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Assessing the Socio-Economic Effects of Electricity Supply on Households in Ojokoro Low-Cost Housing Estate, Lagos State, Nigeria

Olurotimi Sodiya
Department of Urban and Regional Planning, The Federal Polytechnic Ilaro, Ogun State, Nigeria
olurotimi.sodiya@federalpolyilaro.edu.ng

Abstract

Electricity supply contributes to the comfort of the households, improves their health, improves their educational level, and enhances their household economy. The study area is Ojokoro Low-Cost Housing Estate, Ojokoro Lagos, and the estate is faced with an epileptic power supply from IKEDC, resulting in the use of alternative power sources. The population of this research comprised the total number of residential flats in the housing estate and a sample size of 370 arrived at with a household size of 5. A probabilistic random sampling without replacement was adopted and relevant data were collected through the use of a structured questionnaire and checklist. The socio-economic data of respondents revealed 63% of the respondents are 50 years and above, and this implies a higher percentage of respondents close to retirement age or have retired. 3 types of power sources are identified in the study area namely, electricity from IKEDC; the use of generators of different capacities; and solar energy from different capacities of solar panels. 91% of the respondents used both the electricity from IKEDC and the generator, while the remaining 9% used solar energy as an additional alternative power supply apart from the generator. The use of generators by respondents has the highest duration of power supply with an average of 56 hours in a week, representing 33% with an average cost of N25, 800 per month. Empirical data on respondents' satisfaction level of electricity supply revealed a 41% level of satisfaction, but this level should not be considered to be fair, but rather as low because electricity is a basic need for all households' socio-economic welfare and therefore must be adequate in supply from the IKEDC.

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Introduction

Infrastructural facilities such as electricity play vital roles in the socio-economic welfare of households, which is the basis for a good standard of living. It is therefore not surprising that socio-economic welfare is tied to infrastructural development, while adequate electricity supply serves as an indicator of socioeconomic welfare of households. In the subjective socio-economic welfare concept, Ravallion & Lokshin (2016) noted that the most widely used measure of a person's economic welfare is the real income of the household to which the person belongs, adjusted for differences in family size and demographic composition (relative to some reference, such as a single adult), while Paradowska (2017) noted that the shift in approaches from wealth to welfare, and from welfare to well-being, including the idea of sustainable development, is reflected in developing different indicators used to measure economic growth, economic development and socio-economic welfare. It was also pointed out that the shortcomings of the traditional and the most common indicators have led to the development of new tools for measuring welfare, such as the Geneva Method; Measure of Economic Welfare – MEW; Net National Welfare – NNW; Economic Aspect of Welfare – EAW; Index of Sustainable Economic Welfare – ISEW and Genuine Progress Indicator – GPI. Chinedum et al., (2020), viewed the concept of socio-economic welfare as wide and multi-dimensional in context, but a consensus of thought on the concept expressed it as a necessity for comfort

which a person is accustomed to enjoying, while its indices are supposed to serve not only for the assessment of the results of development but also targets for the development plan.

However, Joyeux and Ripple (2007) have posited that household electricity has been an enabler for social welfare and its consumption is widely viewed as enhancing tool for socio-economic welfare while Masuduzzaman (2012) asserted that household (residential) electricity consumption is the volume of electricity consumed by households in the course of their daily activities upon which the socio-economic welfare is anchored, while the level of household electricity consumption is a function of many variables such as; the number of electrical home appliances in use, the level of income of the household, family structure, family characteristics such as the number of old age people that are not working but stay at home, and other important variables. Chinedum et al., (2020) drew a structural connection between the Nigerian economy and the standard of living and identified the determinants of the standard of living to be connected to the core variable and control variables.

Salau (2009) pointed out that the quality of infrastructure and services, particularly that of electricity, within any city or nation has become increasingly important in attracting new investments and promoting socio-economic development, and that in reality, the inadequacy of infrastructural facilities in many developing countries has translated into the low standard of living, which is expressed as poor socio-economic welfare. Olaseni (2011) identified four (4) factors that are responsible for the present state of electricity in Nigeria including funding, population explosion, poor governance, and corruption and economic sabotage. The inability of the government resources to meet the increasing demand for adequate electricity supply was identified, while corruption was identified to be a major socio-economic problem in Nigeria with negative effects on infrastructural development.

