Rural Infrastructure Access and Household Welfare in Ogun State

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ARTICLE INFO

Article History:
Received: Nov 12, 2021
Accepted: Mar 14, 2022
Available Online: Apr 12, 2022

Keywords:
Rural infrastructure, Rural households, Welfare status, Household Welfare

JEL Classification:
P25, H54, D19.

ABSTRACT

The study was carried out to determine the effect of access to rural infrastructure on household welfare in Ogun State. A three-stage sampling procedure was used to collect data from 442 selected respondents. The study was based on primary data obtained through questionnaires. Data were analysed using descriptive statistics and ordered logit regression. The study revealed that majority of the respondents were male (62.3%), married (80.1%), aged 48.1±11.5 years, with years of formal education, household size and farming experience of 7.3±4.7 years, 7.2±2.8 persons and 13.7±10.4 years, respectively. The MPCHHE was N7, 152. 10. The proportion of households with access to potable water, primary school, health centre, market and agro-centre were 89.1%, 88.5%, 43.9%, 64.5% and 33.7%, respectively. More households had high access to infrastructure (52.8%). Many of the households had high welfare (43.9%), while 24.4% had medium welfare and 31.7% had low welfare. High household welfare was explained by age (β=0.32), male-headed households (β=0.51), non-farm income (β=0.20), ARI (β=0.49), access to credit (β=0.39), educational level (β=0.25) and labour size (β=0.34), while age (β=0.15), male-headed households (β=0.12) and ARI (β=0.18) explained low household welfare. Based on these findings, it was recommended that policies that would increase public investment in functional rural infrastructure must be given high priority by the government.

1. INTRODUCTION

Infrastructure is a public asset and adequate access to it contributes immensely to the well-being of households. Despite the tremendous impact of rural dwellers to the economic development of Nigeria, the sector has experienced retarded growth and development with the resultant high level of poverty for many years, mainly due to the absence and/or limited access to infrastructure (Dittoh and Okumadewa, 1990; Idachaba et al., 1994; Akinola, 2007; Olagunju et al., 2017; Aderogba and Adegbuyi, 2019; Naz and Khaliq, 2011). Access to infrastructure aids production activities and enhances the level of quality of living of the people. Every member of the community, both destitute and wealthy, is able to use equal amount of the goods and services to their satisfaction. Hence, the development of infrastructure is reasoned to be one of the solutions to eradication of poverty.

Infrastructure are public goods and members of the community have equal rights to access and benefit from their services without necessarily paying for access to them because they are usually provided by the government and private organizations. Thus, provision of infrastructure closes the gap between the poor and the better-off in a community and also enhances the nature of rural life generally. A lot of other studies show that adequate infrastructure access reduces production, processing and marketing cost, thus increasing their profit levels, other things remaining constant and ultimately household welfare (Adeoye et al., 2011; Obayelu et al., 2014; Wu et al., 2019; Olorunfemi, 2020; Saheed & Obianuju, 2021; Aslam et al., 2014).

Inadequate access to infrastructure in rural Nigeria is the main cause of the under-development of rural economy and the consequent high level of poverty and poor welfare of its households. Interestingly, the economic activities of these households are vital to the economic development of the country, particularly through their agricultural activities which constitutes the major share of the country’s export earnings. Despite the important role it plays, the rural sector continues to experience stunted growth and development over the years primarily due to inadequate and sometimes no access to infrastructure.

Nigeria is considered a developing country largely because of its lack of modern infrastructure which has hindered its economic development. Despite being the “Giant of Africa”, some other countries in the continent have overtaken her in terms of infrastructure development because over the years, their governments had given greater attention to its provision and supply. Until recently, very little attention was given to infrastructure and even so, priority was given to the urban centres at the detriment of the rural. The problem of inadequate transportation facilities, potable water, power, sanitation and hygiene, to mention a few, has limited the country’s economic transformation and alleviation of poverty. With the background information, it would be interesting to describe the
socioeconomic characteristics of the rural households, assess the extent of rural infrastructural development and determine the effect of access to rural infrastructure on welfare of households in Ogun State, Nigeria.

