



THE LEVEL OF AWARENESS OF ELECTRICAL SAFETY AMONG ENERGY USER'S IN SOKOTO STATE

Umar, A.,¹ Abubakar, I. N.,² Yusuf, H. M.³ & Okosun, O. E.⁴

¹Department of Electrical and Electronics Engineering Umar Ali Shinkafi Polytechnic.

^{2,3,4}Department of Electrical and Electronics Engineering Federal University of Technology, Minna.

Corresponding author's email: is.abubakar@futminna.edu.ng

ABSTRACT

Electricity hazards and safety measure awareness of energy user's is very important in the sense that it enhances the safety of people's lives and their properties. Consequently, the study assessed the level of electrical hazards and safety measures awareness among electricity users in Sokoto State. Two research questions and two hypotheses were formulated and tested at 0.30 level of significant. Questionnaire was the sole instrument used for the study, distributed to 200 industrial and 100 Domestic users in 5 places namely Sokoto North Local government area, Sokoto South Local Government Area, Wamakko Local Government Area, Cement Company of Northern Nigeria PLC, Sokoto and Kaduna Electricity Distribution Company of sokoto state metropolis using purposively sampling techniques. Mean, standard deviation and t-test was used to analyze research questions and hypotheses. One of the findings that emerged among other; energy users are aware of lack of proper electrical installation which in turn destroy electrical/electronic gadgets and equipment's.

Keywords: *Electrical Safety, Energy, Population, Domestic Energy, Industrial Energy, Questionnaire*

1 INTRODUCTION

Safety should be defined as the reduction of risk to a level that is as low as reasonable and as practicable. It is a state of mind and environment that must become an integral part of each working procedure. (Manik, *et al.*, 2015). Energy is an essential ingredient for socio-economic development and economic growth. The objective of energy system is to provide energy services. (Abalaka, 1998). Energy services are the desired and useful products process or indeed services that result from the use of energy such as lighting, provision of air conditions indoor climate, refrigerated storage, transportation, appropriate temperature and others. (Doherty, 2011). The energy chain to deliver these cited services begins with the collection or extraction of primary energy, which is then converted into energy carriers suitable for various end-uses. (Doughty *et al.*, 1991). It is clear that energy is an essential input to all aspects of modern life. It is indeed the life wire of industrial production, the fuel for transportation and as well for the generation of electricity, in conventional thermal plant. (Croft *et al.*, 1953) Currently, a high proportion of the world's total energy output is generated from fossils such as oil and coal. The unit of energy is Joules or ergs; energy can take a wide variety of forms, such as potential, chemical, electrical, kinetic, heat, magnetic, light and sound energy. (Becker, 2010). This paper focuses on Electrical Energy. Electrical Energy is the energy made by the flow of electric charge through a conductor. It is used to describe energy absorbed or delivered by an electrical circuit (for example, one produced by an electric power), once electrical energy has been converted from potential

energy, it can always be described as another type of energy heat, light, motion and others.

Electricity is virtually important in our daily lives, as long as the electricity is available; no one think much about it. The importance is realized when the power goes out. If for any reason there was no electricity in the world chaos and disorder will immediately take hold. Despite the fact, that electricity plays an important role to national development, and aid us to be comfortable. It is also regarded as a bad servant when it is used wrongly or when the users have shallow knowledge of it; thereby there is need for electrical safety awareness among energy users. It is also important for us to know that risk in electrical work is more than any other job. (Roberts, 2014).

Safety is a practical certainty that injury will not result from the use of electrical substance or agents, equipment's, (Williams, 2008). machines, under specified condition or quality and manner of use. (Kumbhar *et al.*, 2012).

The need for the general public to be aware of the revised electrical regulations to ensure that electrical installations and wiring are done in compliance with the IEE regulations. It has been discovered that 98% of electrical fatalities occurred from all causes and are due to lack of awareness of electrical safety rules and regulation. Electricity exists as a hazardous condition and has long been recognized as a serious hazard. It is present in the form of overhead and underground power lines, temporary and permanent power supplies. No matter what

the source or form of electricity, it exists as a hazard to those who use/work around it. Every year lives are lost or injured due to electrical related accidents that could have been prevented with proper training and awareness of electrical hazards. Electrical safety hazards are the cause of about a quarter of all deaths within the domestic and industrial energy users. As we all know electricity is a good slave but a bad master (Usifo, 2010). It is also important to know that the result of electric shocks ranges from stopping of the heartbeat, bleeding, neurological imbalance and ventricular fibrillation. Electrical Energy always follows the shortest path of a circuit of lower resistance. Electricity can pass through the human body to the ground if there is any provision for it to. (Cadick and Neitzel, 2006) the effects of electric shocks are severe and the table below presents the amount of current and its effect on the body.

Table 1: The amount of current and its effect on the body.

Current in milliamperes	Effects
1 or less	No sensation, probably no effect
1 to 3	noticed
3 to 10	Mild sensation not painful
10 to 30	Painful shock
30 to 75	Muscular control could be lost or
75mA to 4	muscle clamping
amps	Respiratory paralysis
Over 4 amps	Ventricular fibrillation
	Tissue begins to burn. Heart muscles clamp and heart stops beating.

