Direct Research Journal of Agriculture and Food Science
Vol. 11(9), Pp. 274-282, September 2023
ISSN: 2354-4147
DOI: https://doi.org/10.26765/DRJAFS83728459
Article Number: DRJAFS83728459

https://directresearchpublisher.org/drjafs/

Original Research

Effect of Rural Infrastructure on Livelihood of Farmers in Niger Delta Area, Nigeria

Owigho, O.[1]*, Eromedoghene, E.O.[2], Ebewore, S. O.[2], and Ofuoku, A. U.[2]

[1]Department of Agricultural Economics, Faculty of Agriculture, Delta State University of Science and Technology, Ozoro Delta State, Nigeria.
[2]Department of Agricultural Extension, Faculty of Agriculture, Delta State University, Abraka. Delta State, Nigeria.
*Corresponding Author E-mail: owighoovo@gmail.com

Received 11 August 2023; Accepted 19 September 2023; Published 28 September 2023

ABSTRACT: This research was designed to evaluate the effects of rural infrastructure provided by Government, NGOs/Corporate Organizations, and self-help on the livelihood of farmers in Niger Delta area, Nigeria. The specific objectives were to identify the socio-economic characteristics of the farmers, establish the livelihood status of farmers in the study area, identify the Government, NGOs/Corporate Organizations, and self-help rural infrastructure in the study area, and determine the state of infrastructure provided by government, NGOs/Corporate Organizations, and self-help. The multi-stage sampling procedure was used to select a sample size of 450 with the aid of a questionnaire. Descriptive and inferential statistics were used for data analysis. The result on livelihood was positive, with a Livelihood status index of 0.73, indicating that 73% of the farmers had good livelihood status in the study area. The respondent identified eleven (11) infrastructures, and the infrastructure provided by self-help had six infrastructures that was in a good state. Community centres/halls (M=3.72), Access road (untarred) (M=3.62), Potable water (M=3.56), Agro-Processing facilities (M=3.17), security service (M=2.93) and Market /Stalls (M=2.60). The Cox & Snell R^2 value of 0.314 and the Nagelkerke R^2 value of 0.437 showed the amount of variance explained by the model, and the chi-square value of 30.902 with 3 degrees of freedom is highly significant ($p<0.001$).The study recommends, among others, that the Government should offer an infrastructure framework that is adapted to rural farmers' perceived needs to improve the livelihood activities among rural communities.

Keywords: Rural, infrastructure, livelihood, farmers, Niger Delta
Citation: Owigho, O., Eromedoghene, E. O., Ebewore, S. O., Ofuoku, A. U. (2023). Effect of Rural Infrastructure on Livelihood of Farmers in Niger Delta Area, Nigeria. Direct Res. J. Agric. Food Sci. Vol. 11(9), Pp. 274-282. https://doi.org/10.26765/DRJAFS83728459. This article is published under the terms of the Creative Commons Attribution License 4.0.

INTRODUCTION

Agriculture, despite being the backbone of Nigeria's economy, has remained underdeveloped in Nigeria and most of Sub-Saharan Africa (SSA). It is one of the major sectors of the economy that requires continuity for sustainable food security, poverty reduction and rural development in Nigeria (Odjebor *et al*., 2022; Owigho *et al.,* 2023). According to Ayuk (2014), most of the population resides in rural areas and is either directly or indirectly dependent on agriculture. The sector has a significant impact on people's access to food. It employs between 60 and 75 percent of the labour force on the continent and boosts GDP by 8 to 45 percent (World Bank, 2010; Ayuk, 2014). According to Nedozi et al. (2014), infrastructure is defined as the principles, necessary services, or facilities that promote development. The infrastructure supports economic

growth by enhancing productivity and offering services that raise the standard of living, claim Gaal and Afrah (2017). In a larger sense, infrastructure covers all public services like water supply, market stalls, transportation, storage facilities, and public health (Nedozi et al., 2014). Critical analysis of the link between socioeconomic infrastructure and rural development is required in the global effort to promote rural development. For rural development and job creation, which raises the living standards of rural farmers and lowers the prevalence of rural poverty, infrastructures, including roads, electricity, education, healthcare services, communication, water, and markets, are crucial. Gaal and Afrah (2017) stated that there are three ways to look at the significance of infrastructure to rural socioeconomic life. First, they encourage economic activity; second, they advance societal well-being; and third, they reduce rural depopulation.

