

Impact of Hadejia Valley Irrigation Project (HVIP) on Rural Livelihoods, Household Resource Endowments and Wealth Status of Beneficiaries in Jigawa State, Nigeria

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Abstract: Hadejia Valley Irrigation Project (HVIP) is under Hadejia-Jama'are River Basin Development Authority (HJRBD) owned by the federal government of Nigeria which uses a barrage at Gamsarka to provide irrigation water to the sector areas. It involves the development of land, water resources and irrigation to enhance agricultural production in the predominantly farming communities within the Project area. The major objective of this study was to examine the impact of the project on cropped area under irrigation activities of beneficiaries in the study area. The specific objectives were to: describe the socio-economic and institutional characteristics of beneficiaries and non-beneficiaries and analyse the impact of the project on mean cropped area under irrigation activities of beneficiaries. 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 as the sample size of the study. Data were obtained using a structured questionnaire, analysed by 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 kilometres, 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. This showed that there was disparity in asset ownership between the three quintiles of asset indices for beneficiaries. Also, the correlation analysis found a rank order association between the variables in the population represented in the sample between non-beneficiaries' lower and middle; lower and higher; medium and higher quintiles of asset indices. This revealed that for non-beneficiaries, there was no difference in asset ownership between the three quintiles of asset indices. Therefore, from the results it was concluded that the HVIP contributed to livelihood, resource endowments and wealth status of beneficiaries and non-beneficiaries in the study area. It was recommended that given that the studied homes had a mean of 15 and 21 people, the government should increase efforts in family planning through birth control; the government should invest in human capital development in rural communities through formal education; through their affiliation with community and religious organisations, beneficiaries should promote social capital capacities; more specifically, social capital should be fostered and supported among rural families through religious platforms, and the government should provide farm assistance policies/services to rural households in order to improve their welfare.

Key words: Irrigation Household wealth Rural economy Farm assistance

INTRODUCTION

The use of unidimensional methodologies to studying living standards and human welfare has given

way to multidimensional approaches. Initially, studies mostly focused on calorie intake, income, and expenditures. One of the first ideas to shift the focus from unidimensional to multidimensional metrics was Sen's capability approach. To assess human wellbeing, this approach employs the ideas of 'functionings' and

'capabilities' (Sen, 1999). The Human Development Index was created as a result of Sen's capability theory (HDI). HDI measures human wellbeing in three dimensions: health, education, and resource access, using four indicators. The UNDP then created a new program called Millennium Development Goals (MDGs) (MDGs). This project also called for intervening in non-monetary aspects of wellness in addition to monetary ones (Vandemoortele, 2009).

A large body of research demonstrates the importance of various assets in households' adoption of livelihood strategies. The Sustainable Livelihoods Framework (SLF) of the Department for International Development (DFID) is the most extensively used framework in livelihood studies (Lautze and Raven, 2006). As a result, this paradigm will be applied in the current study as well. SLF was used for this study since it was designed for rural areas and has been used frequently in investigations similar to this one. Zhong et al. (2015), Chowdhury (2015), and Xu (2015), are some of the studies mentioned.

However, in rural Nigeria, a livelihood is made up of a variety of farm and off-farm activities which together bring a mixture of procurement sources for food and cash. But, within the sustainable livelihoods framework, three broad groups of livelihood strategies are identified. These are: agricultural intensification, extensification, livelihood diversification and migration. Generally, these are believed to cover the range of options open to rural people. Either one gains livelihood from agriculture: (including; crop cultivation, livestock rearing, aquaculture, forestry etc.) through processes of intensification (more output per unit area through capital investment or increases in labour inputs or irrigation in the dry season): extensification (more land under cultivation): diversifies to a range of off-farm income earning activities: moves away and search for a livelihood elsewhere, either temporarily or permanently. Or more commonly, pursues a combination of strategies together or in sequence.

