



The Influence of Awareness on Electrical Threats and Protection Measures among Electricity Users in Maiduguri Metropolis of Borno State, Nigeria

¹Babagana D. Maikale, ¹Muhammad A. Abbo, ¹Hajja I. Usman and
²Moruma M. Lawan

¹Department of Electrical and Electronic Engineering, Ramat Polytechnic Maiduguri P.M.B 1070, Borno State, Nigeria

²Department of Computer Engineering, Ramat Polytechnic Maiduguri P.M.B 1070, Borno State, Nigeria

Abstract: Electricity helps to facilitate economic development and it is a well-known fact that electricity is essential to everyday life, electrical threats and protection measure awareness of residential electricity user's plays significant role in enhancing safety of lives and property. Consequently the study assessed the level of electrical threats and protection measures awareness among electricity users in Maiduguri metropolis. Two research questions and two hypotheses were formulated and tested at 0.05 level of significant. Questionnaire was the sole instrument used for the study, distributed to 150 male and 110 female respondents in Maiduguri metropolis and it environ using purposively sampling techniques. Mean, standard deviation and Z-test was use to analyze research questions and hypotheses. The findings that emerged among others are; electricity users are aware of improper electrical installation and damage electrical appliance and equipment as threats and they were not aware of ungrounded circuit and equipment and coiled extension leads as hazards. On the protection measures, they are knowledgeable on proper electrical insulation and switching off and unplug equipment to be repaired. And not knowledgeable about uncoiled extension cord on the drum and when circuit breaks or fuses trip should not be reset till fault is detected. The following recommendations were made among others are; they should be public awareness on electrical hazards and safety by government and NGOs on Hazards and safety practices attributed to each equipment, appliances and machines should be conspicuously printed on it.

Key words: Electrical, Hazards and Safety, Residential Electricity Users.

Strictly as per the compliance and regulations of:



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1.0 Introduction

Electricity is often referred to as a "silent killer" because it cannot be tasted, seen, heard, or smelled. It is essentially invisible. Electricity has long been recognized as a serious workplace hazard, exposing employees to electrical shock; which can result in

electrocution, serious burns, or falls that result in additional injuries or even death; as well as electrical arc-flash and electrical arc-blast. (Madhav *et al.*, 2008). According to Saba *et al.* (2014), an electricity is used in many ways such as lighting, cooling, heating and it is use to power or drive electrical equipment and machines. Electricity helps to facilitate economic development and it is a well-known fact that electricity is essential to everyday life, without it life will be boring both at home and at the work place. Electricity passes more easily through some materials than others. Some substances such as metals generally offer very low resistance to the flow of electric current and such materials are called “conductors.” Another conductor which is usually overlooked is the surface or subsurface of the earth. While insulator materials offer high resistance to the flow of electric current among the examples are rubber, dry wood, plastic and clothing. It is a well-known fact that electricity is essential to everyday life, both at home and on the job. Perhaps because it has become such a familiar part of daily life, most people don’t give much thought to it or how much our work depends on a reliable source of electricity. More importantly, people tend to overlook the hazards that electricity poses and fail to treat it with the respect it deserves (Madhav *et al.*, 2008).

As report by (Bakshi, 2008), electricity normally travels in closed circuits, through a conductor, but sometimes a person’s body which is an efficient conductor of electricity mistakenly becomes part of the electric circuit. This can lead to an electrical shock. Electric shocks occur when a person’s body completes the current path having both wires of an electric circuit, one wire of an energized circuit, the ground and a metal part that accidentally becomes energized due to a break in its insulation or another “conductor” that is carrying a current. According to (Seip, 2000), that circuit protection is of paramount important in any electrical installation as it prevent fire hazards. Circuit protection limit or stop the passage of current automatically in the event of an overload, ground fault, or short circuit in the wiring system. Grounding in an electrical system means intentionally providing a low-resistance path that connects to the earth. This prevents the accumulation of voltages that could cause an electrical accident in an installation. Grounding is normally a secondary protective measure to protect against electric shock and it does not completely guarantee the person from a shock or be injured or killed by an electrical current.

