International Journal of Home Economics, Hospitality and Allied Research, 2(2): 275-285.
DOI: https://doi.org/10.57012/ijhhr.v2n2.022
Received: May 10, 2023
Revised: September 29, 2023
Accepted: December 20, 2023
Published: December 28, 2023

Brief Research Report

Attitude and Electricity-Saving Behaviors among Household Users of Electricity in Nsukka, Nigeria

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Abstract: Household electricity consumption rates are increasing globally. However, saving electricity can decrease energy use, avoid wastage, and save financial resources for households. Therefore, this study was conducted to determine how attitude influences electricity-saving behaviors among household users in Nsukka District, Enugu State, Nigeria. The study adopted a descriptive survey design. A research question with corresponding null hypotheses was formulated and tested at a 0.05 level of significance. Stratified random sampling was used to select 400 household users, consisting of 206 females and 194 males. A structured questionnaire was used to collect information from the respondents. The questionnaire was validated by three experts and tested for reliability using the Cronbach alpha method. It contained respondents' personal data (biodata and demographics) and 28 items on attitudinal factors. The data obtained were analyzed to determine mean responses, and t-tests were used to test the null hypotheses at a 0.05 level of significance. The study found that gender does not influence the attitude of household users towards electricity-saving behaviors. It is recommended that government and non-government bodies organize training programs for household users of electricity to improve their attitude and promote more electricity-saving behaviors.

Keywords: Attitude, Electricity Saving Behaviors, Households, Psychological Behavior

1. Introduction

Electricity is generated by power sources, transmitted, and supplied to end users. In Nigeria, electricity is primarily generated by thermal (gas-fired) and hydropower sources. There are 23 power-generating facilities in Nigeria connected to the national grid, with a combined capacity of 11,165.4 MW. These facilities are operated by two generating companies: independent power suppliers and Niger Delta Holding Company (Ijeoma & Briggs, 2018). The electricity is transmitted from the national grid and distributed to different regions before reaching end customers, including households (Oyewo et al., 2018).

Energy is used in various sectors in Nigeria and around the world, including industrial, transportation, commercial, agricultural, and residential sectors. However, the residential sector tends to consume the most electricity. According to available statistics on Nigeria's electricity consumption sectors, the residential sector consumes the highest amount of energy overall (Ito, 2014). Households use energy for various daily activities such as lighting, cooking, laundry, entertainment, and cooling. Cooking, lighting, and using electrical appliances are the main energy-consuming activities in Nigerian households (Oyedepo, 2012). While using electrical appliances provides comfort and convenience for households, it often leads to concerns and struggles in managing electricity bills and meeting other family needs. Orokpo and Mutong (2018) reported that about 70% of Nigerians are poor and have difficulty balancing the increasing costs of goods and services. As a result, their income is thinly spread among competing needs, leaving little for electricity tariff payment. This situation raises questions about households' comfort and their ability to regularly pay their electricity bills with their limited earnings. Therefore, it is crucial to properly manage the electricity transmitted and distributed to homes through efficient electricity-saving behaviors.

Electricity-saving behavior refers to conscious measures and practices that electricity users implement to ensure efficient energy use without unnecessary waste (Arowolo, 2019). It involves adopting behaviors that minimize energy utilization (Mahmoud & Alajmi, 2010; Rohlfing et al., 2016). Research has shown that positive changes in electricity-saving behavior can reduce household energy and electricity consumption by up to 22% and electricity use by up to 19% (Abrahamse et al., 2005). In this context, electricity-saving behavior refers to habitual positive actions or changes in electricity use that individuals should incorporate into their daily lives to reduce energy consumption. According to the United Nations Program on Sustainable Development Goal 7, the scarcity of energy resources is expected to increase between 2021 and 2030 (Painuly et al., 2020). Oyedepo (2012) also asserted that about 30 to 40% of generated electricity is lost due to inappropriate utilization, which is attributed to consumers' lack of knowledge and awareness about energy management. By saving energy, households can reduce the resources previously allocated to electricity and redirect them towards fulfilling other essential needs, resulting in improved comfort and quality of life. Most household electricity users may not be able to take steps to conserve energy on their own unless they receive proper education on the importance and methods of reducing electricity consumption.