Infrastructure's significance in satisfying the needs of rural farmers rests heavily on or is related to the amount, quality, and dependability of the infrastructures that are present there (Ebewore, 2021). Since it is commonly accepted that agriculture predominates in rural regions, rural development must understand how these farmers view the impact of infrastructure on their way of life. According to (Hassan et al., 2022), a number of interventions (infrastructures) offered by various administrations in government or non-governmental organizations are either non-functional or in disrepair. Therefore, it is necessary to review them in order to tell policy and government makers about their significance in helping to improve rural areas' infrastructure (Onwujekwe et al., 2022).

Research questions

The following research questions guided the study:

i. What are the socio-economic characteristics of farmers in the study area?
ii. What is the livelihood status of the farmers in the study area?
iii. What are the government, NGOs/Corporate Organizations, and self-help rural infrastructure available in the study area?
iv. What are the states of infrastructure provided by the Government, NGOs/Corporate Organizations, and self-help in the study area?

The general objective of the study is to examine the effect of rural infrastructure on the livelihood of farmers in Niger Delta area, Nigeria. The specific objectives were to:

i. identify the socio-economic characteristics of the farmers in Edo State,
ii. establish the livelihood status of farmers in the study area,
iii. identify the Government, NGOs/Corporate Organizations, and self-help rural infrastructure in the study area, and
iv. determine the state of infrastructure provided by government, NGOs/Corporate Organizations, and self-help.

Hypothesis

Rural infrastructure state does not significantly affect the livelihood of farmers.

MATERIALS AND METHODS

The study area

The Niger Delta Area in Nigeria is the second largest delta in the world, covering over 20,000 km2 and being the largest wetland in Africa. It is divided into four ecological zones: coastal Inland zone, Mangrove swamp zone, freshwater zone, and low forest zone. The region is rich in oil and has faced challenges from oil companies' activities, gas flaring, and climate change. The Niger Delta is made up of nine states: Cross River, Edo, Delta, Abia, Imo, Bayelsa, River, Akwa-Ibom, and Ondo. The region is home to 21% of Nigeria's population and represents 12% of Nigeria's total surface area. The Niger Delta is home to over 31 million people from over 40 ethnic groups and has two seasons: wet and dry. The region is located on latitudes 4°15°N and 4°50°N and longitudes 5°25°E and 7°37°E.Contributor to the economy, with crops like oil palm, rubber, cocoa, and cassava being cultivated (Figure 1).

Sampling procedure

The sample size was created using a multi-stage random technique. First, three of the nine states that make up the Niger Delta region were chosen at random. Secondly, two Local Government Areas were selected at random from the agricultural zone that each state had chosen. Thirdly, a total of 12 communities were selected by drawing two from each of the Local Government Areas. Finally, the sampling frame of 4533 household heads was composed of the rural farmers in the selected communities. 450 homes heads, representing 10% of rural farming household heads, were randomly chosen from the chosen localities. To gather the survey data, questionnaires and interview schedules were used. Field extension agents gave surveys to each farmer they visited (Table 1).