The decay in electricity infrastructure in Nigeria has resulted in poor electricity supply and has manifested in the absolute dependency on generating plants, as an alternative power supply for households. Onuoha (2010) has pointed out that the total installed capacity is not enough to meet the load demand of Nigeria due to the increase in the need for electricity while it is estimated that over 60 million Nigerian own power generating sets and they spend a staggering amount of #1.5 trillion ($13.35 million) to fuel these generating set annually. Hence this research critically examined the electricity supply as a factor of households' socio-economic welfare in Ojokoro LSDPC Housing Estate, Ojokoro, Lagos State, Nigeria. The Ojokoro Housing Estate is one of the public residential housing estates in Lagos state, which accommodates different categories of households with different socio-economic characteristics.

The research problem is viewed from two (2) perspectives, namely: the problems associated with the state of electricity supply in the study area, and the problems associated with the households' socio-economic welfare in relation to the state of electricity supply in the study area. It is important to note that the state of the electricity supply has a bearing on the quality of lives of the people, which is expressed in this research as the households' socio-economic welfare.

Oke (2008) noted that poor socio-economic welfare is better expressed in terms of the low standard of living which is a major indicator of poverty, as it is income determined in developed countries, whereas in developing countries, it is in addition, the result of deprivation and lack of access to basic services, and that the contribution of infrastructural facilities, such as electricity to improve the standard of living of the people in a community, as the socio-economic development in any part of the world would depend largely on the availability of the necessary infrastructure at the right quantity and quality. Eberhard et al., (2011) noted that the unavailability of electricity has been a critical problem in Nigeria and that the case of Nigeria is similar to many countries in Sub-Saharan Africa. On the issue of transmission and distribution of electricity, Onuoha (2010) noted that there is a great need to review the policies on electricity transmission and distribution

to achieve an improved electricity supply, while the need for adequate data of all users and prospective users should be capture to make projections on all electricity infrastructures.

Olamide & Agboola (2019) pointed out that the essence of living and growth is a function of the extent a person's ability to find necessities, such as food, water, clothing and shelter, while finding basic life necessities requires accessibility to some other basic facilities among which is electricity service delivery, and that the service delivery of electricity is fundamental to life. While Ogundipe et al (2016) have earlier observed that the importance of energy cannot be over-emphasized as it is increasingly becoming a major force in achieving sustainable development, as the accessibility to electricity aids the process of meeting residential and domestic needs and that the outages of electricity in Nigeria are not just frequent and long but also erratic

One of the problems identified in the study area in the course of the reconnaissance survey is the epileptic power supply which is been expressed as a power outage, and this has resulted in the use of an alternative power supply which can be either in the form of the use of generators of different capacity, depending on the affordability of the household, or the use of solar energy to power various electrical appliances. However, it is important to note that the combination of the two (2) sources of alternative power sources is in place when the household can afford them to boost the power supply. Households' facilities are negatively affected when power outages occur frequently, while the purposes of the use of facilities such as refrigerators (for cooling and preservation of food items), televisions, radio, charging of phones (for education and communication), lighting (for visual and security)and other related benefits which are either direct or indirect to enhancing the socio-economic activities of the households and translate into improved socio-economic welfare are defeated.

In the study area, poor electricity supply has contributed to the waste of household finances, as it has led to an increase in the spoilage of food items such as vegetables, fish, and others due to the non-preservation of these food items in refrigerators adequately, while the poor energy supply results into power cuts, which affect the operation of televisions, radio sets, computers, refrigerators and other home electrical appliances, and this often results into damages of these appliances.

Methodology

The Study Area

Lagos state is located on the southwest coast of Nigeria, between latitudes 6.22^0 and 6.42^0 N of the equator, and latitudes 2.420 and 4.22^0 E of the Greenwich Meridian. It occupies a land mass of 3.6sqkm, and it is representing 0.4% of the landmass.