Several studies acknowledge that spending on infrastructure meaningfully affect rural income and welfare. However, as rightly observed by Ayogu et al. (2007); Mensah (2011); Bilal et al., (2016); Mensah et al., 2014; Daud et al., 2018 and Olanrele (2020), many of these studies have not pointed out the causative relationship between livelihood opportunities and infrastructure investment which result into household welfare. This has resulted in limiting policy recommendation to only proposing a general expansion of infrastructure investment. The study aimed at closing the gap in existing literature by evaluating the effect of rural infrastructure development and household welfare. The six infrastructure elements in this study are those considered to be vital to the overall welfare of rural households and these are potable water, electricity, health centre, school, market and agro service centre.

2. METHODOLOGY

The study was carried out in Ogun State, Nigeria. Ogun State has 20 Local Governments Areas and is divided into three senatorial districts namely, Ogun Central, Ogun East and Ogun West Senatorial Districts. It lies within latitude 40 -14N and longitude 30 -14E and exhibits the typical tropical climate of averagely high temperature and high relative humidity. The main occupations of the people include are farming, petty trading, among others.

Sampling Technique and Data Collection

Primary data were collected with the use of questionnaires from households in the study area through a multistage sampling procedure. The first stage involved a random selection of two rural local government areas (LGAs) each from the three senatorial districts of Ogun State making a total number of six LGAs. In the second stage, a simple random sampling technique was employed to select villages from the six rural LGAs, proportionate to size. A total of eighteen villages were selected. Using a proportionate to size sampling, 442 households were selected randomly from the sampling frame, proportionate to the size of the villages at the third stage. The data collected included the socio-economic characteristics of the respondents, infrastructure access and household monthly expenditure.

Analytical Techniques

i. Descriptive statistics: The descriptive tools used include measures of central tendency and dispersion, frequencies and percentages.

ii. Construction of Infrastructural Index (Component Measure of Access to Infrastructure): A common infrastructural index (INF) was constructed for all the types of infrastructure (Ahmed and Hossain; 1990 and Ashagidigbi et al., 2011, Africa Development Bank, 2020) to determine how developed the rural communities were with respect to the level of infrastructure access. Transportation cost to the location of the nearest assessed infrastructure was used because most of the respondents could not give precise distance to the infrastructure (Obayelu et al, 2014; Olorunfemi, 2020). The INF was obtained as presented in the equations below:

\[ \text{INF} = \sum_{i=1}^{n} \frac{\sum_{i=1}^{n} W_i}{\sum_{i=1}^{n} ACI_i} \]

Where:

\( AC_i \) = transportation cost of a respondent to an infrastructure in each community (N);
\( TC_i \) = average cost of transportation in each community to an infrastructure (N);
\( ATC_i \) = total cost of transportation to an infrastructure across communities (N);
\( W_i \) = weight of average transportation cost to an infrastructure in each community;
\( INF \) = infrastructural index;
\( N \) = number of communities;
\( n \) = number of respondents in each community.

The addition of the individual access cost (\( TC_i \)) to the infrastructure gave the cost of transportation of individual respondents (\( IDC_i \)) in each of the communities. The \( TC_i \) was obtained by summing the \( AC_i \). The selection of these infrastructure elements was based on their relative homogeneity across the selected communities. The average total cost (\( ATC_i \)) of accessing each infrastructure across these communities was calculated and divide by the average costs (\( AC_i \)) of getting to a particular infrastructure facility in each of the communities to give \( W_i \), which was added together to get the INF. INF indicates the level of access to infrastructure and how developed a community is. The lower the value of INF, the more the access to infrastructure and hence, the more developed the community (Ahmed and Hossain, 1990; Bulus and Adefila, 2014; Mangat et al., 2018). The communities were grouped into developed and underdeveloped by finding the average infrastructural index. Communities with values more than the average are underdeveloped and less than average are developed.
Ordered Logit Regression Model: This was used to determine the likelihood of a household being in high, moderate and low welfare categories.