Nonetheless, Nigeria's rural agricultural sector like most African economies is characterised by small-scale resource-poor farmers and also by informal traders cutting across both gender groups (Omonona, 2009). The country is endowed with significant resources including human resources, land, oil and other natural resources. Therefore, important determinants of living conditions of households and their members will be the economic activities in which they are engaged and the returns they are able to reap there from. This study aimed to fill this important gap in irrigation literature in terms of clarifying the contribution of the HVIP on livelihood, resource endowments and wealth status of beneficiaries and non-beneficiaries in the study area. The study achieved the following objectives:

- i. To describe the socio-economic and institutional characteristics of beneficiaries and non-beneficiaries and of the project, and
- ii. To assess the livelihoods, household resource endowments and wealth status between beneficiaries and non-beneficiaries in the study area.

CONCEPTUAL FRAMEWORK

SLF was chosen as the theoretical framework for this research. Figure 1 shows how it is done. This paradigm indicates that peoples' livelihoods are the consequence of a complex interaction of several circumstances that influence their choice of occupation. SLF demonstrates that the livelihood strategy chosen and the endowment of livelihood assets in a specific institutional and vulnerability situation are dependent on households' endowment of livelihood assets.

The assets pentagon is at the heart of 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 is a key factor of livelihood options (DFID, 2000). The quantity and quality of human capital owned by households are both included in the 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 part 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 livelihood strategies and engage in high-paying livelihood strategies with better infrastructure (Scoones, 2000). Financial capital can comprise credit, savings, and cash, among other 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 utilised 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 social networks, family, and volunteer organizations (Ballet et al., 2007). "Livelihood strategies" is another key phrase in SLF

Sustainable livelihoods framework

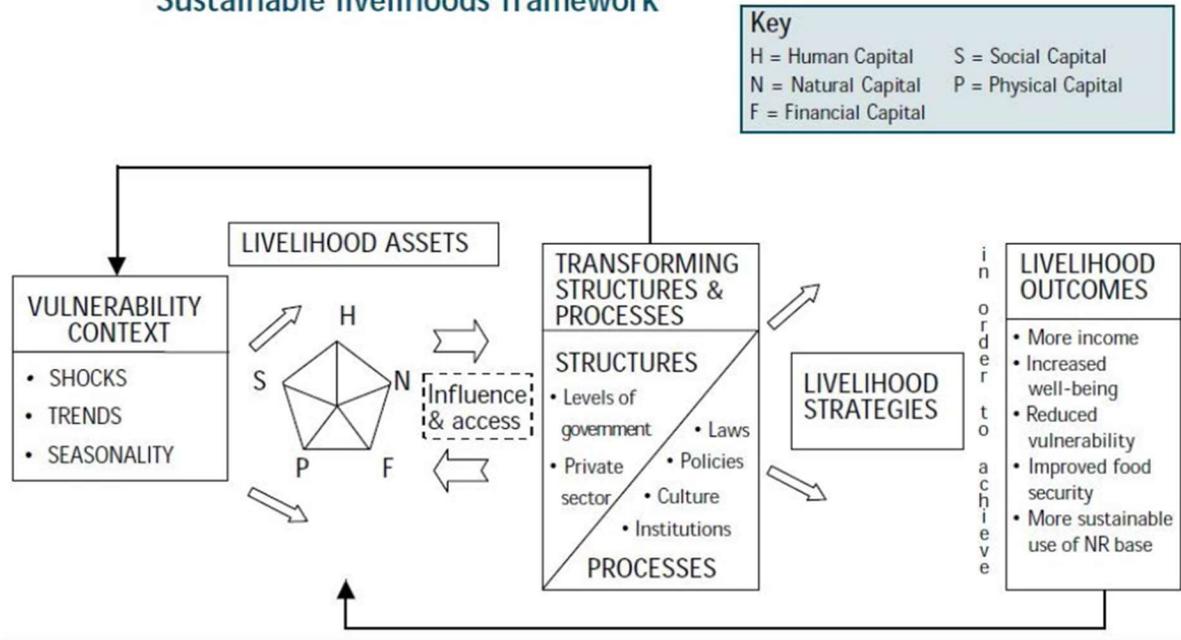


Fig 1.: Sustainable livelihoods framework

METHODOLOGY

Study Area: The research was carried out in two Local Government Areas (LGAs); Auyo and Kirikasamma, including eight (8) villages (the sector) in Auyo: Adaha, Auyo, 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 100% at times. The daily minimum and maximum temperatures were respectively 15.100 and 33.100 degrees Celsius.