(Cadick and Neitzel, 2006)

1.1 PURPOSE OF THE STUDY

The main purpose of this study is to assess the level of electrical hazards and safety measures awareness among electricity users in Sokoto State of Nigeria; specifically, the study will determine:

1. The level of electrical hazards awareness among electricity users in Sokoto State of Nigeria.
2. The level of safety measures awareness among electricity users in Sokoto State of Nigeria.

1.2 RESEARCH QUESTIONS

In order to achieve the objective of the study, the following research questions were formulated to guide the study:

1. What is the level of electrical hazards awareness among electricity users in Sokoto State of Nigeria?
2. What is the level of safety measures awareness among electricity users in Sokoto State of Nigeria?

1.3 HYPOTHESES

The following null hypotheses was stated and tested at $P < 0.03$ level of significance in order to guide the study:

H₀₁: There is no statistical significant difference between the mean responses of industrial electricity users and Domestic electricity users with respect to their perceptions on level of electrical hazards awareness among electricity users in Sokoto State of Nigeria.

H₀₂: There is no statistical significant difference between the mean responses of industrial electricity users and Domestic electricity users with respect to their perceptions on level of safety measures awareness among electricity users in Sokoto State of Nigeria.

2 METHODOLOGY

The research design used in carrying out this study was the survey method. Survey research is defined as a procedure in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group to determine the level of electrical hazards and safety measures awareness among electricity user's in Sokoto State. The study utilized electricity user's as the population. Purposive sampling was adopted as the populations of the electricity users were not known. 200 industrial electricity users and 100 Domestic electricity users were used in five (5) local Government Area of Sokoto.

The questionnaire was the sole instrument developed by the researcher for the collection of data and was validated by Lecturers in Electrical and Electronics Engineering and Industrial and Technology Education Department, Federal University of Technology Minna. The analysis of data for the research questions and hypotheses were accomplished using frequency counts, mean, standard deviation and t-test at 0.03 level of significant. The mean value of 2.50 was used as a decision point at four (4) point rating scale and any item that has it mean rating of 2.50 and above was considered aware or knowledgeable and any item that has the mean item below 2.50 was considered not aware and not knowledgeable.

Table 2 shows the target population of domestic and industrial energy users in Sokoto State.

TABLE 2: SHOWS THE TARGET POPULATION OF DOMESTIC AND INDUSTRIAL ENERGY USERS IN SOKOTO STATE

S/N	Name of Places	Industrial energy user	Domestic energy user
1	Sokoto North Local government area	70	-
2	Sokoto South Local Government Area	70	-
3	Wamakko Local Government Area	60	-
4	Kaduna Electricity Distribution Company	-	55
5	Cement Company of Northern Nigeria, Sokoto	-	45
	Total	200	100

2.1 Research Question 1.

What is the level of electrical hazards awareness among electricity users in Sokoto State?

Table 1. Show the level of electrical hazards awareness among electricity users in Sokoto State. This indicated that people are aware of certain electrical hazards and also they are still ignorant of some hazards despite long time of electricity usage. The results indicated that industrial

2.2 Research Question 2.

What is the level of safety measures among electricity users in Sokoto State?

Table 3: Mean Responses of Industrial energy users and Domestic energy users on the level of electrical hazards awareness among electricity users in Sokoto State. $N_1 = 200, N_2 = 100$

S/N	ITEM	X_1	X_2	X_t	Remarks
1	Defective parts	2.00	2.00	2.00	Not Aware
2	Inadequate electrical protection of installation	3.00	3.00	3.00	Aware
3	Ground faults in equipment	2.60	2.40	2.50	Aware
4	Use of tools or equipment too close to energized parts	2.40	2.40	2.40	Not Aware
5	Improper insulation	2.30	2.30	2.30	Not Aware
6	High voltage bulb on lower lighting fitting	3.70	3.30	3.50	Aware
7	Loose connections	2.95	2.55	2.75	Aware
8	Covered ventilation holes in electrical equipment	2.31	2.31	2.31	Not Aware
9	Placing socket outlet in wet ground	1.79	1.79	1.79	Not Aware

$N_1 =$ Industrial energy users $N_2 =$ Domestic energy users
 $\bar{X}_1 =$ Mean responses of Industrial energy user's $\bar{X}_2 =$ Mean responses of Domestic energy user's $\bar{X}_t =$ Average Mean responses of Industrial energy user's and Domestic energy user's. Table 3 shows that Industrial energy users were more aware of hazards while using electricity compare to Domestic Energy users.