Although the important of electricity in day to day life, Madhav *et al.*, (2008) reaffirmed that electricity is often referred to as a “silent killer” because it cannot be tasted, seen, heard, or smelled. It is essentially invisible. It is a destroyer of properties if not handle with respect. Electricity is invisible in nature and it is long recognized as a serious hazard at residential, commercial areas, institutions of learning and other places. Neitzel, (2006) said that in the late 1800s, hotels had to place signs assuring their guests that electricity is harmless, but by late 1900s, signs had to be hung to remind people that electricity is a hazard. Signs had to be hung to remind people that electricity is a hazard. MacKinnon, (2010) said that the presence of electricity is increasing in modern live and we ought to know that more electricity usage means more potential electrical hazards. As people continue to put confidence on electricity, so does the importance of electrical safety awareness for the electricity users becomes necessary. People can never be too young to start learning to use electricity safely.

Similarly (Madhav *et al.*, 2009) makes an estimation that 53,000 electrical fires occur in homes each year. Most of these can be avoided by taking simple safety precautions. Electricity is a powerful and versatile energy but can be dangerous if it is not used properly.

Most of the accidents that occur are due either to carelessness or to a lack of awareness of some basic rules that should be observed when using electricity (Networks, and distribution). The use of electricity is something taken for granted, but using it safely is very important. By understanding how electricity works and where it is found, we can each do our part in preventing electrical dangers no matter where we are. The major causes of fire in buildings are arcing or sparking due to loose electrical connections, it was confirmed (MacKinnon, 2010) which assures that the causes of electric fire in a building is overheating of electrical equipment, materials and appliances such as socket, lamp holder and others, wrong use of cable size during installation, overloading of socket, wrong use of fuse and loose electrical connection. OSHA, (2009) recommends way to avoid the fire due to electricity in a building. He said that, the electricity user must avoid overloading of socket, ventilation hole in electrical equipment, appliances and machines must not be locked, using of extension cord that are of correct size or rating for the equipment use. The knowledge of safety measures need to be passed to electricity users as knowledge is the seed of tomorrow's change. Neitzel (2006) classified the effects of electric shocks are severe and the table below presents the amount of current and its effect on human body as shown in Table 1.

Table 1: Classification and Effect of current on human body

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

Source: Cadick, Capelli-Schellpferffer and Neitzel (2006)

However, the electric shock may likely occur when the body becomes part of an electric circuit and there are three ways or path that may lead to electric shocks such as: A person may have contact with both conductors in a circuit; A person may provide a way between an ungrounded conductor and the ground.; A person may provide a way between the ground and a conducting material that is in contact with an ungrounded conductor. Taylor, Easter and Hegney (2004) observed that, the degree of shock an individual may receive is dependent on several factors, including skin resistance. Skin resistance is greatly reduced when the skin is wet or moist, and so the degree of shock will be greater. Other factors include the: The amount of current that is conducted through the body; the path of the

current through the body; the duration of time a person is subjected to the current and status of the individual. In view of the relevance of electricity to man, therefore there is need to educate everyone on the use of electricity to meet human needs because electrical hazard pose a significant risk of death and injuries to individuals. The main purpose of this study is to assess the level of electrical threats and protection measures awareness among electricity users in Maiduguri and its environs.

2.0 Material and Method

2.1 Description of the Study Area

The study was carryout in Maiduguri semi -arid region of Nigeria, which located between latitude $11^{\circ}51'N - 11^{\circ}55'N$ and longitude $13^{\circ}02'E - 13^{\circ}16'E$. It lies on a vast open plain, which is flat with gentle undulations at an average elevation of 345m above sea level. According to Hess *et al.* (1996), the climate of the region is characterized by a cool-dry season (October to March), hot season (April to June) and a rainy season (July to September). The area is fragile and highly susceptible to drought with relative humidity of 13% in dry seasons and 65% in rainy seasons. The area is also highly vulnerable to desertification Dibal (2002).

