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# ASSESSMENT OF FUNCTIONALITY OF SELECTED PUBLIC UTILITY INFRASTRUCTURE AND ITS EFFECT ON THE LIVELIHOODS OF RURAL HOUSEHOLDS IN SOUTHEAST, NIGERIA

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## ABSTRACT

*This paper assessed the functionality of public utility infrastructure and its effect on the livelihoods of rural households in southeast, Nigeria. A multi-stage sampling procedure was used in selecting 324 respondents from three states (Abia, Enugu, and Ebonyi) for the study. Data were analyzed using both descriptive and inferential statistics. The functionality of public utility gave a grand mean of* $\bar{X}$ *= 1.9 indicating relatively poor functional conditions of the infrastructure. The result on the perceived effect of public utility on the livelihood of the rural households showed a grand mean of 3.3 implying a positive effect of public utilities on the livelihood of rural households in the study area. Age, level of education, and household size were significant at a 1% level and were positively related to the level of utilization of public utility, while access to credit was significant at a 5% level and was directly related to the level of utilization of public utility infrastructure. The regression result on the functionality of public utility infrastructure showed that the coefficient of access to the market was significant at a 5% level and was directly related to the functionality of public utilities. The functionality of public utility has a positive effect on livelihoods of the rural households in the Southeast. Therefore, government, private sectors, and NGOs should assist the rural communities by building new and functional public utilities and/or revitalizing the existing ones.*

***Keywords:*** *public utilities, infrastructure, livelihoods, households*

## INTRODUCTION

Public utility infrastructure refers to those infrastructures that provide service to the public. Utility service covers a wide range of activities including electricity, water, transportation, and telecommunication. These services have a great impact on a country's economic growth and the standard of living of the people. Public utility infrastructure can affect the ability of agro-industries to produce goods that can compete favorably in the international market.

Adequate provision of public infrastructure is expected to accelerate agricultural growth and boast production (Limi and Smith, 2007). For instance, a good road network and irrigation facilities could strengthen the production efficiency of agricultural commodities. Telecommunication infrastructures are also very important for branding and advertising these commodities. Adequate water supply systems and electricity are very important in rural communities and will boost agricultural production which in turn would improve the living standard of the rural dwellers.

Rural areas in Nigeria have long been neglected by the government while placing a considerable emphasis on the development of urban infrastructure directly or indirectly (Oguzor, 2011). The importance of the provision of rural infrastructure lies in its capacity to sustain daily activities, quality of life, and economic base in rural areas (Madu, 2012). In other words, the quality of life and means of livelihood of the rural dwellers can be assessed by analyzing the availability of rural infrastructural facilities at their disposal. Livelihood captures not just what people do in order to make a living, but their conduct, behavior, and the resources that provide them with the capability to build a satisfactory living.

At the macro level, the relationship between public utility infrastructure and agricultural growth is not clear in rural areas in southeast, Nigeria. It is natural to expect that aggregate agricultural growth is positively related to the functionality of these infrastructure. However, assessing the functionality of these infrastructure and their implication for rural livelihood improvement is a strategy to the development of infrastructure in rural areas in southeast, Nigeria. Hence, the study. The study sought to;

i. identify the public utility infrastructure available and its functionality;
ii. ascertain the level of utilization of public utility infrastructure among rural households;
iii. ascertain the perceived effect of public utilities in the improvement of livelihoods among rural households.

## METHODOLOGY

The study was conducted in Southeast Nigeria. South-east Nigeria is located within latitudes 5ºN to 6ºN of the equator and longitudes 6ºE and 8ºE of the Greenwich (prime) meridian (M.S Corporation, 2009). The southeast zone of Nigeria is made up of Enugu, Anambra, Imo, Abia, and Ebonyi States. The population of the study constitutes all the rural households in the study areas.

A multi-stage sampling procedure was used in selecting a sample for the study. The first stage involved a purposive selection of three States out of the five States in Southeastern Nigeria because of the presence of rural infrastructural facilities in the areas namely; Abia, Enugu, and Ebonyi States. The second stage involved a random selection of four local government areas from each of the selected States. The third stage involved a random selection of three communities from each of the selected local government areas making 36 communities. Nine (9) rural households were randomly selected from each of the communities through the help of an ADP agent making total respondents of one hundred and eight (108) for each state. Therefore, the sample size for the study was three hundred and twenty-four (324) respondents for the study.

Primary data was used for the study, using a questionnaire and interview schedule. A cross-sectional data was collected for the study.