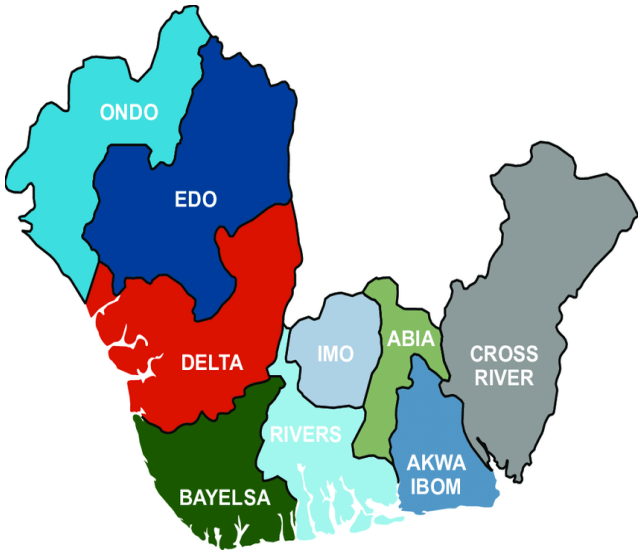

Figure 1: Map of Niger Delta region. Source: *Federal Republic of Nigeria (2020)*

Table 1: Sample size distribution.

Agricultural Zones	Local Government Area	Communities	Total household heads	Number of selected respondents (10%)
Delta South	Isoko North	Egbahe	61	6
		Ofagbe	270	27
	Patani	Okoloware	121	12
		Oporoza	96	10
Delta North	Ndokwa East	Onogbokor	182	18
		Umuolu	256	27
	Ukwuani	Obi-ogbe	150	15
		Ezionum	132	13
Delta Central	Ethiope East	Kokori	174	17
		Oria-Abraka	86	9
	Ughelli North	Ejekota	134	13
		Eboh	91	9
Sub-total Delta				**176**
Edo North	Akoko Edo	Ikpeshi	152	15
		Ibillo	174	17
	Etsako East	Imiegba	167	17
		Okpekpe	91	9
Edo Central	Esan West	Uzairue	143	14
		Idumebo	77	8
	Esau Central	Egbor Camp	143	14
		Uzogholo	113	11
Edo South	Ovia North-East	Edaidolor	127	13
		Oluku	114	11
	Orhionmwon	Orogho	102	10
		Evboesi	126	13
Sub-total Edo				151
Bayelsa East	Nembe	Ogboloma	83	8
		Ogbolomabiri	44	4
	Ogbia	Ewoi	71	7
		Kolo	54	5
Bayelsa Central	Yenagoa	Ovom	49	5
		Amarata	102	10
	Kolokuma	Odi	274	27
		Opokuma	157	16
Bayelsa West	Ekeremor	Ekeni	121	12
		Azama	162	16
	Sagbama	Ofoni	89	9
Sub-total Bayelsa		Sampou	45	4 (123)
Total			4,533	N = 450

Source: field data, 2023

Table 2: Socio-economic Characteristics of the Farmers (n = 450).

Characteristics	Frequency	Percentage	Mean	Mode
Sex				
Males	183	40.7		
Female	267	59.3		Female
Age				
Middle age			46	
Marital Status				
Married	296	65.8		Married
Single	89	19.8		
Divorced	40	8.9		
Widowed	25	5.6		
Educational level				
No Formal Education	67	14.9		
Primary School Leaving Certificate	33	7.3		
SSCE	139	30.9		Tertiary education
Tertiary Education	211	46.9		
Occupation:				
Farming	225	50.0		Farming
Civil Service	143	31.8		
Unemployed	82	18.2		
Farm size				
<2 Ha	331	73.6	< 2 Ha	
2 Ha	119	26.4		
Type of enterprises (*Multiple responses)*				
Arable	234	52.0		
Perennial	58	12.9		
Livestock	143	31.8		
Processing	50	11.1		
Households size				
1-4 persons	205	45.6	6	
5-8 persons	196	43.6		
9-12 persons	47	10.4		
Above 12 persons	2	0.4		
Income				
<100,000	157	34.9		
101,000-200,000	147	32.7	<₦100,000	
201,000-300,000	78	17.3		
301,000-400,000	22	4.9		
401,000-500,000	17	4.9		
Above 500,000	29	6.4		

Source: field data, 2023

Method of data analysis

In analyzing the data, descriptive statistics (simple percentages, frequency counts, mean, frequency tables) and inferential statistics were used. A 4-point Likert-type scale of strongly agree = 4, agree = 3, disagree = 2, and strongly disagree = 1 was used to determine their responses to perceived statements on infrastructures. The inferential statistics used to test the stated hypothesis was the logistic regression model.