3.0 Methodology

The research design used in carrying out this study was a survey method, data for this study was derived from a survey of Maiduguri metropolitan LGA of Borno State, Nigeria. Survey research is one 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 threats and protection measures awareness among electricity user's in Maiduguri and it environ . This study covers Maiduguri metropolis a capital town of Borno State, Nigeria. The study utilized electricity user's as the population. Purposive sampling was adopted as the populations of the electricity users were not known. 150 male electricity users and 110 female electricity users were used in Gwange, State low cost housing estate, and Hausari within Maiduguri town. The questionnaire was the only instrument for gathering data. The analysis of data for the research questions and hypotheses were accomplished using frequency counts, mean, standard deviation and Z - test at .05 level of significant. The mean value of 2.50 was used as a decision point at four 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.

4.0 Result and Discussion

Result on impact of electrical threats awareness among electricity users and level of protection measures awareness were presented in Table 1-5 below.

Table 1: Mean Responses of Male electricity users and Female electricity users on the level of electrical threats awareness among electricity users in Maiduguri metropolis. N1= 150, N2 = 110

S/N	Items	X ₁	X ₂	X _t	Remarks
1	Insufficient electrical protection of installation	3.01	3.11	3.22	Aware
2	Inappropriate insulation	2.70	2.49	2.65	Aware
3	Ungrounded circuit and equipment	2.23	2.00	2.19	Not Aware
4	Impairment electrical appliance and equipment	2.56	2.65	2.74	Aware
5	Coiled extension leads	2.05	1.69	2.06	Not Aware
6	Enclosed ventilation holes in electrical equipment	2.55	2.32	2.43	Not Aware
7	Pulling the plug out of a socket outlet by the cable	2.45	2.28	2.40	Not Aware
8	Fixing of wall socket or switches in the bathroom	2.41	1.98	2.14	Not Aware
9	Lighting fitting overheating	3.43	3.01	3.10	Aware
10	High voltage bulb on lower lighting fitting	2.00	2.05	1.90	Not Aware
11	Over load of socket outlet	2.43	2.21	2.02	Not Aware
12	Placing socket outlet in wet ground	2.57	2.09	2.21	Not Aware

Key N1 = Male Electricity Users, N2 = Female Electricity Users, X₁ = Mean of responses of Male Electricity Users, X₂ = Mean of responses of Female Electricity Users, X_t = Average mean of responses of Male and Female Electricity Users

As presented in Table 1. The finding revealed that, people are aware of certain electrical hazards and also they are still ignorant of some threats despite long time of electricity usage. The results indicated that male were more aware of threats while using electricity compare to female.