The data for this study were analyzed using both descriptive and inferential statistics. The descriptive statistics included percentages, means, and frequencies. A 4-point rating scale of very good =4, good=3, fair =2, and poor =1 was used to determine the functionality of public utility infrastructure. The cut-off point was determined by adding up the rating (4+3+2+1 = 10) and dividing it by 4 gives 2.5. Any mean score above 2.5 was considered a good condition (functional) and less than 2.5 was regarded as a poor condition (not functional). A five point Likert scale of always=5, often = 4, sometimes = 3, rarely = 2, and never = 1 was used to ascertain the level of utilization of public utility infrastructure by rural households. The mean levels were obtained by adding together 1 + 2 + 3 + 4 + 5 = 15, which was later divided by 5 to get a mean score of 3.0. The level of utilization of infrastructural facilities by rural households was categorized as follows;

3.05-3.499 = Average/Moderate
3.5 – 4.00 = High
> 4.00 = Very high
2.5 – 3.0 = Poor
< 2.5 = Very poor

A 5-point Likert scale of strongly agree (5), agree(4), undecided(3), disagree(2), and strongly disagree(1) was used to ascertain the perceived effect of public utility in improving livelihoods among rural households. The cut-off mean score was 3.05.

## RESULTS AND DISCUSSION

### Availability of public utility infrastructure

Table 1 showed the availability. From the result majority of the infrastructure were available but poorly functional. The respondents said the entire infrastructure sampled such as roads (94.8%), public market (96.4%), transportation (91.0%), housing (84.6%), electricity (87.3%) and boreholes (84.3%) were available to them but were not in a functional state.

**Table 1**: **Availability of public utility infrastructure in South-East Nigeria**

| Variables | Availability | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Abia | | Enugu | | Ebony | | SE | |
| | Yes | No | Yes | No | Yes | No | Yes | No |
| **Public utilities** | | | | | | | | |
| Roads | 96 (88.9) | 12 (11.1) | 104 (96.3) | 04 (3.8) | 107 (99.1) | 1 (0.9) | 307 (94.8) | 17 (5.2) |
| Public market | 103 (95.4) | 5 (4.6) | 100 (92.6) | 08 (7.4) | 108 (100) | 0 (0) | 311 (96.4) | 13 (4.0) |
| Transportation | 93 (86.1) | 15 (13.9) | 94 (87.0) | 14 (13.0) | 108 (100) | 0 (0) | 295 (91.0) | 29 (8.9) |
| Housing | 84 (77.8) | 24 (22.2) | 84 (77.8) | 24 (22.2) | 106 (98.1) | 2 (1.9) | 274 (84.6) | 50 (15.4) |
| Electricity | 93 (86.1) | 15 (13.9) | 92 (85.2) | 16 (14.8) | 98 (90.7) | 10 (9.3) | 283 (87.3) | 41 (12.7) |
| Boreholes | 85 (78.7) | 23 (21.3) | 88 (81.5) | 20 (18.5) | 100 (92.6) | 08 (7.4) | 273 (84.3) | 51 (15.7) |

***Source:*** *field survey, 2019*

***Note: the figures in parenthesis are percentages (%)***

### The functionality of public utility infrastructure

The functional condition of rural infrastructure in southeast Nigeria is presented in Table 2.

The grand mean of $\bar{X}$ = 1.9 indicated the poor functional condition of this infrastructure. Electricity was available but in a poorly functional condition with a mean score ( $\bar{X}$) of 1.9. This implies that there is a poor supply of power in the study area. Only public markets ( $\bar{X}$ = 2.7) and transportation ( $\bar{X}$ = 2.5) are in good condition as presented in Table 2. Electricity plays a very important role in the socio-economic and technological development of every nation. The electricity demand in Nigeria far outstrips the supply and the supply is epileptic in nature (Abubakar *et al.,* 2010). It is widely accepted that there is a strong correlation between improving the livelihood of rural households and the functionality of the power supply sector. The result showed a grand mean of 1.9 indicating that the rural infrastructure assessed in the study area is in relatively poor functional conditions.

**Table 2: Functionality of rural infrastructure in South-East Nigeria**

| Rural s/n | Infrastructure | Abia $\bar{X}$ | SD | Enugu $\bar{X}$ | SD | Ebonyi $\bar{X}$ | SD | South-East $\bar{X}$ |
|---|---|---|---|---|---|---|---|---|
| **Public Utilities** | | | | | | | | |
| 1 | Roads | 1.8 | .128 | 2.7 | .158 | 2.5 | 1.122 | **2.3** |
| 2 | Public market | 2.5 | .152 | 2.7 | .158 | 2.8 | .783 | **2.7** |
| 3 | Transportation | 2.5 | .152 | 2.3 | .145 | 2.7 | 1.039 | **2.5** |
| 4 | Housing | 2.4 | .148 | 2.0 | .136 | 2.7 | .927 | **2.4** |
| 5 | Electricity | 2.0 | .136 | 2.0 | .136 | 2.3 | 1.145 | **1.9** |
| 6 | Boreholes | 2.4 | .149 | 1.9 | .132 | 2.5 | 1.169 | |
| | **Grand mean** | **2.3** | | **2.3** | | **2.6** | | **1.9** |