Ojokoro low-cost housing estate was commissioned alongside some other public housing estates in Lagos state during the regime of Air Commodore Gbolahan Mudasiru between January 1984 and August 1986, but the idea was initially been conceptualized by Alhaji Lateef Jakande during his regime (October 1979 – December 1983), to cater for the needs of the low-income earners. Presently, Ojokoro low-cost housing estate has a total of 176 residential blocks of both 2-bedroom flats and 3-bedroom flats, and each residential block has six flats which house mostly retired civil servants and professionals.

Population, Sample and Sampling Techniques.

The population for this research comprised the total number of residential blocks and flats, and the total number of households in the housing estate. The need to identify the population and examine its characteristic becomes imperative to determine the sample and adopt appropriate techniques.

The housing estate comprises two (2) and three (3) bedroom flats of six (6) flats per block. A total of 176 residential blocks exist in the housing estate, and out of which the two (2) bedrooms flat of the residential block has a total of 69 residential blocks, representing 39% of the total number of residential blocks in the estate, while the remaining 107 residential blocks are of three (3) bedrooms flat, representing 61% of the total number of residential blocks in the study area. However, 42 flats are either

under reconstruction or abandoned and 23 flats are unoccupied while the remaining 991 flats are occupied. Although variation occurs in the housing design with respect to the design of the flats, the pre-survey conducted revealed that an average of five(5) household sizes exist in the housing estate, irrespective of the variation in the design of the flats. It is on this premise that the random sampling technique was adopted after the determination of the sample size through the adoption of Yamane (1967) sampling size method of computation.

Yamane Sampling Size Method of Computation:

$$\boldsymbol{n = N \div (1 + Ne^2)}$$

Where n = the sample size
N = the population size
e= the acceptable sampling error
95% Confidence level, and P = 0.05
N = total number of occupied flats multiply by the average household size.
N= 991 * 5 = 4955
n = 4955 ÷ (1+4955 $(0.05)^2$)
n= 370

Using the Yamane Sampling Size Method of Computation, the sample size is 370. It is important to note that the 370 respondents are the heads of households, and they are selected randomly.

Probabilistic random sampling without replacement technique was adopted in the selection of the sample, after the determination of the sample size.

Data Collection, Analysis and Presentation Techniques

Data on the electricity supply and the rate of its consumption by households were collected from the sampled respondents in the study area through the use of both a structured questionnaire and a checklist. Data on the socio-economic characteristics of the selected households were sourced through the use of a structured questionnaire. The data on the electricity supply and its rate of consumption level by the household are components which are made up of; the duration of power supply without outage in a week both in terms of the number and the time duration in hours, number of power outages in a week, average time duration of power outage in a week (in hours), monthly cost of electricity supply (both for per paid metering and the old system of billing), fuel consumption rate for the use of the generator and its cost per week (cost of maintenance to be included), and the cost of other alternative sources of power supply such as the solar energy.

However, the checklist on the types of home appliances and the duration of uses are collected from the sampled respondents. The socioeconomic characteristics of the household include occupational status, income levels, family structure and size, and other socio-economic variables germane to the research. Data was collected from the households on their satisfaction with the socio-economic benefits of the electricity supply in the study area. The statistical analytical technique of descriptive and tabular presentation of data was adopted.

Results and Discussion

The socio-economic characteristics of the respondents are germane to the research as a line of association can be drawn between the socio-economic status of respondents and the level of socio-economic welfare, because the socio-economic welfare is better expressed in terms of standard of living and is income determined in developed countries, whereas in the developing countries, it is in addition, the result of deprivation and lack of access to basic services, as established by Oke(2008). It is on this premise that the relativity of socio-economic welfare becomes apparent in assessing electricity supply as a factor of socio-economic welfare in the study area. Hence, the socio-economic variables of respondents considered for further analysis are presented in Table 1.