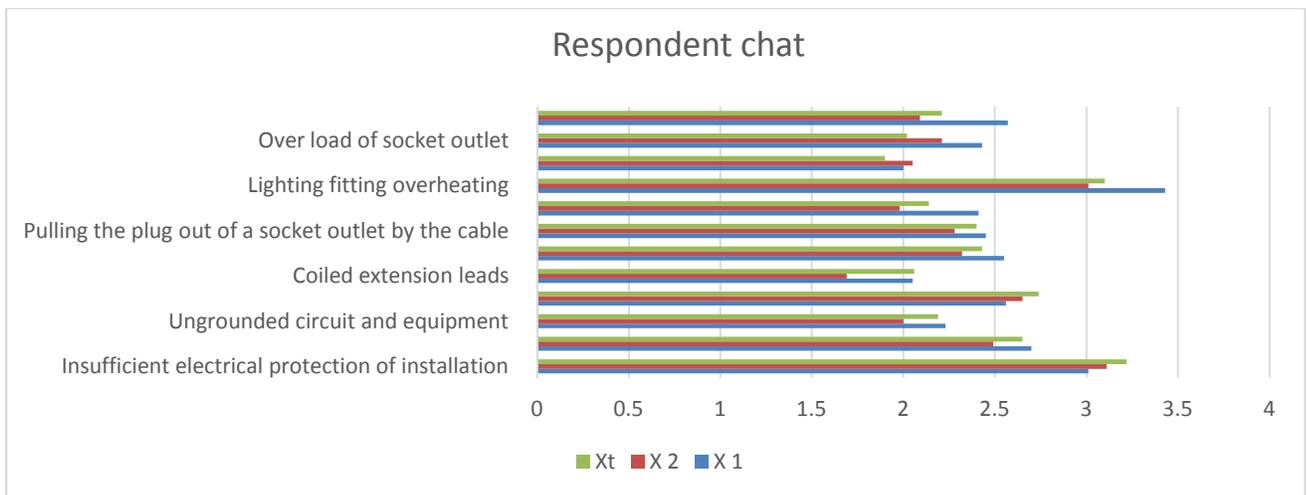


Figure 1: showing the average response and remark from the interviewer

Table 2: Z-test Analysis of Male and Female electricity users with respect to their perceptions on level of electrical threats awareness among electricity users in Maiduguri Metropolis

Respondents	N	Mean	S.D
Male	150	2.41	0.14
Female	110	2.22	0.20
df	348		
p	0.05		
z-cal	2.82		
z-critical	1.56		
decision	S*		
SE±	0.021		

* Significant; N = Number of Respondents; S.D = Standard Deviation; d.f = Degree of Freedom; P = Probability of Testing

The result of z-test presented in Table 2 shows that z-cal was 2.82. This implies that there is significant difference ($P > 0.05$) in the mean responses of Male electricity users and Female electricity users with respect to their perceptions on level of electrical threats awareness among electricity users in Maiduguri metropolis.

Table 3: Mean Responses of Male electricity users and Female electricity users on the level of electrical protection measures awareness among electricity users in Maiduguri metropolis. N1= 150, N2 = 110

S/N	Items	X ₁	X ₂	X _t	Remarks
1	Placing of socket outlet on dry ground	3.05	2.69	3.06	Aware
2	Uncoiled extension cord on the drum	2.65	2.24	2.41	Not Aware
3	Pull out the plug from socket by the plug	2.45	2.28	2.40	Not Aware
4	Labeling of defective equipment	2.41	1.98	2.14	Not Aware
5	Ground electric circuit and equipment	2.43	2.01	2.10	Not Aware
6	Use nonconductive material to remove a victim	2.90	2.45	2.68	Aware
7	Turn off power before leaving equipment	2.23	2.42	2.40	Not Aware
8	Fixing of wall socket or switches in the bathroom	2.41	1.98	2.14	Not Aware
9	Lighting fitting overheating	3.43	3.01	3.10	Aware
10	Avoid plugging heater on extension cord	2.87	2.20	1.95	Not Aware
11	Avoid touching of power equipment with wet body	2.90	2.87	2.96	Aware
12	When circuit breaks or fuses trip don't reset	2.04	2.16	1.96	Not Aware

As illustrated in Table 2, the findings discovered that, the level of protection measures knowledge among electricity users in Maiduguri metropolis showed that, many people have no knowledge of protection measures when using electricity. The results indicated

that male were more knowledgeable in protection measures compare to female. For more detail see Figure 2.