***Source:*** *field survey, 2019*
***Decision: mean > 2.5 indicates good condition; mean score < 2.5 indicates poor condition of infrastructure.***

**Level of Utilization of Rural Infrastructure in Southeast**

The level of utilization of transportation was high with a mean score of 3.8. The high level of utilization of transportation arises from the presence of a market in the study area as presented in Table 3. Housing, electricity, and boreholes were highly and moderately utilized with mean scores of 3.5 and 3.3 respectively. Roads were highly utilized with a mean score of $\bar{X}$= 4.5 which also agree with the response of some households that they use the roads all the time whether in good condition or not. Rabirou *et al.* (2012) reported that improved transport reduces operating costs and provides more direct and cost- effective access to public utilities. Utilization of public infrastructure leads to agricultural expansion, growth, and development of rural areas. An increase in the level of utilization of public utilities by rural households will lead to improved living conditions for rural people. Lindy *et al.,* (2015) in their study found that public utilities such as roads, public market, electricity, and water supply systems are key factors affecting rural incomes in developing countries and reported that maintenance of road infrastructure had a significant positive effect on the household income of rural households. The study showed that public utilities have rather contributed to decreasing income inequality and improving rural livelihood in the study area. The poorest households gained the most from the road and market infrastructure, making it a pro-poor development intervention. Pius *et al.* (2014) reported that road improvements in the rural areas of Lesotho may lead to higher land values and more intensive land use. In addition, the same road infrastructure may also lead to increased agricultural production and increased and expanded use of modern agricultural tools, machines, inputs, and modes of transportation as well.

**Table 3: Level of utilization of rural infrastructure in South-East, Nigeria**

| s/n | Infrastructure | Abia $\bar{X}$ | SD | Enugu $\bar{X}$ | SD | Ebonyi $\bar{X}$ | SD | South-East $\bar{X}$ |
|---|---|---|---|---|---|---|---|---|
| | **Public Utilities** | | | | | | | |
| 1. | Roads | 3.7 | 1.37 | 4.7 | .856 | 4.5 | .751 | 4.5 |
| 2. | Public market | 4.1 | 1.34 | 3.7 | 1.17 | 4.6 | .709 | 4.1 |
| 3. | Transportation | 3.9 | 1.31 | 3.9 | 5.11 | 4.2 | .921 | 3.8 |
| 4. | Housing | 3.9 | 1.36 | 2.8 | 1.31 | 3.9 | 1.45 | 3.5 |
| 5. | Electricity | 3.7 | 1.50 | 2.9 | 1.16 | 3.5 | 1.24 | 3.3 |
| 6. | Boreholes | 3.3 | 1.42 | 2.6 | 1.37 | 3.6 | 1.28 | 3.3 |
| | **Grand mean** | **3.4** | | **3.2** | | **3.9** | | **3.8** |

**Source: field survey, 2019**

**Perceived Effect of Public Utilities on The Livelihood of Rural Households**

Table 4 showed a grand mean of 3.3 implying a positive effect of public utilities on the livelihood of rural households in the study area. The access and use of public utility infrastructure improved income of rural households ( $\bar{X}$=3.4), provided local employment opportunity ( $\bar{X}$=3.3), empowering the rural poor ( $\bar{X}$=3.3), increased market information ( $\bar{X}$=3.3), increased capacity building on technical skills of operators of infrastructure ( $\bar{X}$=3.3), increased access to market ( $\bar{X}$=3.5), and held in livelihood diversification ( $\bar{X}$=3.2)A good road and transportation system is a wealth creating industry on its own, extremely important for livelihood improvement (Olubomehin, 2012). Therefore, an adequate, reliable, and economical road and transport system is essential for the social and economic development of rural areas in Southeast Nigeria.

**Table 4: Perceived effect of public utilities infrastructure on livelihood among rural households in South-East, Nigeria**

| S/N | Variables | Abia | | Enugu | | Ebonyi | | Southeast |
|---|---|---|---|---|---|---|---|---|
| | | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ |
| 1. | Improved income | 3.1 | 1.74 | 3.4 | .957 | 3.7 | 1.19 | 3.4 |
| 2. | Local employment opportunity | 2.9 | 1.49 | 3.4 | .983 | 3.6 | 1.11 | 3.3 |
| 3. | Empowerment of rural poor | 2.8 | 1.58 | 3.5 | .903 | 3.7 | 1.12 | 3.3 |
| 4. | Increased market information | 3.2 | 1.56 | 3.2 | 1.051 | 3.6 | 1.10 | 3.3 |
| 5. | Increased skills in the local management of resources | 3.1 | 1.48 | 3.3 | .919 | 3.6 | .956 | 3.4 |
| 6. | Increased capacity building on technical skills of operators of infrastructures | 2.9 | 1.51 | 3.3 | .955 | 3.5 | 1.02 | 3.3 |
| 7. | Increase access to market | 3.3 | 1.63 | 3.4 | .902 | 3.8 | .984 | 3.5 |
| 8. | Livelihood diversified | 2.8 | 1.60 | 3.2 | .961 | 3.6 | .779 | 3.2 |
| | **Grand mean** | **3.0** | | **3.3** | | **3.6** | | **3.3** |