The welfare \( w \), of a household \( i = 1, \ldots, N \) is modelled as:

\[
    w_i = f (x^h, x^a, x^r)
\]

where,

\( x^h \) represents the household characteristics variables;
\( x^a \) represents the household’s asset endowment;
\( x^r \) represents access to rural infrastructure.

\( Y = \) Welfare status of households (1 = low welfare, 2 = medium welfare, 3 = High welfare).
\( X_1 = \) age of the household head (years)
\( X_2 = \) square of the age variable in years
\( X_3 = \) gender of the head of household, (1 = male, 0 = female).
\( X_4 = \) Labour size
\( X_5 = \) Household size;
\( X_6 = \) Years of education (in years)
\( X_7 = \) Non-farm Income (Yes = 1, No = 0)
\( X_8 = \) Access to Credit (Yes = 1, No = 0)
\( X_9 = \) Access to rural infrastructure in (\( \Delta x \))
\( \varepsilon = \) the error term.

The total monthly consumption expenditure was used as a proxy to measure the welfare status of households.

3. **RESULTS AND DISCUSSIONS**

The socio-economic characteristics of the respondents are presented in table 1. As shown in the table, about 72.6 percent of the respondents were between 25 and 54 years of age. The average age was 48.11±11.46 years and means that most of the respondents were economically active. A large number of the households were male headed (69.2 percent) and many of the households (57.7 percent) had between five and eight members while only 1.5 percent of the households had over 12 members. The study further revealed that most of the respondents had formal education with only 19.8 percent of household heads having informal education. Thus, the literacy level is very high in rural southwestern Nigeria. Majority of them (40.5 percent) had primary education as the highest level attained; 34.7 percent had secondary education and only 5% had tertiary education. About 80.1 percent were married and only 29.4 percent were non-indigenes. The main occupation of the respondents was farming (81.7 percent) with an average of fourteen 14±10 years of farming experience while the remaining 18.3 percent were non-farm activities. This indicates that a higher number of the respondents had agriculture as either a primary or secondary

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(in yrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 34</td>
<td>40</td>
<td>9.0</td>
</tr>
<tr>
<td>35 – 44</td>
<td>152</td>
<td>34.4</td>
</tr>
<tr>
<td>45 – 54</td>
<td>129</td>
<td>29.2</td>
</tr>
<tr>
<td>55 – 64</td>
<td>72</td>
<td>16.3</td>
</tr>
<tr>
<td>&gt;=65</td>
<td>49</td>
<td>11.1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>306</td>
<td>69.2</td>
</tr>
<tr>
<td>Female</td>
<td>136</td>
<td>30.8</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>354</td>
<td>80.1</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>36</td>
<td>8.1</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>52</td>
<td>11.8</td>
</tr>
<tr>
<td>Household Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>137</td>
<td>31</td>
</tr>
<tr>
<td>5-8</td>
<td>255</td>
<td>57.7</td>
</tr>
<tr>
<td>9-12</td>
<td>43</td>
<td>9.7</td>
</tr>
<tr>
<td>&gt;12</td>
<td>7</td>
<td>1.6</td>
</tr>
<tr>
<td>Years of Schooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>88</td>
<td>19.9</td>
</tr>
<tr>
<td>1-6</td>
<td>179</td>
<td>40.5</td>
</tr>
<tr>
<td>7-12</td>
<td>153</td>
<td>34.6</td>
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<tr>
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<td>Primary Occupation</td>
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</tr>
<tr>
<td>Farming</td>
<td>361</td>
<td>81.7</td>
</tr>
<tr>
<td>Non-farm</td>
<td>81</td>
<td>18.3</td>
</tr>
<tr>
<td>Farming Experience (Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=10</td>
<td>125</td>
<td>28.3</td>
</tr>
<tr>
<td>11 – 20</td>
<td>288</td>
<td>65.1</td>
</tr>
<tr>
<td>&gt;20</td>
<td>29</td>
<td>6.6</td>
</tr>
</tbody>
</table>
source of income. Furthermore, over half of the respondents (57.9 percent) earned between N20,000 and N40,000 monthly while one-fifth earned over N40,000, with the average income in the study area being N36,500 ± 24,800 per month.