Reducing energy consumption by household users of electricity can be achieved through various methods, such as using energy-efficient bulbs like Light Emitting Diode (LED) light bulbs. According to Zeb et al. (2016), light-emitting diodes are one of the most common energy-efficient lighting options. They are defined as diodes that use semiconductors to convert electricity into light. Another way to reduce energy consumption is by purchasing electrical appliances with an energy star rating. Energy Star is a government-backed symbol for energy efficiency that helps households identify energy-efficient products and practices (Ohler et al., 2020). When choosing electrical

appliances, it is important to consider their power rating, as higher-rated appliances consume more power and increase charges (Ogbuanya, 2009). In order to achieve energy efficiency in households, it is important to unplug electrical appliances when not in use and turn off lights at the appropriate times. Studies have shown that "turning off lights" is the most common electricity-saving behavior, followed by turning off other appliances (Bell et al., 2016; DeWaters & Powers, 2008; Menzes et al., 2012). Providing instructions to household members on practicing electricity-saving habits is also an effective measure for saving energy (Simanaviciene et al., 2017).

Habits often influence households. Habits, which are routine behaviors, are crucial for every household member to save electricity. A household is defined as one or more people living in a housing unit or dwelling place (Figus et al., 2016). It is a group of individuals who may or may not be related, living under the same roof, and under the authority of a head acknowledged by all members (Tetlow et al., 2015). Therefore, a household is a group of people living together, sharing common provisions and essentials for living. Among household members, adopting electricity-saving behaviors is essential for saving and managing electricity. According to Albert and Troutan (2006), behavior refers to every action that can be observed or heard from a person. In this context, behavior refers to an individual's response to electricity. A study suggests that electricity users in Enugu State, Nigeria do not exhibit the expected psychological behavior towards electricity saving (Ubani et al., 2013).

Psychological factors have direct or indirect influence on intention (Gregg, 2011; Mansor et al., 2019; Pearson, 2013; Simanaviciene et al., 2017). Psychological factors are dispositions that create the conditions influencing an individual's behavior, such as attitude (Mansor et al., 2019). Having a positive attitude towards electricity saving is crucial for every household. Attitude refers to a person's beliefs, feelings, and tendencies towards certain issues (Razi et al., 2019). It can be defined as a predisposition to behavior and action (Altmann, 2008). In this research context, attitude is an individual's behavior or action towards electricity saving, which can be positive or negative. According to the Energy Efficiency and Conservation Authority, daily household activities can accommodate energy-saving attitudes, such as hand-washing dishes instead of using a dishwasher, fully loading the washing machine to avoid multiple runs, and reducing or turning off air conditioning in unoccupied rooms (Solopova, 2008). Developing an attitude for energy saving can drive individuals towards electricity saving. Therefore, it is pertinent to understand the attitude of household users towards electricity saving. Unfortunately, no study known to the researcher has been conducted to determine how attitude influence electricity-saving behavior among household users in Nsukka District, Enugu State, Nigeria. This research aims to address this gap.

1.1. Statement of Problem

Currently, it is important for households to save electricity. This can be achieved by consciously practicing and observing electricity-saving behaviors in their homes. Electricity-saving behaviors help to reduce energy usage and prevent energy wastage. Saving electricity has several other benefits, including saving money that can be used for other family expenses, slowing down the depletion of scarce energy resources, and promoting a safer environment. However, there is a global trend of increasing household electricity consumption rates. This excessive and inefficient use of electricity in homes leads to the depletion of scarce energy resources, damage to electrical components, harm to the environment, and unnecessary financial losses that could have been allocated to other family needs. In Nigeria, it has been reported that around 30 to 40% of generated electricity is lost due to

improper utilization, largely due to wasteful electricity use by consumers. In Southeastern Nigeria, including Enugu State and perhaps Nsukka, households struggle to develop a conscious effort to save electricity. These households need to possess the necessary electricity-saving behaviors through education. Unfortunately, many households do not possess or acquire the desired electricity-saving behaviors that would contribute to efficient electricity use. Although there are different electricity-saving behaviors that can be practiced by household users in Nsukka, Enugu State, there is currently no research report on the psychological influence on electricity-saving behavior in the area. Therefore, the problem identified by this study is that household users in Nsukka lack sufficient psychological disposition towards saving electricity. As a result, this study aims to determine how attitudes influence electricity-saving behaviors among the population of electricity consumers in the study area.

1.2. Purpose of the Study

Generally, the purpose of the study was to determine how attitudes influence electricity-saving behaviors among household users. Specifically, the study sought to find out:

(a) the influence of attitudes on the electricity-saving behavior of household users.

1.3. Research Question

The following research question guided the study:

(a) What is the influence of attitude on the electricity saving behaviors of household users?

1.4. Hypotheses

The following hypotheses were tested at a significance level of 0.5:

Ho_1: The mean responses of male and female household members do not significantly differ in their attitude towards electricity-saving behaviors.