The state's estimated population is 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 labor, 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. Cattle, sheep, goats, and poultry are among the animals raised.

Mixed cropping is the predominant cropping pattern, with only a few farmers practicing solitary cropping. Millet/sorghum, millet/cowpea, and millet/groundnut are the most common crop combinations. Agriculture in the State, as in other peasant settings, is marked by low levels of productivity due to the use of manual tools, little credit, a high level of risk (drought, flood, pest and disease), and illiteracy.

Sampling procedure and sample 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 Local Government Areas (LGAs)—Auyo, Birniwa, Hadejia, Kafin-Hausa Mallam-Madori, Kirikasamma, and Guri—and the Auyo and kirikasamma LGAs were chosen for the field study, which constitutes the first stratum.

These were chosen because, according to Omonona (2009), whereas Auyo LGA has the HVIP developed irrigable areas (known as "sectors"), Kirikasamma LGA has 80 percent of dray-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 the Auyo and Kirikasamma LGAs 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 villages chosen for the study, eight of which were from the Auyo LGA. Similarly, eight private farms in Kirikasamma LGA (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-sectors). The sixteen settlements were all located in the same geographical area.

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 (146) was done. A total of 353 beneficiaries and non-beneficiaries were interviewed as part of the study's sample size (Table 1).

Table 1: Population and sample sizes of beneficiaries and non-beneficiaries

Villages	Sampling frame	Sample size (5%)	Villages	Sampling frame	Sample size (5%)
Adaha	534	27	Fandum	250	13
Ayama	468	23	Ganji	320	16
Auyo	520	26	Jiyan	500	25
Gamsarka	543	27	Kubayo	180	9
Ganuwar Kuka	542	23	Malinta	260	13
Gatafa	740	37	Matarar Galadima	300	15
Marina	432	22	Tage	400	20
Yamidi	437	22	Turabu	700	25
Total	4126	207		2910	146

Source: Reconnaissance Survey (2019).

Data collection and sources: Both primary and secondary data sources were employed in the investigation. The primary data was collected using a 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, was 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. They were employed to accomplish goals 1 and 2

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 labor, 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 age from 47 to 45 years old, that households had an average of 15 to 21 people, and that there were mean variations in educational levels of 8 and 7 years for beneficiaries and non-beneficiaries, respectively. According to the findings of this study, respondents received a wide range of off-farm income, ranging from ₦137,797.00 to ₦237,104.00 between beneficiaries and non-beneficiaries.

The findings revealed 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 a water supply (Dam), 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-project beneficiaries got a mean of N 52, 771.00 and N 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 Users' Association and Fadama Users' Association for non-project areas, respectively).

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

Variables	Respondents' type	N	Mean	SD	Min.	Max
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	9	0	52
Level of education	Beneficiaries	207	8	7	0	15
	Non-beneficiaries	146	7	7	0	25
Non-farm income	Beneficiaries	207	137,797	222, 554	1500	1500000
	Non-beneficiaries	146	237,104	298,047	10000	2000000
Irrigation farming	Beneficiaries	207	30	13	2	60
Experience	Non-beneficiaries	146	24	11	0	50
Farm size	Beneficiaries	207	3.2	8	1	12
	Non-beneficiaries	146	2.1	2	0.5	7
Cost of hired labour	Beneficiaries	207	33,641	25,408	10000	280000
	Non-beneficiaries	146	55,709	58,460	0	400000
Reaches	Beneficiaries	207	3	2	0	2.4
	Non-beneficiaries	146	0.9	0.2	0	2
Extension visit	Beneficiaries	207	5	3	1	20
	Non-beneficiaries	146	3	0.912	1	4
Credit	Beneficiaries	207	52,771	81,646	0	500000
	Non-beneficiaries	146	50,205.68	51325.79	0	400000
Subsidy on inputs	Beneficiaries	207	32,422.33	35138.21	0	500000
	Non-beneficiaries	146	11,917.81	17850.92	0	800000
Water/Fadama	Beneficiaries	207	0.845	0.363	0	1
Users' Association	Non-beneficiaries	146	0.52	0.501	0	1

Source: Reconnaissance Survey (2019).