The households’ access to rural infrastructure is presented in table 2. The table revealed that 89.1 percent of the respondents had access to potable water either from borehole or deep wells. While some were provided by the government, a large percentage of the boreholes and deep wells were provided by non-governmental organizations.

As revealed in the table, most of the households (88.5 percent) had access to at least primary schools in their communities. These schools were provided by the government in line with the Universal Basic Education policy that every child must go through at least the basic primary education. It was also revealed that the majority of the households (56.1 percent) did not access primary health care service. Most of them move great distances to enjoy good health care facilities and depend on unauthorized medicine sellers for their drugs. About 64.5 percent of the households accessed markets while only 40.7 percent accessed electricity despite the rural electrification projects of many state governments in southwestern Nigeria. The majority of them relied on the use of power generators which increased their overhead cost and increased their total production cost. The study further revealed that only 33.7 percent of the respondents had ready access to agro-service centre and this often caused a major setback for their agricultural activities.

The MPCHHE for the study area was N7,152.14. Households with per capita expenditure less than one-third of the MPCHHE were grouped as low welfare while those with per capita expenditure was less than two-thirds of the MPCHHE were grouped as medium welfare. The high welfare households had their per capita expenditure more than two-thirds of the MPCHHE. Table 3 below shows that 31.7 percent of the households had low welfare, 24.4 percent has medium welfare while 43.9 percent had high welfare.

The profile of infrastructure access in relation to welfare status of households is presented in Table 4. It was revealed that more households in the medium welfare category (61.1 percent) had access to potable water than the low welfare households (23.6 percent) while all the households (100 percent) in the high welfare group has access to potable water and schools. About three-quarter of the households in the medium welfare group (75.9 percent) had access to
schools while more than half in the low welfare group (55.7 percent) did not have access to schools. With regards to access to primary health services, almost all of the households in the low welfare category (80 percent) in the study area did not have access compared to only 32.4 percent and 10.8 percent in the medium and high welfare category. The same pattern was observed for all the other infrastructural facilities – fewer households in the low welfare category had access to agro service centres and electricity, (30.7 percent and 19.3 percent respectively) compared to the 52.8 percent and 56.5 percent respectively in the medium welfare households. Almost all the households in the high welfare groups (94.3 percent and 96.4 percent respectively) had access to these infrastructural facilities. It is interesting to see that all the welfare groups had good access to the market infrastructure at 85 percent, 88.9 percent and 97.4 percent respectively for the low, medium and high welfare groups.

Table 4: Distribution of Respondents Based on Welfare Status in Relation to Access to Rural Infrastructure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled</th>
<th>Low Welfare</th>
<th>Medium Welfare</th>
<th>High Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>Percent</td>
<td>Freq.</td>
<td>Percent</td>
</tr>
<tr>
<td>Potable Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>285</td>
<td>54.1</td>
<td>33</td>
<td>23.6</td>
</tr>
<tr>
<td>No</td>
<td>157</td>
<td>45.9</td>
<td>107</td>
<td>76.4</td>
</tr>
<tr>
<td>Total</td>
<td>442</td>
<td>100</td>
<td>140</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>365</td>
<td>82.6</td>
<td>62</td>
<td>44.3</td>
</tr>
<tr>
<td>No</td>
<td>77</td>
<td>17.4</td>
<td>78</td>
<td>55.7</td>
</tr>
<tr>
<td>Total</td>
<td>442</td>
<td>100</td>
<td>140</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Health Centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>303</td>
<td>61.5</td>
<td>28</td>
<td>20.0</td>
</tr>
<tr>
<td>No</td>
<td>139</td>
<td>38.5</td>
<td>112</td>
<td>80.0</td>
</tr>
<tr>
<td>Total</td>
<td>442</td>
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<td>140</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>290</td>
<td>66.6</td>
<td>119</td>
<td>85.0</td>
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<tr>
<td>No</td>
<td>152</td>
<td>34.4</td>
<td>21</td>
<td>15.0</td>
</tr>
<tr>
<td>Total</td>
<td>442</td>
<td>100</td>
<td>140</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Agro Centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>229</td>
<td>46.7</td>
<td>43</td>
<td>30.7</td>
</tr>
<tr>
<td>No</td>
<td>213</td>
<td>53.3</td>
<td>97</td>
<td>69.3</td>
</tr>
<tr>
<td>Total</td>
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<tr>
<td></td>
<td></td>
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<td>100</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
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<tr>
<td>Yes</td>
<td>206</td>
<td>39.8</td>
<td>27</td>
<td>19.3</td>
</tr>
<tr>
<td>No</td>
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<td>60.2</td>
<td>113</td>
<td>80.7</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Computed from field survey data, 2020