RESULTS AND DISCUSSION

Socio-economic characteristics of the farmers

Sex

Table 2 showed that majority (59.3%) were female and were involved in farming activities. The higher proportion of females in this study suggests that there were more female farmers in the studied area. According to this study, women in the Niger Delta area currently participate in agricultural activities at a higher rate than men do. This finding is in line with a previous study by Ebewore (2021). This socioeconomic trait of the respondent was also at odds with earlier research by Emokaro and Oyoboh (2016), which showed that male dominance affected how rural infrastructure affected smallholders' ability to support themselves in the study area. Despite the patriarchal character of the Nigerian economy, Table 2 demonstrates the critical role that women play in the rural sector.

Age distribution

The mean age of the respondents was 46 years. The result indicates that the farming population is ageing. This finding is in line with earlier authors' claims that older

farmers predominate in rural Nigerian farming because of young people migrating to metropolitan regions in quest of white-collar jobs (Ovharhe et al., 2020; Ebewore 2021). In a similar research, Ovwigho and Ifie (2009) asserted that youth migration to urban regions in Nigeria has a number of repercussions, including years of farm size reduction and low improvement in farming operations. An older farmer may earn less money, which will then have an impact on their way of life.

Marital status

The farmers' marital status data revealed that the majority (65.8%) of them were married. The highest percentage of married respondents suggests that there is an adequate labour pool for farming operations in the growth of the family and society (Pierotti et al., 2002; Eromedoghene et al., 2023).

Educational level

The result revealed that majority (46.9%) had tertiary education. The respondents' predominant educational background was tertiary, which suggests that many of them were university or polytechnic graduates or professional teachers who had their postsecondary education in colleges of education. The association between a farmer's education and agricultural productivity, according to Ajayi and Olutumise (2018), makes more educated farmers more successful, which can also improve their livelihoods.

Occupation

The result in (Table 2) revealed half of the respondents (50.0%) were farmers. The connection between agriculture, rural infrastructure, and farmers' income is crucial because agriculture is the cornerstone of the rural economy and the primary source of labour and income for the majority of rural residents in Nigeria (World Bank, 2014; Pierotti et al., 2002).

Type of enterprises

The result in (Table 2), the result showed that majority (52.0%) of the respondents were arable crop farmers. The study reveals that the farmers' businesses demonstrate a stage of economic productivity, which can be enhanced by a supportive environment and improved agricultural practices (Eromedoghene and Ovwigho, 2019).

Household size

The result in (Table 2) revealed that most (45.6%) of the respondents had 6 persons in their household. This findings is supported by Akeni et al., (2023), who found that farmers had an average household of 4-6. This implies that farmers with large household sizes dominate the study.

Income

The results on farmers' income showed that majority (34.9%) of the farmers earn 100,000. This is consistent with Ekong, (2003) assertion that the implementation of requisite infrastructure and technology will considerably boost rural economics and output. This showed that infrastructure development is necessary to raise the average cost of living for a sizeable section of the population of the nation. The presence of these infrastructures in the study area has a favourable impact on the farmers' financial situation.