2. Materials and Methods

1.1. Design for the Study

A descriptive survey design was adopted for the study. This design was considered suitable as it aimed to gather information from household users of electricity regarding the psychological influence on electricity-saving behaviors among households in Nsukka, Enugu State.

2.1.1. Ethics Statement

This research was approved by the research ethics committee of the Faculty of Vocational and Technical Education. All participants signed an informed consent form to participate in the study.

2.2. Area of the Study

The study was conducted in Nsukka, Enugu State, due to its academic environment, cosmopolitan nature, and economic stress. The academic environment refers to the presence of a university in the area, attracting educated individuals. Cosmopolitan means that Nsukka is home to people from different ethnicities, beliefs, and cultures. Additionally, people in Nsukka face economic stress as they try to make the best use of limited resources. The study specifically focused on urban, semi-urban, and rural areas in Nsukka.

2.3. Population and Sample

A total population of 400 household users of electricity was selected using a stratified Taro Yamane random sampling format to determine sources of information. Eventually, 206 female and

194 male households were sampled. Uzoagulu (2011) stated that stratified random sampling considers identified characteristics or sub-cultures relevant to the study.

2.4. Instrument for Data Collection and Study Procedure

A structured questionnaire with 28 items divided into two sections was used to collect information from the respondents. Section A consisted of respondents' personal data (biodata and demographics), while Section B consisted of 28 items on attitudes towards electricity-saving behavior. The questionnaire used a rating scale of Strongly Agree (1), Agree (2), Neutral (3), and Disagree (4). An attitudinal scale instrument (adapted from Yilmaz & Alici, 2011) was used to obtain information from household users of electricity. Three experts from the Department of Vocational Technical Education at the University of Nigeria Nsukka, along with one household, conducted a face validation of the instrument. Their comments, suggestions, and advice were used to modify some of the items. The internal consistency of the instrument was determined using the Cronbach alpha coefficient method. Twenty copies of the questionnaire were administered to household users of electricity in Igbo Eze South Local Government Area. Their responses were computed using the Statistical Package for Social Science (SPSS), resulting in a reliability coefficient of 0.84.

2.5. Data Collection Technique

The researcher administered and collected the instrument with the assistance of five research assistants. The research assistants were briefed on the different sections of the instrument. They were asked to translate the items into the native language to help households understand them, and read out the items to households who were unable to read and understand them. The research assistants administered the instrument to the respondents and collected it after completion. The respondents were required to provide information that represented their opinions using the response alternatives provided in the questionnaire.

2.6. Data Analysis Technique

The research question was answered using the mean, while the t-test was used to test the null hypotheses at a significance level of 0.05. Items with a mean of 2.50 or above were considered strongly agreed, while items below 2.50 were considered disagreed. A null hypothesis was accepted at a significance level of 0.05 or above, and rejected when the significance level was less than 0.05.

3. Results and Discussion

3.1. **Research Question 1:** What is the influence of attitude on the electricity saving behaviors of household users?

Table 1: Mean and Standard Deviation of the Responses of the Respondents on the Influence of Attitude on Electricity-Saving Behaviors of Household Users

S/n	Influence of Attitude on Electricity-Saving Behaviors of Household Users	$\bar{X}$	SD	Decision
1	I like to switch off electrical bulbs when leaving the house regularly.	4.65	.74	Strongly Agreed
2	Switching off electricity bulb in a room at all times when nobody is making use of it is my usual practice.	4.25	1.01	Agreed
3	I switching off the refrigerator, deep freezer after freezing for 3-5 hours.	3.61	1.32	Agreed
4	I unplug all electrical appliances in the house from the sockets when not in use.	4.02	1.20	Agreed
5	I unplug mobile phone, laptop when fully charged.	4.40	.91	Agreed
6	I usually switch the change-over to neutral when leaving the house	3.73	1.27	Agreed