Table 4: Mean Responses of Industrial energy users and Domestic energy users on the level of safety among electricity users in Sokoto State. $N_1=200, N_2=100$

S/N	ITEM	X_1	X_2	X_t	Remarks
1	Labeling of defective equipment	3.70	3.30	3.50	Aware 2.2
2	Pull out the plug from socket by the plug	3.00	3.00	3.00	Aware
3	Placing of socket outlet on dry ground	2.10	1.90	2.00	Not Aware
4	Proper electrical insulation	2.30	2.30	2.30	Not Aware
5	Uncovered slots of electrical machine and equipment	3.60	3.00	3.30	Aware

Table 4 revealed the level of safety measures knowledge among electricity users in Sokoto State, shows that many people have no Knowledge of safety measures when using electricity. The results indicated that industrial users were more knowledgeable in safety measures compare to Domestic users

2.1 HYPOTHESIS ONE

There is no statistical significant difference between the mean responses of Industrial electricity users and Domestic electricity users with respect to their perceptions on level of electrical hazards awareness among electricity users in Sokoto State

Table 5: t-test Analysis of industrial electricity users and Domestic electricity users with respect to their perceptions on level of safety measures awareness among electricity users in Sokoto State

Respondent	N	Me	SD	df	P	tCal	tcri
Industrial	250	2.8	0.23	234	.03	3.33	1.96
Domestic	210	2.6	0.16				

N =Number of Respondents, $S.D$ =Standard Deviation, $d.f$ =Degree of Freedom, P = Probability of Testing, Me = Mean

The result of t-test presented in Table 5 shows that t-cal was 3.33. This implies that there is significant difference

($P > .03$) in the mean responses of industrial electricity users and Domestic electricity users with respect to their perceptions on level of electrical hazards awareness among electricity users in Sokoto State.

2.2 HYPOTHESIS TWO

There is no statistical significant difference between the mean responses of industrial electricity users and Domestic electricity users with respect to their perceptions on level of safety measures among electricity users in Sokoto State

Table 6: t-test Analysis of industrial electricity users and Domestic electricity users with respect to their perceptions on level of safety measures awareness among electricity users in Sokoto State

Respondent	N	Me	SD	df	P	tCal	tcri
Industrial	250	2.8	0.23	234	.03	3.33	1.96
Domestic	210	2.6	0.16				

N =Number of Respondents, $S.D$ =Standard Deviation, $d.f$ =Degree of Freedom, P = Probability of Testing, Me = Mean

The result of t-test presented in Table 6 shows that t-cal was 3.33. This implies that there is significant difference ($P > .03$) in the mean responses of industrial electricity users and Domestic electricity users with respect to their perceptions on level of on level of safety measures among electricity users in Sokoto State

3 FINDINGS

The electricity users are aware of the followings as electrical Hazards.

1. Defective parts
2. Ground faults in equipment
3. High voltage bulb on lower lighting fitting
4. Loose connections

The electricity users are not aware of the followings as electrical Hazards

1. Inadequate electrical protection of installation.
2. Use of tools or equipment too close to energized parts
3. Improper insulation
4. Placing socket outlet in wet ground



The safety measures awareness among electricity users.

1. Labeling of defective equipment
2. Pull out the plug from socket by the plug
3. Uncovered slots of electrical machine and equipment

The safety measures not awareness among electricity users.

1. Placing of socket outlet on dry ground
2. Proper electrical insulation.

4 DISCUSSION OF FINDINGS

Ensuring safety and raising awareness among individual is very important as knowledge is wealth/health. Electrical hazard posed a significant risk of death and injuries to individual therefore, attention to safety is the necessary as first step in any environmental set up. The findings from Table 3 agreed with the work of (Kolok., 2007, Saba, *et al.*, 2014) which said electric shock occurs if the body contacts with electric circuit. This may cause serious burns, muscle damage and may kill victim by stopping the heart or breathing. In support of this (Smith., 2006) opined that when the body is in contact with live wire or any live components of an energized electrical device and also in contact with grounded object will receive a shock. The risk of receiving electrical shock is greater if one stands in a wet floor or touch live wire with wet body. If someone comes in contact with live electrical source, do not touch the victim with your bare hand. The person must be free either by switching off supply or with the use of insulating materials such as dry wood, clothing, rubber and when people are ignorant of hazards of using electricity they often become a victim of electrical shock or electrocution and related hazards (MacKinnon, 2010)

5 CONCLUSION AND RECOMMENDATION

Base on the findings of the study, it was analyzed that there is need for Domestic and Industrial consumers to be well equipped with Electrical Safety knowledge through various methods of electrical safety awareness for effective safety. The use of standard products, wiring accessories should also be done. Houses should be adequately equipped with electrical control devices such as electrical circuit breaker, switches, fuses and earth leakage circuit breaker. Correct fuse rating should be used and never overload electrical circuit. Do not touch electricity with metal, in wet hand condition and all the industries should be well installed with firefighting devices e.g. fire extinguisher etc.

1. The federal and state government should partake in the effort to improve status of electrical safety awareness through television (jingles, news, and advertisement), and also electricity distribution companies can do the work by sensitizing energy users as they move and distribute bills.

2. The state Government, Electricity Distribution companies and other cooperate bodies should give more information on safety practices to Domestic and Industrial Energy users.
3. The Sokoto state government should involve companies in the state that would supervise new building electrical installation so as to reduce the hazards of fire outbreak, electrocution, loss of lives and valuable properties in the state.

The effectiveness of the result will provide answer to the need of Domestic and Industrial Energy Users of the accident prevention (one who work safely, live to work another day).

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