Livelihood status of farmers in the study area

Livelihood status was measured in four components: financial capital, natural capital, social capital, and physical capital (Table 3). Under financial capital, the farmers agreed that rural infrastructure had boosted their ability to do banking (M=2.95) and financial assets (M=2.76) and facilitated their transactions (M=3.10). On natural capital, farmers acknowledged that infrastructure availability had improved access to capital (M=2.74), improved land preparation (M=2.77), and access to enough potable water (M=2.58), but poor livelihood status was recorded (M=2.45). Biodiversity was the only statement that recorded poor livelihood status among financial, natural, social, and physical capital. It is also clear that rural residents significantly contribute to the gross domestic product of countries in sub-Saharan Africa, including Nigeria. For instance, rural areas in Nigeria have shown to be important starting points for the nation's economic growth, a source of capital generation, and the primary market for homegrown goods (Nedozi *et al.,* 2014). The result on the social capital showed that these infrastructures have significantly improved farmers' household livelihood through participation in social activities (M=2.59), received financial support from social groups due to the availability of infrastructures (M=3.09), access to extension services (M=2.85), availability of labour (M=2.83), quality of labour (M=2.96), my asset in liquid income has improved (M=3.34) and access to market (M=3.02). Ekong (2003) examines rural infrastructure from the perspective of fundamental physical, social, and institutional aspects of capital that improve the production, distribution, and consumption activities and the standard of living of rural residents. Olaseni and Alade, (2012) view infrastructure facilities as components of the set of fundamental

Table 3: Livelihood status of farmers (N=450).

	Livelihood Statements Financial Capital		SD	Mean	Remark
1	Providing infrastructure in their community has boosted their ability to do banking		0.247	2.95	GLS
2	Availability of rural infrastructure enhanced financial assets		0.183	2.79	GLS
3	Rural infrastructure has facilitated my transactions		0.163	3.10	GLS
	Grand mean	**2.95**			
Natural Capital					
1	Access to farm capital has improved due to infrastructure provision		0.188	2.74	GLS
2	Land preparation has enhanced the availability of infrastructure		0.184	2.77	GLS
3	Has adequate access to portable enough water		0.218	2.58	GLS
4	Biodiversity resources are easily accessed		0.272	2.45	PLS
	Grand mean	**2.64**			
Social Capital					
1	My participation in social activities has improved by the availability of infrastructure		0.252	2.59	GLS
2	I have received financial support from social groups due to the availability of infrastructure		0.166	3.09	GLS
3	Agricultural extension access has improved		0.169	2.85	GLS
4	Labour is available		0.209	2.83	GLS
5	Available labour is of quality		0.156	2.96	GLS
6	My asset in liquid income has improved		0.272	3.34	GLS
7	Good access to the market		0.239	3.02	GLS
	Grand mean	**2.95**			
Physical Capital					
1	My community Has worked hard to enhance our infrastructure		0.243	3.07	GLS
2	I have access to the infrastructure required for my farming operations		0.223	3.30	GLS
3	The infrastructure in my community is of quality type		0.227	3.07	GLS
4	The infrastructure provided positively impacted my livelihood activities		0.259	3.62	GLS
5	The infrastructure provided has enabled me to create more funds for expansion		0.291	3.04	GLS
	Grand mean	3.22			

Source: Field Data 2023; The cut-off Mean of > 2.5 = Good livelihood status (GLS) and < 2.5 = Poor livelihood status (PLS), Livelihood Status Index = 0.73

requirements that a community would like to acquire for improved living. This suggests that in the absence of such basic amenities, rural communities cannot significantly contribute to the economic development of a nation. The physical capital of rural households revealed that their livelihood has significantly improved their farming operations (M=3.30), availability of quality infrastructures (M=3.07), and have a positive impact on their livelihood (M=3.62). The deteriorating state of the available infrastructure amenities has a significant effect on the standard of living for rural residents. It just goes to show the lack of and deplorable conditions of these essential facilities worsen the situation for rural residents. As insecure as the facilities are, Olawoye (2003) also found that rural residents have struggled to escape the cycle of poverty that is frequently linked to their rural towns. The Grand Mean (2.95) recorded on the livelihood status and livelihood status index was 0.73 and, implies that 73% of farmers have good livelihood status in this research (Table 3).