**Source: field survey, 2019**
**Decision: mean > 3.05 indicates positive effect; mean scores < 3.05 indicates negative effect**

**Estimates of socioeconomic characteristics and utilization of public utility**

The linear function gave the best fit of the four functional models with an $R^2$ of 0.50 implying that about 50% of the variations in the dependent variables were explained by the explanatory variables expressed in the model (table 5). Age, household level of education, household size, access to credit, and household expenditure were the significant variables. Age, level of education, and household size of the respondents were significant at 1% level respectively, and were positively related to the utilization of public utilities, while access to credit and household expenditure were significant at 5 and 10% respectively. Therefore the null hypothesis was rejected at 0.05 alpha level. Apu (2011) reported that age was inversely related to the utilization of safe water in Abia State. The coefficient of the level of education was significant at 1% level and was directly related to the level of utilization of public utilities. This implies that an increase in the level of education of the respondents in the study area will lead to an increase in the utilization of public utilities such

as roads, boreholes, housing, transportation, and electricity. This could be because the high the respondents go in their educational qualification, the more they desire the need for a good and better life. This result is in conformity with Apu (2011) who reported a positive relationship between the educational qualification of the respondents and the utilization of safe water and health facilities.

**Table 5: Regression estimate on the relationship between selected socio-economic characteristics and utilization of public utility infrastructure by rural households in the study area**

| Variable | Abia (linear) | Enugu (double log) | Ebonyi (linear) | Southeast (linear) |
|---|---|---|---|---|
| Constant | .740(1.438)* | 1.859(2.304)** | .908(7.374)*** | **1.011(2.835)**** |
| Age | -.022(-.101) | -.286(-1.928)* | -.311(-2.240)** | **.040(6.737)***** |
| Sex | -.194(-1.075) | .184(1.220) | .105(.865) | **-.031(-.507)** |
| Household Level of education | .020(.121) | .023(.137) | -.016(-.111) | **.072(5.322)***** |
| Household size | .164(1.022) | .063(.457) | .335(2.617)** | **.122(4.714)***** |
| Household income | -.237(-1.462)* | .025(.114) | .232(1.400) | **-1.723(-1.473)** |
| Market | .168(1.264) | -.239(-1.426)* | .107(.900) | **.004(.874)** |
| Access to credit | .174(1.251) | -.015(-.075) | -.201(1.559)* | **.001(2.663)**** |
| Household expenditure | -.024(-.166) | .079(.322) | -.117(-.669) | **-4.188(-1.740)*** |
| f-statistics | 1.062 | 1.764** | 1.785* | **13.257***** |
| $R^2$ | **.345** | **.469** | **.419** | **.507** |

***Source: field survey, 2019***

*** = significant at 1%, ** = significant at 5%

**Influence of functionality on income, employment opportunity, and access to market**

Table 6 showed that the coefficient of determination ($R^2$) of the model is 0.347, implying that about 35% of the changes in access to the market could be explained by variations in the functionality of public utility. The F-values were significant at the 5% level; this shows the goodness of fit of the model and the overall significance of the model. The functionality of public utility was significantly related to access to the market at a 5% level thereby rejecting the null hypothesis.

**Table 6: Simple regression estimate on the significant influence of functionality of public utilities on income, employment opportunity and access to market**

| Variable | Household income | Employment opportunity | Access to market |
|---|---|---|---|
| Constant | 73249.11 | 3.362 (13.109)*** | .762 (13.784)*** |
| Functionality Of public utilities | .053 (.822) | .077 (1.214) | .154 (2.464)** |
| Adjusted R | .280 | .206 | .320 |
| $R^2$ | .303 | .202 | .347 |
| F- statistics | .675 | 1.474 | 6.074** |

***Source: field survey, 2017***

*** = significant at 1%, ** = significant at 5%

## CONCLUSION

The general conclusion of this study is that public utility infrastructure in a functional condition improves the livelihood of rural households which is an antidote to the chronic menace of poverty. It is recommended that rural roads and public markets should be highly considered by the government to maintain and to expand in order to accommodate the increasing demand for services. More road networks, in some of the localities and markets that are public, should be built, since the rural households tend to utilize these infrastructures more.

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