A. Household wealth and resource endowments: The farm households participated in the study were found to have a variety of resources. Project and non-project areas had different levels of access to these resources. The level of resource endowment was a useful indicator of a household's wealth position.

It was also emphasized that, rather than focusing just on land or other traditional wealth indicators, the Sustainable Rural Livelihood Framework (SRLF) recommended considering an asset portfolio comprised of five types of assets:

B. Access to human capital assets: refers to physical assets that have been created as a result of human activity but have yet to be used. Any type of economic activity necessitates the use of capital. Education, skills, knowledge, health, nutrition, and labor power are all human capital assets that can be accessed in this research

area. The majority of agricultural operations in the surveyed project and non-project regions were done by hand. In farm operations, the farm family was actually the most important source of labor.

The findings revealed that families with 16-20 people had better access to labor resources, with a range of 16-20 people scoring the greatest percentage (38%) in the project area and 6-10 people scoring (46%) in the non-project region. It meant that massive housing holdings dominated the area.

This also indicated that the respondents had sufficient family labor to grow big farm sizes, as evidenced by the medium and large farmers in the project and small farmers in the non-project area. In terms of skill acquisition, the outcomes of this study demonstrated that there were a variety of sources for learning pump operating skills in the field (Fig. 2).

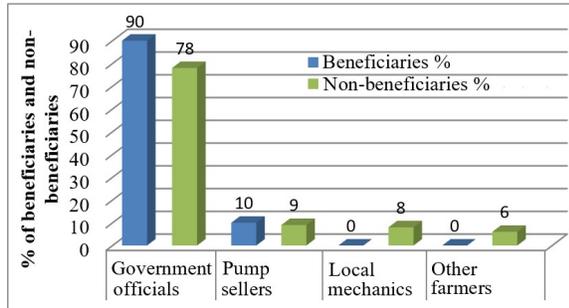


Fig. 2: Distribution of sources of training

A. Access to natural capital assets: Land, water, forest, marine resources, air quality, erosion prevention, and biodiversity were all considered natural/land capital assets. According to the kind of land ownership, 99 percent of beneficiaries and 72 percent of non-beneficiaries received their land through inheritance.

Also, despite the increasing demand on land resources due to population growth, over 19 percent of non-beneficiaries continued to hire land and acquire it through donations (Figure 3). However, the project's overall cultivated area was 658 hectares (maize 156 hectares and rice 502 hectares), with 278 hectares in the non-project area (maize 132 has and rice 146 has). This indicated that beneficiaries allocated more acreage to both project crops than to non-project crops.

Beneficiaries and non-beneficiaries (23 percent and 32 percent, respectively) reported fishing as an extra source of income when it came to marine resources.

In terms of environmental protection, 99 percent of project beneficiaries indicated that they were willing to participate, whereas just 4% of non-project beneficiaries indicated that they were willing to contribute.

When asked why they were unable to protect the environment, 98 percent of project beneficiaries cited a lack of funds as the primary cause, whereas 98 percent of non-project beneficiaries cited other factors.

B. Access to physical assets: Transportation, roads, buildings, shelter, water supply and sanitation, energy, technology, communications, and other household assets were all considered in this study. In the research region, there were several types of dwellings that were typical of households. Mud huts, brick and block dwellings with various roofing materials, and pole and dagma houses with grass thatched roofs are among them.

Mud (64%) and concrete (4% and 0%) houses were the most prevalent types of housing in the project region, but mud houses were more popular in the non-project area, utilizing a very traditional housing technique and

were widely used by households in both locations, despite the fact that they were less expensive to build. Although they were less expensive to build, they were readily destroyed during the rainy season, as evidenced by the high number of house repairs (30% and 28%) (Table 3). In any event, families that could afford either sort of home were considered well-off.