7	I usually switch off all electrical appliances when travelling.	4.50	.89	Strongly Agreed
8	I regularly switch off outdoor security light in the day time.	4.19	1.06	Agreed
9	I always clean all electrical appliances in the home every week to promote optimal efficient energy use.	3.46	1.27	Undecided
10	I tightening the connectors when there are loose connections in the plugs so to maintain the appliances for optimal energy use.	3.82	1.12	Agreed
11	I unplug the socket before cleaning any electrical appliance.	4.29	.99	Agreed
12	I ensure all electrical appliances are better kept in energy efficient mode.	3.99	1.03	Agreed
13	I always clean all electricity lamps and reflectors in the house.	3.74	1.14	Agreed
14	I make sure that TV is switch off when nobody is watching it.	4.32	.91	Agreed
15	During the day I keep doors and windows open for natural lightening.	3.96	1.26	Agreed
16	Normally, I turn off AC/fan when no one is using it.	4.26	1.01	Agreed
17	I always turn off unnecessary light's bulb in the house.	4.12	1.09	Agreed
18	I usually keep the doors and windows open for ventilation instead of using fan or a/c.	3.86	1.26	Agreed
19	When the pressing iron gets fully hot, I unplug it.	3.90	1.17	Agreed
20	I use modern energy conserving Light Emitting Diode (LED) Television.	3.79	1.19	Agreed
21	I always shut down my computer when not in use.	4.63	.67	Strongly Agreed
22	I iron cloth when it is dry.	4.43	.83	Agreed
23	I like to switch off the socket when it is not in use	4.24	1.02	Agreed
24	I ensure that the use of energy-intensive appliances in the home is minimized.	4.16	.92	Agreed
25	I usually sun dry clothes instead of using electrical dryer.	4.35	.96	Agreed
26	I wash dishes by hand instead of using dish washer.	4.26	1.08	Agreed
27	I try to figure out which appliances in the home consume most electricity.	4.033	1.08	Agreed
28	I regularly maintain household electrical gadgets.	4.11	.10	Agreed

Table 1 revealed that items 1, 7, and 21 had mean values of 4.65, 4.50, and 4.62, respectively. These values fall within the response option of "strongly agreed," indicating that the respondents strongly agreed that these items influence the attitude towards electricity saving behavior in household users. Items 2 to 6, 8, and 10 to 20, as well as 22 to 28, had mean values ranging from 3.60 to 4.43, falling within the response category of "agreed." This suggests that the respondents agreed that these items also influence the attitude towards electricity saving behavior in household users. However, item 9 had a mean value of 3.45, falling within the response option of "undecided." This means that the respondents were unsure whether this item is one of the influences on attitude towards electricity saving behavior in household users. The standard deviation for the items ranged from 0.66 to 1.31, indicating that the responses of the respondents were relatively close to each other.

3.2. **Hypothesis 1:** The mean responses of male and female household members do not significantly differ in their attitude towards electricity-saving behaviors.

Table 2: Analysis of Variance of the Responses of Male and Female Household Members on the Influence of Attitude on Electricity-Saving Behaviors of Household Users

S/n	Influence of Attitude on Electricity Saving Behaviors of Household Users	Males n = 193		Females n = 206		Sig.	Decision
		$\bar{X}_M$	S. D_M	$\bar{X}_F$	S. D_F		
1	I like to switch off electrical bulbs when leaving the house regularly.	4.64	.76	4.67	.73	.71	NS
2	Switching off electricity bulb in a room at all times when nobody is making use of it is my usual practice.	4.18	1.06	4.31	.96	.22	NS
3	I switching off the refrigerator, deepfreeze after freezing for 3-5 hours.	3.57	1.33	3.65	1.30	.54	NS
4	I unplug all electrical appliances in the house from the sockets when not in use.	4.13	1.08	3.92	1.29	.07	NS
5	I unplug mobile phone, laptop when fully charged.	4.27	.96	4.51	.85	.01	S
6	I usually switch the change-over to neutral when leaving the house.	3.78	1.26	3.68	1.28	.42	NS
7	I usually switch off all electrical appliances when travelling.	4.55	.82	4.45	.95	.25	NS
8	I regularly switch off outdoor security light in the day time.	4.26	.99	4.13	1.10	.19	NS
9	I always clean all electrical appliances in the home every week to promote optimal efficient energy use.	3.48	1.27	3.45	1.26	.81	NS
10	I tightening the connectors when there are loose connections in the plugs so to maintain the appliances for optimal energy use.	3.92	1.13	3.72	1.11	.09	NS
11	I unplug the socket before cleaning any electrical appliance.	4.30	1.03	4.30	.94	.98	NS
12	I ensure all electrical appliances are better kept in energy efficient mode.	4.04	.99	3.94	1.07	.36	NS
13	I always clean all electricity lamps and reflectors in the house.	3.82	1.15	3.67	1.14	.20	NS
14	I make sure that TV is switch off when nobody is watching it.	4.32	.95	4.34	.86	.84	NS
15	During the day I keep doors and windows open for natural lightening.	3.93	1.28	4.00	1.22	.56	NS
16	Normally, I turn off AC/fan when no one is using it.	4.26	1.00	4.27	1.01	.94	NS
17	I always turn off unnecessary lights bulb in the house.	4.26	.94	3.99	1.20	.01	S