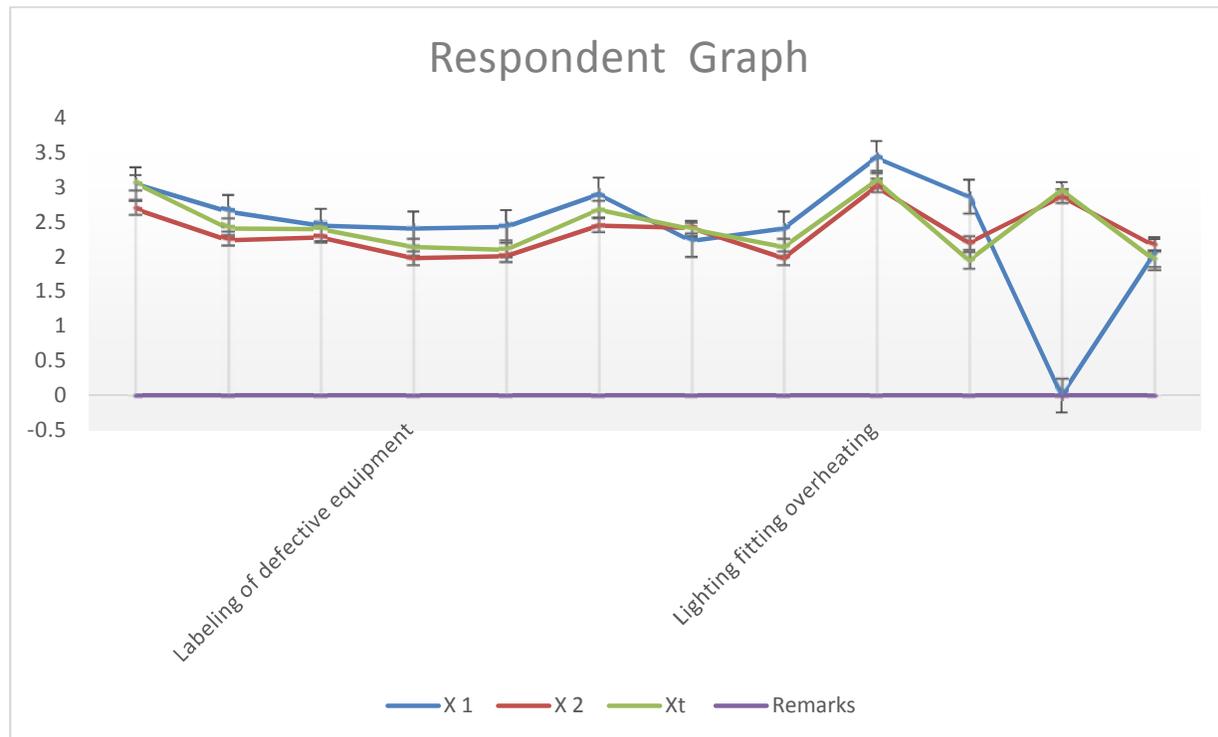


Figure 2: showing the average response and remark from the interviewer.

Table 4: Z-test Analysis of Male and Female electricity users with respect to their perceptions on level of electrical threats awareness among electricity users in Maiduguri metropolis

Respondents	N	Mean	S.D
Male	150	2.75	0.16
Female	110	2.37	0.22
df	235		
p	0.05		
Z-cal	2.35		
Z-critical	1.96		
Decision	S*		
SE±	0.021		

* Significant; N = Number of Respondents; S.D = Standard Deviation; d.f = Degree of Freedom; P = Probability of Testing and SE± = mean standard error of comparison

The result of z-test presented in Table showed that z-cal was 2.35. This implies that there is significant difference ($P > 0.05$) in the mean responses of Male electricity users and Female electricity users with respect to their perceptions on level of protection measures awareness among electricity users in Maiduguri metropolis.

Table 5: Summary of the Findings

S/N	Electrical Threats		Protection measures	
	Aware	Not Aware	Aware	Not Aware
1	Unsuitable electrical installation	Ungrounded circuit and equipment	Proper electrical insulation	When circuit breaks or fuses trip don't reset
2	Impairment electrical appliance and equipment	Coiled extension leads.	Switch off and unplug equipment to be repaired.	Uncoiled extension cord on the drum
3	Lighting fitting overheating	Covered ventilation holes in electrical equipment.	Use nonconductive material to remove a victim from the conductor.	Uncovered slots of electrical machine and equipment

5.0 Conclusion and Recommendation

The study discovered the influence of awareness of electrical threats and protection measures knowledge among electricity users in Maiduguri metropolis. From the study it has become cleared that many users of electricity are not well inform or aware about electricity threats and protection measures. No wonder the implications of these is been seen in numbers of electricity accidents witness in homes and work places. To avoid all forms electricity accident witness in Maiduguri and environ all hands must be on deck to see that electricity users have adequate awareness of electricity threats and protection. The following recommendations were made:

1. Electricity users should be well sensitized by Government, NGOs, electrical power providers and manufacturer of electrical products on the threats pose well using electricity through Televisions Radio, posters, public lectures and other means of communication.
2. The electricity users should be well informed on the protection measures which will help in protecting lives and property of the users of electricity through safety posters, public lectures and other means.
3. Threats and protection practices attributed to each equipment, appliances and machines should be conspicuously printed on it. This will remind the users when using the appliances, equipment and machines.

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