The average cost of transportation to all infrastructure is presented in Table 5. The cost of transportation to school (N32) was the lowest, closely followed by transportation cost to clean water sources (N34). The cost of transportation to the health centre was N69, to the market was N83, while the cost to the agro-service centre was the highest at N87. This shows that many communities had adequate access to schools and potable water while health centres, markets and agro service centres were still fairly out of the reach of most rural communities. The cost of transportation to health centres, markets and agro-service centres is higher than the findings of Obayelu et al (2014) where respondents spent N60 to access each of the three infrastructure facilities. The residents of Oyan Imala paid the highest transportation cost to access health centres (N400), market (N500) and agro centres (N500). On the contrary, households in Igbeti paid the lowest cost of accessing all infrastructure services (N22).

Table 5: Transportation Cost to Infrastructure in Naira (₦)

<table>
<thead>
<tr>
<th>No.</th>
<th>Village</th>
<th>Water</th>
<th>School</th>
<th>Health Centre</th>
<th>Market</th>
<th>Agro Centre</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ojebiyi</td>
<td>20</td>
<td>30</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>52</td>
</tr>
<tr>
<td>2</td>
<td>Orile-Ilugun</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>Alabata</td>
<td>15</td>
<td>20</td>
<td>30</td>
<td>90</td>
<td>90</td>
<td>49</td>
</tr>
<tr>
<td>4</td>
<td>Olodo</td>
<td>20</td>
<td>25</td>
<td>20</td>
<td>40</td>
<td>150</td>
<td>51</td>
</tr>
<tr>
<td>5</td>
<td>Oyan Imala</td>
<td>10</td>
<td>20</td>
<td>400</td>
<td>500</td>
<td>500</td>
<td>286</td>
</tr>
<tr>
<td>6</td>
<td>Idi Emi</td>
<td>15</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>7</td>
<td>Tibo</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td>100</td>
<td>100</td>
<td>61</td>
</tr>
<tr>
<td>8</td>
<td>Ilewo</td>
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<td>50</td>
<td>45</td>
</tr>
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<td>9</td>
<td>Ifoyintedo</td>
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<td>26</td>
</tr>
<tr>
<td>10</td>
<td>Idosemo</td>
<td>50</td>
<td>30</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>76</td>
</tr>
</tbody>
</table>
The result of the infrastructural index is shown in Table 6. The average index is 1.00. The higher the index above the average, the lower the level of infrastructure access and the less infrastructurally developed the community is; and the lower the value below the average, the higher the infrastructure access and the more developed it is. This is in consonance with the findings of Obayelu et al., (2014); Ashagidigbi, et al. (2011) and Ahmed and Hossain, (1990).

As revealed in table 6, nineteen villages with infrastructure index not more than the average index of 1 were developed and the remaining seventeen with infrastructure index more than the 1 were underdeveloped. This shows that most villages in southwestern Nigeria are developed.

Table 6: Construction of the Composite Infrastructure Index (INF)