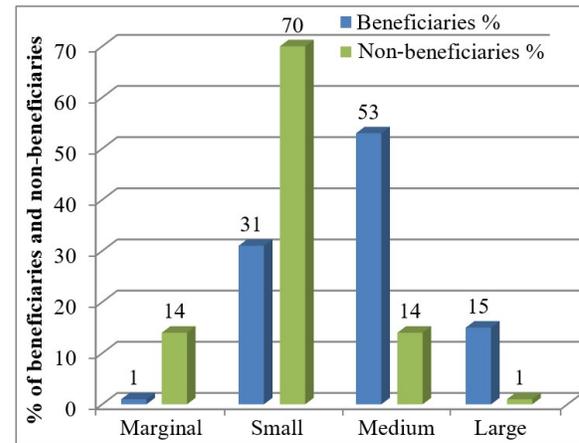


Fig. 3: Distribution of farmers

A tractor and a pumping machine, which are employed in farm activities and for raising water for irrigation, were owned by 4% of beneficiaries, while none of the non-beneficiaries owned a tractor and roughly 25% owned pumping machines.

Automobiles were purchased by 1% of both beneficiaries and non-beneficiaries. Motorcycles were purchased by 44 percent of beneficiaries and 23 percent of non-beneficiaries, respectively.

Bicycles were the most common mode of transportation in northern Nigeria, with roughly 23% of non-beneficiaries in the research area owning at least one, but no beneficiaries.

A refrigerator was owned by 1% of respondents, whereas a generator was held by 1% of non-beneficiaries. Radio and video were purchased by 3% of the tested households as essential sources of information and enjoyment.

Only 1% of those who benefited had access to television. Non-beneficiaries possessed 32 percent, 3 percent, and 4 percent of these information and communication instruments, respectively.

Although not widespread in the tested households in the Project area, about 1% of non-project area households owned a VCD and satellite, and 17% got a rechargeable bulb.

Table 3: Proportional distribution of assets of beneficiaries and non-beneficiaries: Hadejia Valley Irrigation Project (n=353).

Assets	Beneficiaries		Non-beneficiaries	
	Frequency	Percent (%)	Frequency	Percent (%)
A. Buildings:				
a. Mud house	141	68	28	19
b. Concrete house	8	4	0	0
B. Farm equipment:				
a. Tractor	83	40	0	0
b. Pumping machine	8	4	37	25
C. Vehicles:				
a. Car	2	1	2	1
b. Lorry	0	0	0	0
c. Motorcycle	91	44	34	23
d. Bicycle	0	0	25	17
D. Electrical appliances:				
a. Refrigerator	2	1	2	1
b. Generator	0	0	2	1
E. Electronics:				
a. Radio	6	3	32	22
b. Video	6	3	4	3
c. Television	2	1	6	4
d.VCD	0	0	2	1
e. Satellite	0	0	2	1
f. Rechargeable lamp	0	0	25	17
F. Farm animals:				
a. Cattle	153	74	41	28
b. Sheep	52	25	41	28
c. Goats	10	5	19	13
d. Poultry	0	0	20	14

Source: Reconnaissance Survey (2019).

C. Access to financial assets: Savings (cash and liquid assets), loans (formal and informal), and cash inflows were all examples of financial assets (state transfers and remittances). As previously stated, the availability of financial resources was a major factor in determining the extent of arable crop lands in the research area. The availability of credit or financial resources permitted timely access to enough inputs for the execution of all field operations. Credit could encourage farmers to spend more heavily in newly developed technologies.

The study's findings, on the other hand, revealed that both localities have limited access to credit and credit facilities. The average credit disparity between project beneficiaries and non-beneficiaries was ₦52,771.00 and

₦50,205.68 naira, respectively. However, 27 percent and 44 percent of project and non-project farmers, respectively, said that they had received no answer in terms of loans. Although a higher proportion of project beneficiaries have access to credit, the average amount of credit received in non-project regions was significantly lower (Fig. 4).

Further conversations with key informants (KI) revealed that some of the households without access to credit were unaware that credit was available. This could be owing to the perceived bureaucratic processes involved in loan distribution, as well as the high interest rates paid on credit and the requirement for collateral. The study found that most project beneficiaries had a low

mean off-farm income of ₦137,797.00, compared to non-project beneficiaries who received ₦237,104.00.