Identified infrastructures provided by Government, NGOs/Corporate organizations and self-help entities (N=450)

In Table 4 the results on identified infrastructures provided by Government, NGOs/Corporate organizations, and self-help showed that access roads (34.22%), (1.78%) and (16%); potable water (17.78%), (3.33%) and (35.11%); health centre/hospital (4.67%), (1.11%) and (2.67%); education (32.22%), (5.33%) and (12%); community centres/halls (4%), (1.78%) and (3.33%). Security services (2.44%), (1.33%) and (5.11%); financial institutions (2%), (0.44%) and (12%); market/stalls (8%), (1.78%) and (5.56%); public power (12%), (2.00%) and (10.67%) communication facilities (7.11%), (5.11%) and agro-processing facilities (5.56%), (2.22%) and (7.33%) respectively. The survey found that most rural areas visited had a negligible availability of most infrastructure facilities. This has implications for the rural-urban drift of young and active youths, thereby abandoning agriculture in the weak hands of aged rural men and women. Idachaba (1989) insisted that the insufficiency of basic infrastructure had made it difficult for the rural sector to make significant contributions to actual economic growth. The result is in tandem with Ogunniyi et al., (2021), who observed that rural communities are seriously marginalized in terms of essential elements of development such as electricity, health care, education and recreational facilities.

State of Infrastructure Provided through Government

In Table 5 the mean values of the state of government infrastructures were access roads (M=3.8), education (M=3.00), pipe-borne water (M=2.81), Communication facilities (M=2.80), health facilities (M=2.60) and market (M=2.51) were still in good state, While public power (electricity) (M=1.38), financial institution (M=1.12), Agro-

Table 4: Identified infrastructures provided by Government, NGOs/Corporate organizations, and self-help entities (N=450).

Rural infrastructures provided/available	Government		NGOs		Self-help	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Access road	154	34.22	8	1.78	72	16
Potable water	80	17.78	15	3.33	158	35.11
Health Centre/Hospital	21	4.67	5	1.11	12	2.67
Education (schools)	145	32.22	24	5.33	54	12
Community centres/ halls	18	4.00	8	1.78	15	3.33
Security services	11	2.44	6	1.33	23	5.11
Financial institutions	9	2.00	2	0.44	54	12.0
Market/stalls	36	8.00	8	1.78	25	5.56
Public Power (electricity/energy)	54	12	9	2.00	48	10.67
Communication facilities	32	7.11	23	5.11	17	3.78
AgroProcessing facilities	25	5.56	10	2.22	33	7.33

Source: Field data, 2023

Table 5: Mean response to the state of infrastructure provided through Government (N=450)

Rural infrastructures provided/available	VGS	GS	PS	VPS	Mean	S. D	Rank	Remarks
Access road	156 (34.7)	218 (48.4)	102 (22.7)	39 (8.7)	3.38	0.78	1st	Good state
Education (schools)	113 (25.1)	193 (42.9)	109 (24.2)	99 (22.0)	3.00	0.78	2nd	Good state
Potable water	142 (31.6)	186 (41.3)	40 (8.9)	58 (12.9)	2.81	0.93	3rd	Good state
Communication facilities	153 (34.0)	156 (34.7)	57 (12.7)	66 (14.7)	2.80	0.75	4th	Good state
Health Centre/Hospital	159 (35.3)	104 (23.1)	59 (13.1)	107 (23.8)	2.61	0.92	5th	Good state
Market stalls	117 (26.0)	170 (37.8)	62 (13.8)	29 (6.4)	2.51	0.97	6th	Good state
Public Power (electricity/energy)	59 (13.1)	85 (18.9)	28 (6.2)	75 (16.7)	1.38	0.94	7th	Bad state
Financial institutions	44 (9.8)	75 (16.7)	29 (6.4)	47 (10.4)	1.12	0.97	8th	Bad state
Agro-Processing facilities	30 (6.7)	73 (16.2)	49 (10.9)	26 (5.8)	1.03	0.83	9th	Bad state
Community centres/ halls	20 (4.4)	68 (15.1)	21 (4.7)	47 (10.4)	0.83	0.79	10th	Bad state
Security services	14 (3.1)	33 (7.3)	21 (4.7)	36 (8,0)	0.52	0.72	11th	Bad state

Source: Field Data, 2023. NB: mean cut off = 2.50VGS=Very Good State, GS=Good State, PS=Poor State and VPS=Very poor State, Grand mean=2.00

processing facilities (M=1.03), community halls (M=0.83), and security services (M=0.52) were in bad state. This report is similar to a previous study conducted by Ebewore (2021) on farmers' perception of the state of infrastructure in Delta State on agricultural production.