<table>
<thead>
<tr>
<th>No.</th>
<th>Village</th>
<th>Weight of Average Transportation Cost to a Particular Infrastructure in each village</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ojebiyi</td>
<td>Water 0.60 School 1.00 Health Centre 1.02 Market 0.84 Agro Centre 0.80 INF 0.84</td>
</tr>
<tr>
<td>2</td>
<td>Orlile-Ilugun</td>
<td>Water 0.30 School 0.63 Health Centre 0.44 Market 0.60 INF 0.57</td>
</tr>
<tr>
<td>3</td>
<td>Alabata</td>
<td>Water 0.45 School 0.63 Health Centre 0.44 Market 1.08 INF 0.75</td>
</tr>
<tr>
<td>4</td>
<td>Oloodo</td>
<td>Water 0.60 School 0.79 Health Centre 0.29 Market 0.48 INF 0.75</td>
</tr>
<tr>
<td>5</td>
<td>Oyan Imala</td>
<td>Water 0.30 School 0.63 Health Centre 4.38 Market 4.82 INF 2.70</td>
</tr>
<tr>
<td>6</td>
<td>Idi Emi</td>
<td>Water 0.45 School 0.63 Health Centre 0.44 Market 0.24 INF 0.36</td>
</tr>
<tr>
<td>7</td>
<td>Tibo</td>
<td>Water 1.04 School 1.00 Health Centre 1.02 Market 1.32 INF 1.11</td>
</tr>
<tr>
<td>8</td>
<td>Ilewo</td>
<td>Water 0.74 School 1.59 Health Centre 0.73 Market 0.60 INF 0.75</td>
</tr>
<tr>
<td>9</td>
<td>Ifoyintedo</td>
<td>Water 0.45 School 0.63 Health Centre 0.29 Market 0.24 INF 0.39</td>
</tr>
<tr>
<td>10</td>
<td>Idoosemo</td>
<td>Water 1.50 School 1.00 Health Centre 1.46 Market 1.20 INF 1.27</td>
</tr>
<tr>
<td>11</td>
<td>Mogbara</td>
<td>Water 1.50 School 1.60 Health Centre 0.73 Market 0.84 INF 1.09</td>
</tr>
<tr>
<td>12</td>
<td>Oke Odan</td>
<td>Water 1.50 School 1.00 Health Centre 0.88 Market 1.20 INF 1.15</td>
</tr>
<tr>
<td>13</td>
<td>Ajilete</td>
<td>Water 1.50 School 1.00 Health Centre 1.46 Market 1.20 INF 1.26</td>
</tr>
<tr>
<td>14</td>
<td>Jowoje</td>
<td>Water 0.89 School 0.95 Health Centre 1.46 Market 2.41 INF 1.60</td>
</tr>
<tr>
<td>15</td>
<td>Gbasemo</td>
<td>Water 0.74 School 0.95 Health Centre 0.88 Market 1.20 INF 1.17</td>
</tr>
<tr>
<td>16</td>
<td>Seguse</td>
<td>Water 2.08 School 0.95 Health Centre 2.92 Market 2.41 INF 2.31</td>
</tr>
<tr>
<td>17</td>
<td>Idagolu</td>
<td>Water 2.08 School 0.95 Health Centre 1.17 Market 1.20 INF 1.31</td>
</tr>
<tr>
<td>18</td>
<td>Imosu Daniel</td>
<td>Water 2.08 School 3.17 Health Centre 1.46 Market 1.81 INF 2.05</td>
</tr>
</tbody>
</table>

Mean INF 1.00

➢ INF means index of infrastructure
➢ Calculated INF that is greater than 1.00 indicates underdeveloped communities INF that is less than 1.00 indicates developed communities.

Source: Computed from field survey data, 2020.

The distribution of households in relation to their welfare status and level of development of their villages of residence is presented in table 7. As shown in the table, more households in the developed villages were in the high

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welfare group while the underdeveloped villages had more low welfare households. Out of 194 households in the high welfare group, only 19 (9.7 percent) were in the underdeveloped villages and the remaining 175 (90.2 percent) were in the developed ones. The medium welfare group did not have much variation in the number of households in the two categories of development as 62 (57.4 percent) of them were in the developed villages compared to 46 (42.6 percent) in the underdeveloped ones.

Table 7: Distribution of Households in Relation to their Welfare Status and Level of Development of their Villages

<table>
<thead>
<tr>
<th>Development Status</th>
<th>Welfare Status</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>High 175</td>
<td>Low 13</td>
</tr>
<tr>
<td></td>
<td>Medium 62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low 13</td>
<td></td>
</tr>
<tr>
<td>Underdeveloped</td>
<td>High 19</td>
<td>Low 127</td>
</tr>
<tr>
<td></td>
<td>Medium 46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low 127</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>High 194</td>
<td>Low 140</td>
</tr>
<tr>
<td></td>
<td>Medium 108</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low 140</td>
<td></td>
</tr>
</tbody>
</table>

Source: Computed from field survey data, 2020.

