the study’s sample size (Table 1).

Table 1: Population and Sample Size of beneficiaries and non-beneficiaries

<b>Villages</b>	<b>Sampling Frame</b>	<b>Sample Size (5%)</b>	<b>Villages</b>	<b>Sampling Frame</b>	<b>Sample Size (5%)</b>
Adaha	534	27	Fandam	250	13
Ayama	468	23	Ganji	320	16
Auyo	520	26	Jiyan	500	25

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Gamsarka	543	27	Kubayo	180	09
Ganuwar-Kuka	542	23	Malinta	260	13
Gafata	740	37	Matatar Galadima	300	15
Marina	432	22	Tage	400	20
Yamidi	437	22	Turabu	700	25
<b>Total</b>	<b>4126</b>	<b>207</b>		<b>2910</b>	<b>146</b>

Source: Reconnaissance Survey, 2019

**Data collection and sources:**

Both primary and secondary data sources were collected by the investigation. The primary data was collected using standardized questionnaire that was distributed to project and non-project beneficiaries and non-respondents in both project and non-project areas. Information on cropped area under irrigation activities, as well as demographic, socio-economic and institutional data, gathered.

**Analytical Framework:**

The Statistical Programs for Social Scientists (SPSS) and STATA software were used to analyze the data collected. To meet the study's stated aims, the following analysis tools were used:

**Descriptive Statistics:**

Means, percentages, graphs, standard deviation and frequency count were used to summarize, classify and tabulate data on beneficiaries and non-beneficiaries, socio-economic and institutional characteristics, as well as other variables in the study, using descriptive statistics.

**RESULTS AND DISCUSSION**

**Socio-economic and institutional characteristics of beneficiaries and non-beneficiaries:**

The study's first goal was to describe the respondents' socio-economic and institutional features. Age, level of formal education, household size, farm size, non-farm income, cost of hired labour, irrigation farming experience, membership of a water users association, reaches, input subsidy, access to financing and extension visits were among the factors considered. Table 2 summarizes the findings. The table reveals that the respondents ranged in the age from 47 to 45 years old, that the households had an average of 15 21 people, and that there were mean variations in educational levels of 8 to 7 years for beneficiaries and non-beneficiaries respectively. According to the findings of this study, respondents received a wide range off-farm income, ranging from ₦ 137, 797.00 to ₦ 237, 104.00 between beneficiaries and non-beneficiaries.

Findings revealed that a mean of 30 and 24 years of irrigation farming experience, a mean of 3.2 and 2.1 hectares of farm size, ₦ 33, 641.00 and ₦ 55, 709.00. Furthermore, project beneficiaries had fields 3 kilometers from the water supply (barrage), but non-project beneficiaries had farmland 0.9 kilometers from a water source, possibly the river Hadejia. Project recipients received an average of 5 extension visits per season, while non-project beneficiaries received an average of 3 visits per season, according to the findings. In addition, both project and non-projects beneficiaries

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got a mean of ₦ 52, 771.00 and ₦ 50, 205.00 in credit, ₦ 50, 205.68 and ₦ 32, 422.33 in farm input subsidies, in that order. The membership of cooperative societies revealed a mean of 0.8 and 0.5 membership of social organizations registered under the plan (Water User’s Association and Fadama User’s Association for non-project areas respectively).

Table 2: Distribution of beneficiaries and non-beneficiaries by socio-economic and institutional characteristics.

<b>Variables</b>	<b>Respondents’ types</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Min.</b>	<b>Max.</b>
Age	Beneficiaries	207	47	9.4	18	75
	Non-beneficiaries	146	45	11	27	72
Household size	Beneficiaries	207	21	11	0	18
	Non-beneficiaries	146	15	09	0	52
Level of education	Beneficiaries	207	08	07	0	15
	Non-beneficiaries	146	07	07	0	25
Non-farm income	Beneficiaries	207	137, 797	222, 554	1500	1500000
	Non-beneficiaries	146	237, 104	298,047	10000	2000000
Irrigation Farming Experience	Beneficiaries	207	30	13	02	60
	Non-beneficiaries	146	24	11	0	50
Farm size	Beneficiaries	207	3.2	08	01	12
	Non-beneficiaries	146	2.1	02	0.5	07
Cost of hired labour	Beneficiaries	207	33,641	25,408	10000	280000
	Non-beneficiaries	146	55,709	58,460	0	400000
Reaches	Beneficiaries	207	03	02	0	2.4
	Non-beneficiaries	146	0.9	0.2	0	02
Extension visit	Beneficiaries	207	05	03	01	20
	Non-beneficiaries	146	03	0.912	01	04
Credit	Beneficiaries	207	52,771	81,646	0	500000
	Non-beneficiaries	146	50,205.68	51,325.79	0	400000
Subsidy on inputs	Beneficiaries	207	32,422.33	35,138.21	0	500000
	Non-beneficiaries	146	11,917.81	17,850.52		800000
Water/Fadama	Beneficiaries	207	0.845	0.363	0	01

Source: Data Analysis, (2019)

## **CONCLUSION**

The country Nigeria has abundant resources, including water resources, human resources, land resources, oil resources and other natural resources. This study found that rural livelihoods in Hadejia Valley Irrigation Project (HVIP) and Nigeria in general contains a social capital dimension in addition to socio-economic livelihoods and assets dimensions. As a result, the economic activities in which households and their members were involved, as well as the rewards they were able to harvest from them as the key drivers of their living conditions. As a result, the study found that the Hadejia Valley Irrigation Project (HVIP) helped beneficiaries and non-beneficiaries in the study region with their livelihoods.

## **RECOMMENDATIONS**

1. Given that the studied homes had a mean of 15 and 21 people, the government should increase the effort in family planning through birth control.
2. The government should invest human capital development in the rural communities through formal education.
3. Through their affiliation with community and religious organizations, beneficiaries should promote social capital capabilities. More specifically, social capital should be fostered and supported among rural families through religious platforms.
4. The government should provide farm assistance policies/services to rural households in order to improve their welfare.

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