Mean response to the state of infrastructures provided through NGOs/corporate organizations

Table 6 showed that communication facilities (M=3.77), agro-processing facilities (M=3.54), and pipe-borne water (M=3.14) which were provided by NGOs/corporate organizations are in a good state among the eleven (11) infrastructures in the study area. Despite its availability in a few numbers, several authors have documented that the management and sustainability of these infrastructures were careless on the part of the rural farmers (Anderson et al.,1999). Non-governmental organizations are renowned for their active participation in regions where the Government has been unable to offer the infrastructure and services required to meet the fundamental requirements of the local populace. However, there is a need to ensure that the community plays a significant role by coming up with, organizing, and carrying out all projects and Programmes. Still, the reverse is the case (Awojobi, 2014).

State of infrastructure provided through self-help

Table 7 showed that community halls/centres (M=3.72), access roads (M=3.62), potable water (M=3.56), agro-processing facilities (M=3.17), security services (M=2.93) and market (M=2.60) infrastructures were in a good state. It was also observed that these women self-help groups made these access roads motorable even after contributing. This report agreed with a separate study on community participation in rural infrastructural development through self-help approach in Benue state (Vihi *et al.,* 2022). The living standards of farmers and how they could access some of the basic infrastructures not provided by the Government or NGOs/Corporate organizations within the community largely depend on themselves (Bolis *et al*., 2014).

Rural infrastructure state does not significantly affect the livelihood of farmers.

The model summary provides additional information about the overall fit of the model. The -2 Log likelihood value of 73.018 indicates the overall fit of the model. The Cox & Snell R^2value of 0.314 and the Nagelkerke R^2 value of 0.437 showed the amount of variance explained

Table 6: Mean response to the state of infrastructures provided through NGOs/Corporate Organizations

Rural infrastructures provided/available	VGS	GS	PS	VPS	Score	Mean	S. D	Rank	Remarks
Communication facilities	236(52.4)	205 (45.6)	56 (15.8)	26 (5.8)	1697	3.77	0.926	1st	Good state
Agro-Processing facilities	258 (57.3)	160 (35.6)	20 (4.4)	42 (9.3)	1594	3.54	0.914	2nd	Good state
Pipe-borne water	175 (38.9)	191 (42.4)	50 (12.6)	38 (8.4)	1411	3.14	0.941	3rd	Good state
Financial institutions	20 (4.4)	18 (4.0)	6 (1.3)	32 (7.1)	178	0.40	0.838	4th	Bad state
Education (schools)	21 (4.7)	20 (4.4)	10 (2.2)	35 (7.8)	199	0.44	0.826	5th	Bad state
Community centres/ halls	22 (4.9)	21 (4.7)	8 (1.8)	26 (5.8)	193	0.43	0.780	6th	Bad state
Public Power (electricity/energy)	21 (4.7)	13 (2.9)	19 (4.2)	18 (4.0)	179	0.40	0.799	7th	Bad state
Health Centre/Hospital	15 (3.3)	21 (4.7)	17 (3.8)	20 (4.4)	177	0.39	0.408	8th	Bad state
Security services	12 (2.7)	16 (3.6)	16 (3.6)	25 (5.6)	153	0.34	0.765	9th	Bad state
Market stalls	11 (2.4)	27 (6.0)	9 (2.0)	15 (3.3)	152	0.34	0.760	10th	Bad state
Access road	12 (2.7)	8 (1.8)	0 (0.0)	18 (4.0)	90	0.2	0.402	11th	Bad state