Table 1: Socio-Economic Characteristics of Respondents (Heads of Households)

S/N	Category	Classification	Number	Percentage
1	Gender	Male	255	69

		Female	115	31
		Total	370	100
2	Age	18yrs – 25 yrs	15	4
		26 yrs – 33 yrs	26	7
		34 yrs – 41 yrs	41	11
		42 yrs – 49 yrs	55	15
		50 yrs – 57 yrs	78	21
		58 yrs – 65 yrs	85	23
		66 yrs and above	70	19
		Total	370	100
3	Marital Status	Single	7	2
		Married	311	84
		Divorced	19	5
		Widow	33	9
		Total	370	100
4	Educational Background	Non-Formal Education.	7	2
		Primary School Leaving Cert.	26	7
		Secondary School Cert. Education	33	9
		Modern / Tech. Education	41	11
		Tertiary Education	263	71
		Total	370	100
5	Employment Status	Self Employed	70	19
		Private Sector	126	34
		Public Sector	89	24
		Retired	85	23
		Total	370	100
6	Income Level	N50,000 - N80,000	70	19
		N80,001 - N110,000	67	18
		N110,001 - N130,000	126	34
		N130,001 - N160,000	52	14
		Above N160,000	55	15
		Total	370	100
7	Family Size	Below 4	37	10
		4	48	13
		5	174	47
		6	78	21
		Above 6	33	9
		Total	370	100

Source: Author's Field Survey June 2022

Data presented in Table 1 revealed that the male has the highest frequency of 69% with 255 respondent's male, out of the 370 respondents selected, while the remaining 115 respondents are female, representing 31% of the total number of respondents selected.

The analysis of the ages of respondents shows that the respondents fall within the cohort of 58 years – 65 years have the highest frequency of 23% with 85 respondents out of the 370 respondents selected, and 78 respondents fall within the range of 50 years –

57years, representing 21% of the total number of respondents selected for the study. It is important to note that 70 respondents are of 66 years and above, and this represents 19% of the total number of respondents. A critical examination of the data on the ages of respondents revealed that respondents of 50 years and above have a significant percentage of 63% of the total number of respondents sampled, and this may translate into higher demand for electricity for the use of home appliances such as television, radio, fans, air-conditioning, and charging of laptops, since the respondents of these ages (50years and above) are either close to retirement or already retired, with high tendency of staying at home longer than those of age productivity ages. However, the demand for electricity of those respondents of 50 years and above is premised on the need to be well informed on the happenings around the world through television, radio, laptops and cell phones, and maintain adequate communication through their cell phones. A cross-examination of the ages of respondents and employment status further affirmed this assertion on the demand for electricity as 85 respondents out of the 370 respondents are retired, and this represents 23% of the total number of the sampled respondents, while the remaining 77% are working class.

The data on marital status as presented in Table 1 shows those respondents with married status have the highest percentage of 84% with 311 respondents. This significant percentage is a major basis for the 174 respondents out of 370 respondents with a household size of 5, representing 47% of the total number of respondents sampled which was unveiled during the empirical investigation. It is important to note that the significant percentage of those respondents with married status when cross-examined with the ages of respondents translate into a higher number of home appliances with a higher frequency of use, as demography is a major factor in the consumption level of infrastructure such as electricity.

The importance of income level in socio-economic welfare analysis cannot be over-emphasized as economic welfare is a subset of the total welfare, and the affordability of this basic infrastructure is hinged on the income level of the household, even at the least affordable rate of payment determined from the perspective of a socialist economy. Data on the income level of the sampled respondents revealed that those respondents with an income level of N110, 001 - N130, 000 have the highest percentage of 34%, 126 respondents out of the 370 respondents sampled.

Types and costs of power supply used by households are major variables when assessing electricity as a factor of households' socio-economic welfare. It is on this premise that the data on the types and cost of power sources used by households from January 2022 to June 2022 were collected and analysed.