18	I usually keep the doors and windows open for ventilation instead of using fan or a/c.	3.86	1.25	3.86	1.28	.99	NS
19	When the pressing iron gets fully hot, I unplug it.	3.79	1.19	4.01	1.15	.05	NS
20	I use modern energy conserving Light Emitting Diode (LED) Television.	3.67	1.19	3.89	1.18	.06	NS
21	I always shut down my computer when not in use.	4.61	.68	4.65	.65	.55	NS
22	I iron cloth when it is dry.	4.46	.81	4.42	.83	.60	NS
23	I like to switch off the socket when it is not in use.	4.23	1.05	4.24	.99	.89	NS
24	I ensure that the use of energy-intensive appliances in the home is minimized.	4.25	.85	4.07	.98	.06	NS
25	I usually sun dry clothes instead of using electrical dryer.	4.33	.89	4.35	1.01	.81	NS
26	I wash dishes by hand instead of using dish washer.	4.21	1.10	4.31	1.05	.36	NS
27	I try to figure out which appliances in the home consume most electricity.	4.13	.99	3.95	1.14	.08	NS
28	I regularly maintain household electrical gadgets.	4.20	.94	4.03	1.05	.10	NS

N = total number of respondents, $\overline{X}_M$ = calculated mean value for males, $S.D_M$ = standard deviation for males, $\overline{X}_F$ = calculated mean value for females, $S.D_F$ = standard deviation for females, Sig. = probability value, NS = Not significant, S = Significant.

The results in Table 2 show a significant difference in the mean responses of household members for items 5 and 17, with probability values of 0.01 and 0.01, respectively. Since these probability values are less than the 0.05 level of significance, the null hypothesis of no significant difference was rejected for these items. The results also revealed that there was no significant difference in the mean responses for items 1, 2, 3, 4, 6 to 16, and 18, 20 to 28, as their probability values ranged from 0.06 to 0.99, which is greater than the 0.05 level of significance. Therefore, the null hypothesis of no significant difference was accepted for these items.

The study found that households strongly agree on the influence of attitude on three items: regularly switching off electrical bulbs when leaving the house, switching off all electrical appliances when traveling, and shutting down the computer when not in use. They also agreed on 18 other items, such as switching off electricity bulbs in unoccupied rooms, unplugging electrical appliances when not in use, and cleaning electrical appliances regularly. However, respondents were undecided on one item: cleaning all electrical appliances in the home every week to promote efficient energy use. These findings align with the report by Al-Marri et al. (2018), which highlights the importance of energy-related attitudes and energy-saving behaviors. The t-test analysis comparing the responses of male and female household members on the influence of attitude on electricity-saving behavior revealed no significant difference for 26 items. However, there was a significant difference for two items. This contradicts the findings of Al-Marri et al. (2018), who stated that most consumers do not engage in energy-saving practices despite awareness of the need for energy sustainability. These findings have implications for households, academic researchers in the field of electricity, government and non-governmental organizations, the Enugu Electricity Distribution Company

(EEDC), curriculum planning administrators and teachers, and society as a whole. The findings can help promote the development and application of the right electricity-saving attitudes. They can also serve as a reference for the EEDC to identify locations with high energy consumption. Curriculum developers can use the findings to design a suitable curriculum that includes electricity-saving behavioral attitudes as a course. Further research should be conducted on factors affecting electricity-saving behaviors in commercial and industrial sectors, as well as in urban and rural areas. Additionally, investigations into household awareness of electricity-saving behavior should be conducted in the future.

4. Conclusion

Psychological factors, such as attitude, are crucial determinants for effective electricity saving behavior among household members. The study also reveals that gender does not significantly influence attitude towards electricity-saving behavior. This suggests that the attitude of household members towards electricity-saving behavior can be improved regardless of gender. Government and non-governmental bodies should continue to organize training programs for household electricity users to enhance their attitudes towards electricity-saving behavior. Additionally, electricity-saving behavior should be included in the curriculum of primary and secondary schools, technical schools, and colleges.

Acknowledgements

The researcher would like to thank the study participants who took part in this research.

Conflict of Interest

The author declare no conflict of interest.

Author Contributions

All research activities in this study were carried out by CTO.

Data Availability Statement

The dataset used for this study is available on request from the author.

Funding Information

This study was not funded by any organization.

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Publisher: Department of Home Economics and Hospitality Management Education, University of Nigeria, Nsukka 41001, Nigeria