Source: Field Data, 2023. NB: mean cut off = 2.50VGS=Very Good State, GS=Good State, PS=Poor State and VPS=Very poor State, Grand mean = 1.22

Table 7: State of infrastructure provided through Self-help (n = 450)

Rural infrastructures provided/available	VGS	GS	PS	VPS	Score	Mean	S. D	Rank	remark
Community centres/ halls	251 (55.8)	175 (38.9)	58 (12.9)	27 (6.0)	1672	3.72	0.983	1st	Good state
Access road (untarred)	210 (46.7)	217 (48.2)	51 (12.4)	35 (7.8)	1628	3.62	0.898	2nd	Good state
Potable water	243 (54.0)	157(34.9)	56 (13.6)	46 (10.2)	1601	3.56	0.951	3rd	Good state
Agro-Processing facilities	120 (26.7)	256 (56.9)	77(17.1)	26 (5.8)	1428	3.17	0.855	4th	Good state
Security services	128 (28.4)	222 (49.3)	62 (13.8)	18 (4.0)	1320	2.93	1.079	5th	Good state
Market /Stalls	142 (31.6)	127 (28.2)	74(16.4)	73 (16.2)	1170	2.60	1.059	6th	Good state
Health Centre/Hospital	5 (1.1)	27 (6.0)	181 (44.0)	223 (56.1)	686	1.52	1.506	7th	Bad state
Education (schools)	2 (0.4)	3 (0.7)	215 (1.1)	134 (1.1)	581	1.29	1.038	8th	Bad state
Public Power (electricity/energy)	28 (6.2)	49 (10.9)	26 (5.8)	45 (10.0)	356	0.79	0.810	9th	Bad state
Communication facilities	17 (3.8)	27 (6.0)	16 (3.6)	30 (6.7)	211	0.47	0.715	10th	Bad state
Financial institutions	12 (2.7)	13 (2.9)	8 (1.8)	21 (4.7)	124	0.28	0.557	11th	Bad state

Source: Field Data, 2023. NB: mean cut off = 2.50VGS=Very Good State, GS=Good State, PS=Poor State and VPS=Very poor State, Grand mean = 2.18

Table 8: Logistic regression of rural farmers and perception of the state of rural infrastructure.

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Education	1.048	0.631	2.756	1	0.097	2.853
Agro-Processing facilities	-0.364	0.132	7.639	1	0.006	0.695
Income	0.000	0.000	9.968	1	0.002	1.000
Constant	-3.087	1.500	4.237	1	0.040	0.046
Model Summary						
-2 Log likelihood		Cox & Snell R Square			Nagelkerke R Square	
73.018[a]		0.314			0.437	
Omnibus Tests of Model Coefficients						
Chi-square		Df			Sig.	
30.902		3			0.000	

Source: Field Data 2023

by the model. These measures suggest that the model has a moderate level of explanatory power in predicting the perception of the state based on the socioeconomic characteristics of rural farmers.

The omnibus test of model coefficients, represented by the chi-square value of 30.902 with 3 degrees of freedom, is highly significant ($p<0.001$). This indicates that the overall model, including all independent variables, has a substantial effect on the perception of sustainability. The significant omnibus test suggests that the socioeconomic characteristics of rural farmers collectively play a role in shaping their perception of the sustainability of rural infrastructure development in the Niger Delta region of Nigeria.

Conclusion

Based on the findings, it is concluded that most of the rural farmers in the Niger Delta area were female, married and had tertiary education, and they also had good livelihood status. The infrastructure provided by self-help was in a good state compared with the Government and NGOs/Corporate Organizations. Based on the findings of the study, it was recommended that the Government should offer an infrastructure framework that is adapted to rural farmers' perceived needs to improve the livelihood activities among rural communities and also use local leaders to maintain the available infrastructure provided.

Authors' Declaration

We affirm that our research team's work on this topic is original, and we consent to its publication in the journal.

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