As expected, the low welfare group had very few households in the developed villages. Only 13 (9.3 percent) households were in the developed villages as opposed to 127 (90.7 percent) households in the developed ones.

The result of the ordered logit regression model is as presented in Table 8 and the marginal effects estimates are presented in Table 9. Age of the household head which endeavors to reveal the life-cycle issues negatively affected household welfare while that of the age-squared (age$^2$) was positive. This is in consensus with the findings of Mensah (2011), Mohammadi et al. (2015) and Mensah et al., 2014. This is because as the household’s head advance in age, the welfare of the household becomes higher. Age negatively affected household welfare at five percent level of significance. An increase in the age of the household head increased the probability of the household having low welfare by 15.2 percent and having medium welfare by 17.6 percent but decreased the likelihood of it having high welfare by 32.9 percent. The opposite was observed with age$^2$variable. An increase in the variable decreased the probability of the household head having low welfare by 24.1 percent and medium welfare by 27.1 percent while it increased the likelihood of having high welfare by 51.2 percent.

The sex variable was positive at one percent level of significance and this implies that male-headed households had higher level of welfare than the female headed ones. Being a male-headed household decreased the probability of the household having low welfare by 12.4 percent and medium welfare by 33.8 percent while it increased the likelihood of the household having high welfare by 46.2 percent. This finding is in consensus with the findings of Rubaba et al. (2015); Oluwatayo (2009) and Majeed (2019) but in dissonance with the findings of Olamere (2020).

Table 8: Effect of Rural Infrastructure on Household Welfare

| Variable          | Coefficient | Z-value | P>|z| |
|-------------------|-------------|---------|------|
| AGE               | -0.3502**   | -2.72   | 0.029|
| AGESQ             | 0.0051**    | 1.98    | 0.085|
| SEX               | 0.3382*     | 1.75    | 0.834|
| MARRIED           | -0.0745     | -0.87   | 0.387|
| HhSZ              | -0.1395***  | -3.08   | 0.000|
| LabourSz          | 0.1981***   | 4.83    | 0.000|
| Edu               | 0.9736**    | 1.94    | 0.048|
| HhINCOME          | 1.4206      | 0.45    | 0.652|
| NFINCOME          | 0.4428**    | 2.79    | 0.042|
| CREDITACCESS      | 1.1274**    | 2.54    | 0.122|
| ARI               | -0.2162*    | -1.76   | 0.096|

cut1: -19.17461
cut2: -17.45157
Observation = 442
Pseudo R$^2$ = 0.6905
Log likelihood = -143.31706
Prob > chi2 = 0.0000
LR chi2(16) = 47.54

***, **, * indicate 1%, 5% and 10% levels of significance respectively.

Source: Field Survey, 2020

Household size was negative at one percent level of significance. The probability of the household having low welfare increased by 3.1 percent and medium welfare by 17.4 percent with an increase in the size of the household. However, it decreased the likelihood of the household having high welfare by 20.4 percent. This is in agreement with the findings of Gani (2015). Labour size positively affected household welfare. An increase in the number of household members who are above fifteen and below sixty-five years and are actively engaged in economic activities increased the probability of the household having high welfare by 34.2 percent and reduced the likelihood of it having low and medium welfare by 18.5 percent and 15.7 percent respectively. This is in consonance with a priori expectation and with the results of Mensah (2011), Asmah (2011) and Rubaba et al. (2015).