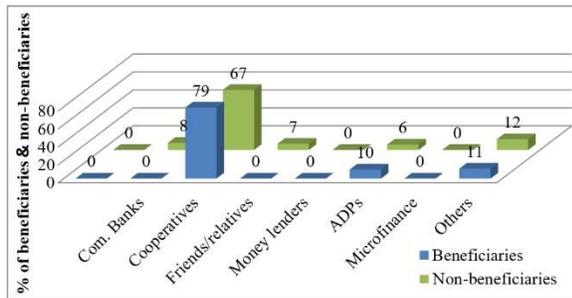


Fig. 4: Sources of credit

Cooperatives were used by 79 percent of beneficiaries and 67 percent of non-beneficiaries, respectively. ADPs were used by 10% and 6% of respondents, respectively, while others were utilized by 11% and 12%. Despite the fact that no beneficiary sought credit from commercial banks, acquaintances, or family, 8% and 7% of non-beneficiaries did.

One of the more unexpected findings was that no one in the research region used microfinance as a source of credit, despite the fact that one exists in Hadejia (the emirate capital) (Figure 4).

D. Access to institutional and social assets: Access to institutional and social assets, such as trust-building networks, the ability to collaborate, access to opportunities, and reciprocity; informal safety nets; and organizational participation.

The percentage of project and non-project beneficiaries who belonged to a social organization registered under the scheme (WUA and FUA for the non-project area) was 100 percent and 56 percent, respectively, indicating that the more farmers participated in cooperative societies, the better their ideas, knowledge, and other benefits.

Table 2 shows that project and non-project beneficiaries received an average of 5 and 3 extension visits, respectively. This meant that both groups may use extension services.

On the ability to work together, 100 percent of project and non-project beneficiaries were satisfied with their neighbors, indicating that the study's environment was favorable. However, when it came to access to opportunities, 100 percent of beneficiaries got water pumps from open marketplaces, while 84 percent of non-beneficiaries got them from the same place, with 16

percent getting them from the government, possibly through the National Fadama Program.

Access to services such as roads was indicated by 98 percent of beneficiaries, but non-beneficiaries in the research area did not name any services.

The project area had a wider range of cooperative association experiences than the non-project area. In the project region, durations of 1-5 years were recorded at 45 percent, 16-20 years at 23 percent, and 1 year at 38 percent, whereas in the non-project area, durations of 1-5 years were reported at 68 percent and 1 year at 38 percent.

In terms of reciprocity, 92 percent and 70 percent of both beneficiaries and non-beneficiaries cited information as the most valuable advantage of being a member of an association, respectively (Fig. 5).

Access to capital was cited by 8% and 7% of respondents, respectively. In the case of non-beneficiaries, access to commodities, services, and labor was increased by 15%.

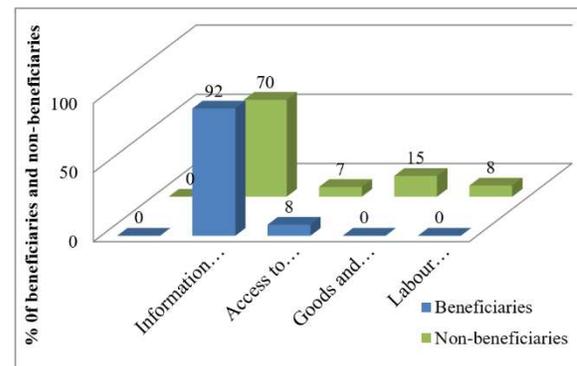


Fig. 5: Distribution of WUA/FUA benefits

E. Indicators of household assets: The last three columns show the mean of each variable by the asset indices' lowest 40 percent, middle 40 percent, and highest 20 percent. The majority of individuals in the lowest quintile (the bottom 40%) possessed both mud and concrete buildings, as well as tractors, water pumps, and motorcycles.

The bulk of individuals in the top 20% of the distribution, on the other hand, lived in mud and concrete dwellings with no tractors, water pumps, or dryers. They did, however, own automobiles, trucks, and motorcycles, but no bicycles (Table 4).