Table 2: Types and Costs of Power Source Used by Households within a Period of January 2022 – June 2022

Type(s) of Power Source	No flats that used the power source	% of the No of flats that used the power source	The average duration of power supply in a week (in hours)	% of the duration of power supply in a week (in hours)	Average Cost (monthly)
Electricity from IKEDC	370	100	35	21	N2,100
Generators	359	97	56	33	N25,800
Solar Panel	34	9	41	25	-
Total	-	-	132	79	N27,900

Source: Author's Field Survey June 2022

Note – The average cost for the use of a generator includes the cost of fueling and the cost of maintenance.

Three (3) types of power sources are identified in the study area, namely: electricity from the Ikeja Electricity Distribution Company (IKEDC), generators of different capacities ranging from 950KV, 6-8.5KV to 1.5-3.5KV, and solar energy from the use of the solar panel. Data on the number of flats that used the power source revealed that all the flats used electricity sourced from IKEDC with the pre-paid meters, while 359 flats used different types of generators as alternative power supply, and this proportion represents 97% of the total number of flats sampled. 34 flats out of 370 flats sampled used a solar panel to source power for different home uses, and this represents 9% of the total number of flats selected.

Data on the average duration of power supply from different power sources, in a week, was collected to assess its adequacy or otherwise. For electricity from IKEDC, an average of 35 hours of power supply was recorded in a week. A variation exists in the use of generators but the average duration of the use of the generator by the sampled respondent was 56 hours a week, while an average of 41 hours of the use of solar energy was recorded.

Data on the percentage of the duration of power supply by types of power source revealed that generators have the highest duration of power supply with 56 hours in a week, representing 33% of the total hours in a week (that is, 168 hours in a week), and this implies that generators are mostly used, though it is an alternative power supply. However, solar energy via the solar panel also has a significant duration of power supply with 41 hours in a week, representing 25% of the total hours in a week, but the empirical investigation revealed that solar energy is mostly used for lighting bulbs, charging phones, and charging of flashlights. The 35 hours duration of electricity supply from IKEDC, which represents 21% of the total hours in a week shows an epileptic power supply from the company, with high negative socio-economic consequences.

The data on the average cost per month incurred by households on electricity consumption is germane to this study as this has a great implication on the economic welfare of the households, taking into cognizance the importance of electricity to household comfort and sustenance. An average cost of N25, 800 on both the fueling and maintenance of the generator in a month is very high when compared to the N2, 100 costs of power usage through the IKEDC prepaid meter. The cost of the use of solar panels for solar energy is the total cost of purchasing the necessary material, such as the solar panel, the batteries and other materials plus the cost of installation and periodic maintenance. However, to arrive at the monthly average cost of maintenance, the cost of replacement of batteries and other materials are important elements of cost which are the functions of the capacity of the loads, and in most cases, as the capacity of the loads the solar system intends to carry increases, so also the total cost of the solar material, installation, and maintenance increase. Hence, the respondents installed less capacity of loads for the solar energy system, specifically for lighting bulbs, charging phones and flashlights.

A cross-examination of the income level of respondents and the average monthly cost of the use of a generator as an alternative power supply shows that 34% of the respondents earning between N110, 001 – N130, 000 per month (average of N120, 000.50), an average of N25, 800 monthly cost of the use of generation, results into 21.5% of monthly earning going to the use of power supply when the electricity from IKEDC and the use of solar panel are not included. The economic implication of this situation on household economic sustenance is highly negative as the remaining 79% of the earnings are distributed among other basic needs such as food, housing, clothing and so on.

The types of home appliances and their duration of use are important elements of this research as these

variables are major factors in assessing the levels of socio-economic welfare. It is important to note that the socio-economic welfare of the households is measured in terms of the followings; the comfort achieved through the use of home appliances; the improvement in health as a result of the use of the home appliance such as refrigerators for the preservation of foods and drinks, and the use of fans for cooling effect; the educational improvement through the use of home appliances such as television, radio; the enhancement of communication through the use of cell phones and laptops which need recharging; and sustenance of household economy through the preservation of foods and drinks in the refrigerator.

Table 3: Electrical Home Appliances Used by Households in the Study Area.