Education positively affected the level of welfare at five percent level of significance. An increase in the numbers of years of education of the household head reduced the chances of the household having low welfare and
medium attainment usually enjoy higher level of welfare by 24.5 percent. Households with higher levels of educational attainment usually enjoy higher level of welfare because they are able to participate in high income activities like employment. This is in consensus with the findings of Olanrele, 2020; Mohammadi et al., 2015, Stiefel, 2010, Haggballe et al., 2007; Amendola & Vecchi, 2007; Bhaumik et al., 2006; Brown et al., 2006 and Dercon & Krishnan, 1996. Access to Credit increased the likelihood of a household having high welfare by 38.6 percent but reduced the chance of the household having low and medium welfare by 17.2 percent and 21.4 percent respectively. This is in consensus with the findings of Lin et al., 2019; Kimengsi et al., 2017; Minh et al. (2016); Stiefel (2010), Brown et al. (2006), Ellis (1998) and Dercon and Krishnan (1996); Jadoon et al., (2018).

The access to rural infrastructure variable (ARI) was negatively significant at 10 percent and this implies that low access to infrastructure has a negative impact on the welfare of rural households. The likelihood of households with low access to infrastructure having low welfare increased by 17.9 percent and having medium welfare by 30.7 percent while the likelihood of these households having high welfare decreased by 48.6 percent as presented in table 24. Therefore, households with high access to infrastructure have a higher welfare than those with low access. This is in consonance with the findings of Olagunju et al., 2017, Olanrele, 2020.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Marginal Effect for Y = low welfare</th>
<th>Marginal Effect for Y = medium welfare</th>
<th>Marginal Effect for Y = high welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>0.1525</td>
<td>0.1762</td>
<td>-0.3287</td>
</tr>
<tr>
<td>AGESQ</td>
<td>-0.2406</td>
<td>-0.2711</td>
<td>0.5117</td>
</tr>
<tr>
<td>SEX</td>
<td>-0.1235</td>
<td>-0.3384</td>
<td>0.4619</td>
</tr>
<tr>
<td>MARRIED</td>
<td>0.0168</td>
<td>0.0157</td>
<td>-0.0325</td>
</tr>
<tr>
<td>HhINCOME</td>
<td>0.0309</td>
<td>0.1735</td>
<td>-0.2044</td>
</tr>
<tr>
<td>LabourSz</td>
<td>-0.1847</td>
<td>-0.1567</td>
<td>0.3414</td>
</tr>
<tr>
<td>Edu</td>
<td>-0.1061</td>
<td>-0.1388</td>
<td>0.2449</td>
</tr>
<tr>
<td>HhINCOME</td>
<td>-2.0907</td>
<td>-3.1407</td>
<td>5.2314</td>
</tr>
<tr>
<td>NFINCOME</td>
<td>-0.0916</td>
<td>-0.1165</td>
<td>0.2081</td>
</tr>
<tr>
<td>CREDITACCESS</td>
<td>-0.1717</td>
<td>-0.2143</td>
<td>0.3860</td>
</tr>
<tr>
<td>ARI</td>
<td>0.1788</td>
<td>0.3072</td>
<td>-0.4860</td>
</tr>
</tbody>
</table>

4. CONCLUSION
The study examined the effect of rural infrastructure access on household welfare in Ogun state, Nigeria. The empirical findings revealed that access to rural infrastructure, specifically water, health, electricity, market, agro services and education infrastructure had meaningful and positive impact on household welfare. The index of infrastructural development was negative and lower than unity, and this shows that low access to infrastructural facilities in the underdeveloped communities negatively affected the welfare of those households residing in them. Households with high access to infrastructure enjoyed better and increased level of welfare than the low access ones. The study concludes that low access to infrastructure can limit the general welfare of rural households. Household size had a negative effect on welfare as large households had low welfare. Education positively affected the level of welfare b 6.

5. RECOMMENDATIONS
Based on the findings of the study, it is thus suggested that policy should be targeted at increasing the number, type and quality of infrastructure of rural communities. Government and Non-Government Organizations should sensitize the rural dwellers on the need and advantage of having smaller household size by educating them on birth control methods. Policy makers should give priority to the establishment of more schools in the rural areas and also organize programmes that will encourage rural households to be educated through mass literacy programmes and free adult education. Government should also encourage financial institutions especially the microfinance banks to establish access outlets in the rural areas and also grant credits to rural households with little or no collateral.

6. REFERENCES