Table 4; Summary of beneficiaries' asset characteristics

Assets	Sum	Mean	Std	Low (40%)	Medium (40%)	Highest (20%)
MD	196	1	0.22857	0.87654	0.9878	1
CC	81	0.03382	0.18195	0.02469	0.06098	0.13333
TR	54	0.26087	0.44017	0.1358	0.52439	0
WP	7	0.03382	1.81195	0.02469	0.06098	0
DR	0	0	0	0	0	0
CR	22	0.15172	0.35997	0	0.01754	0.67741
LR	15	0.10345	0.3056	0	0.01724	0.45161
MC	81	0.3913	0.48923	0.39759	0.3625	0.43182
BC	1	0.00483	0.0695	0	0.0122	0

Furthermore, among non-project beneficiaries, the majority of those in the lowest quintile (the bottom 40%) lived in mud huts and owned water pumps, dryers, motorcycles, and bicycles. On the other hand, the vast majority of those at the top of the income scale (the top

20%) also lived in mud houses with tractors, water pumps, and dryers.

They did, however, own motorcycles and bicycles, but no cars or trucks (Table 5).

Table 5: Summary of non-beneficiaries' asset characteristics

Assets	Sum	Mean	Std	Low (40%)	Medium (40%)	Highest (20%)
MD	83	0.57241	0.49644	0.53571	0.53448	0.7097
CC	4	0.02609	0.16435	0	0	0
TR	8	0.05517	0.22911	0	0	0.25806
WP	120	0.82759	0.37905	0.75	0.81035	1
DR	20	0.13793	0.34602	0.01786	0	0.6129
CR	3	0.01449	0.1198	0	0.06585	0
LR	0	0	0	0	0	0
MC	99	0.68276	0.46702	0.66071	0.63793	0.80645
BC	88	0.55172	0.49904	0.41071	0.53448	0.83871

The asset indices were used as measures of livelihood to investigate their prediction potential using Spearman's correlations. For all values of $r \geq 0.2011$ and $r \geq 0.9395$, all correlations were in predicted directions and were virtually statistically different from zero, i.e. at $df = n - 2 * 9 - 2 = 7$, $N = 7$ to ∞ ; .01(10 percent). After taking significant correlation ($p < 0.01$ or $p > 0.05$) values into account, the end results were characterized as strong ($r = 0.7-1$), moderate ($r = 0.5-0.7$), or low ($r = 0.3-0.5$) according to the degree of relationship. The statistically significant strong positive correlation between lower and middle $r = 0.9395$ and low positive correlation between lower and higher $r = 0.2011$; medium and higher $r = 0.3117$ quintiles of asset indices for beneficiaries was discovered using Spearman's correlation analysis.

Non-beneficiaries' asset indices showed a statistically significant strong positive connection between the lower and middle $r = 0.88664$; lower and higher $r = 0.909$; middle and higher $r = 0.756$ quintiles.

Impliedly, 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. This showed that there was disparity in asset ownership between the three quintiles of asset indices for beneficiaries.

The correlation analysis found a rank order association between the variables in the population represented in the sample between non-beneficiaries' lower and middle; lower and higher; medium and higher

quintiles of asset indices. This revealed that for non-beneficiaries, there was no difference in asset ownership between the three quintiles of asset indices.

Coping mechanisms in households: Crop farming and livestock rearing were the study area's primary sources of income for rural farm households. Respondents also worked off-farm to supplement their income. However, guaranteeing regular access to water lifting facilities such as pumping machines was one of the coping mechanisms utilized by both beneficiaries and non-beneficiaries to mitigate production risks. Another coping method used by both beneficiaries and non-beneficiaries was to change the distribution of land to important crops. In addition, the study discovered differences in the conduct of both beneficiaries and non-beneficiaries. Their irrigation activities were both specialized and diverse.

CONCLUSIONS

The country has abundant resources, including human resources, land, oil, and other natural resources. This study found that rural livelihood in Nigeria contains a social capital dimension in addition to socioeconomic, livelihood, and asset 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, were key drivers of their living conditions. As a result, the study found that the HVIP helped beneficiaries and non-beneficiaries in the study region with their livelihood, resource endowments, and wealth status.

RECOMMENDATIONS

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

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