Home Appliances	No of the respondents that used the home appliances	% of the No of respondents that used the home appliances	Average duration of use in a week (in hours)	% ina week (hours)
Television	370	100	91	54
Radio	210	57	72	43
Washing Machine	86	23	3.5	2
Laptop	141	38	11	7
Refrigerator	370	100	35	21
Light Bulb	370	100	132	79
Flashlight	370	100	132	79
Air Conditioner	34	9	4.5	3
Electrical Stove	208	56	5	3
Microwave	311	84	3	2
Electrical Oven	76	21	3	2
Blender	319	86	91	54
Electric Kettle	186	50	8	5
Electric Fans	370	100	91	54
Electric Pressing Iron	370	100	91	54
Radio Sets	274	74	19	11
Bread Toaster	164	44	4	2
Total	-	-	-	

Source: Author's Field Survey June 2022.

In Table 3, the data shows variations in the types of home appliances and duration of the use of the home appliance. The data revealed that home appliances such as the television, refrigerator, light bulbs, electric fans, and electric pressing iron 100% of the users of home appliances by the respondents, while the durations of use of home appliances such as electric stoves, micro-oven, electric ovens and bread toaster are very low when compared to television, radio, electric fan and electric pressing iron.

The overall assessment of the benefits of electricity supply to the respondents is germane to this research as the electricity supply is considered a factor of socio-economic welfare. Hence, Table 4 shows the assessment of the households' satisfaction with the socio-economic benefits of electricity supply.

Table 4: Households' Satisfaction levels with the Socio-Economic Benefits of Electricity Supply

S/N	Indices	HS	S	NS	UD	Total
1	Comfort	-	88(24%)	273(74%)	9(2%)	370 (100)
2	Improved Health	76(20%)	169(46%)	121(33%)	4 (1%)	370 (100)
3	Educational Improvement	102 (28%)	124 (34%)	135 (36%)	9 (2%)	370 (100)
4	Sustained Household Economy	21 (6%)	73 (20%)	271 (73%)	5 (1%)	370 (100)
Total		199 (14%)	454 (30%)	800 (54%)	27 (2%)	1480 (100)

Source: Author's Field Survey June 2022.

Note: Highly Satisfied (HS), Satisfied (S), Not Satisfied (NS), Undecided (UD).

The data above revealed that on average, 200 respondents out of the 370 respondents sampled are not satisfied with the socio-economic benefits derived from the electricity supply in the study area, and this represents 54% of the total number of respondents sampled, while 163 respondents are either highly satisfied or satisfied with the benefits derived from the socio-economic benefits of electricity supply in the study area, representing 44% of the total number of sampled respondents. The 7 respondents have no clear cut of the benefit derived from the electricity, and this represents 2% of the total number of respondents sampled.

However, the 44% level of satisfaction of respondents on the socio-economic benefits of the electricity supply in the study area is to be considered as low because electricity is a basic infrastructure needed for households' socio-economic development, which is better translated as households' socio-economic welfare. The need for electricity as a basic infrastructure is also premised on its affordability by all households irrespective of their socio-economic status.

Conclusion and Recommendations

Electricity supply has been a major determinant in assessing household socio-economic welfare. Through data collection and analysis, the empirical investigations have revealed the various sources of power supply in the study area, and their duration, with the cost of each identified power source. The 44% level of satisfaction of respondents on the socio-economic benefits of the electricity supply in the study area should not be interpreted as fair or just below average, rather, the result should be interpreted as a low level of satisfaction because the electricity supply is a basic need for all households irrespective of their income levels and that the power outages by the IKEDC are an unacceptable situation, as this translate to under development within the context of socio-economic development of both the households.

Adequate demographic data of all the users and prospective users of electricity infrastructure in Nigeria is needed to assess the adequacy or otherwise of the existing electricity infrastructures. The electricity transmission and distribution are to be assessed when adequate data are available in the data bank.

An adequate supply of electricity from IKEDC is desirous as it is cost-effective when compared to the alternative sources of power, hence, the creation of enabling environment by the government for all the electricity distribution companies to operate should be in place, with proper monitoring of performance through a feedback mechanism involving all the stakeholders.

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