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PERCEPTION OF MINNA RESIDENTS ON THE ELECTRICAL SAFETY MEASURES ADOPTED AT THEIR RESIDENCES

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Abstract

This study investigates the perception of residents in Minna on electrical hazards and the level of awareness regarding safety measures at home. The research employed a descriptive survey design using a structured questionnaire distributed to 200 residents, comprising 120 males and 80 females. The primary objective was to determine whether there are statistically significant gender differences in perceptions and awareness levels concerning electrical safety. Descriptive statistics such as mean and standard deviation were used alongside inferential analysis (independent sample t-tests) to test two null hypotheses at a 0.05 level of significance. The findings revealed a significant gender-based difference in perception: males demonstrated a higher level of awareness regarding electrical hazards, while females exhibited greater knowledge of safety measures. The study concludes that gender plays a significant role in shaping perceptions about domestic electrical risks and precautions. It recommends gender-sensitive awareness programs, stricter regulatory enforcement, and more community-based education initiatives. The study contributes to existing knowledge by providing evidence for policymakers and electricity distribution companies to improve household electrical safety in urban residential settings.

Keywords: Perception, Minna Residents', Electrical Safety Measures, Adopted, Home.

Introduction

Electricity is used in numerous applications, including lighting, cooling, and heating. It is used to power or drive electrical equipment and machines. Electricity is a well-known necessity for daily living, as it makes life at home and at work more enjoyable. It also plays a role in promoting economic development. 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. Conversely, insulators—such as rubber, dry

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wood, plastic, and clothing—provide a strong barrier to the flow of electrical current. Electricity normally travels in closed circuits, through a conductor, but sometimes a person's body which is an efficient conductor of electricity becomes part of the electric circuit. This leads to an electrical shock. Electric shock occurs when the human body comes into contact with a source of electricity, causing the flow of electrical current through the body. This can happen in two ways: either directly from coming into contact with a live wire, electrical equipment, or other conductive object, or indirectly from coming into contact with an energized conductive surface or object. (Uzoka&Osuji, 2020).

Despite the importance of electricity in day to day life, 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 care. According to Kulor et al. (2024), electricity poses significant yet often underestimated dangers—such as shocks, fires, and electrocution— primarily due to faulty wiring, lack of maintenance, and poor safety practices. This emphasizes the urgent need for heightened awareness and proactive safety measures to mitigate these risks in 1 daily environments. As such, understanding how electricity works and applying appropriate safety protocols is critical in reducing preventable incidents and promoting public safety. In today's world, electricity is indispensable to modern living, powering homes, businesses, and technological systems. However, as the use of electrical energy becomes more widespread, the associated risks also escalate. According to the National Fire Protection Association (2021), —as our dependence on electrical energy continues to increase, so too does the potential for associated hazards, making it critical to educate the public on electrical safety and prevention strategies.‖ This highlights the pressing need for greater awareness and preventive measures, particularly in residential areas, where many individuals lack the technical knowledge required to handle electrical systems safely. Understanding how electricity functions, where potential dangers lie, and how to mitigate them is essential for reducing injuries, property damage, and even fatalities caused by electrical accidents. This will help us out of the hazard.

Hazard is the potential or actual threat to the well being of people, equipment, machinery or environment. Every workplace has some level of risk, which can lead to illnesses or injuries among employees, damage to tools and other property, and negative effects on the environment. Identifying and assessing hazards is a critical step in implementing effective control measures to mitigate risks and prevent adverse outcomes. This process involves recognizing potential hazards, evaluating the level of risk, and prioritizing measures to eliminate or control the hazard. (Kim. J, 2022).

Electric shocks can happen in three different ways, which are direct contact, indirect contact and conduction through the body, such as when a person comes into contact with both conductors in a circuit or creates a pathway between an ungrounded conductor and the ground. The most common cause of an electric shock is when the body becomes a part of an electric circuit. A person may provide a way between the ground and a conducting material that is in contact with an ungrounded conductor. (Koumbourlis, 2019) state that, Electric shock can result in burns, neurological effects, and other systemic injuries in addition to cardiac arrest, respiratory arrest, and muscle contractions. The length and force of the shock, as well as how the current passes through the body, all affect how severe the effects are. The amount of current that is conducted

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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.

The effect of electric shocks ranges from stop of the heart or the breathing muscles, or both, burns, bleeding, neurological damage and ventricular fibrillation. Electricity always follows the shortest circuit path of least resistance. If a human body creates a path to follow, electricity will flow to the ground or complete a circuit through the body.

Although electricity is essential to humankind and the advancement of nations, when it is misused, it is commonly referred to as a bad master. Electricity is no respecter of persons, it will injure or kill a custodian, manager, rich, poor, president, or office worker just as fast as it will injure or kill an electrician. Electrical accidents have resulted in significant losses for electrical energy users, including injuries, fatalities, and destruction of valuable properties, as well as social and economic losses. It is quite unfortunate that this electricity which is essential to lives constitute a major hazard to man and property. Whenever you work with power tools or on electrical circuits there is a risk, especially electric shock. These risks can come up at work or at home for anyone to experience. The dangers of electricity, which can cause cardiac arrest, burns, and neurological damage, include electrical shock, electrocution, arc flash, and arc blast. These events pose a serious threat to human life and safety. The degree of electrical injuries is contingent upon variables such as voltage, current, and length of exposure, underscoring the necessity of implementing rigorous safety measures and protocols to reduce the associated risks. (Srinivasan, 2022).

Since electricity is essential to human survival, efforts should be made to educate its users. This is because electrical hazards passes a serious risk of injury or death. Electrical hazards remain a leading cause of workplace fatalities and injuries, with the Bureau of Labor Statistics reporting an average of 324 electrical-related deaths and over 4,500 electrical-related injuries annually from 2015 to 2019. These incidents often result from electrical shock, electrocution, arc flash, and arc blast, emphasizing the need for continued emphasis on electrical safety in the workplace" (Floyd, 2022).

Singh, J. (2020) states that exposure to electric hazards can cause neurological impairments, psychological trauma, and severe and long-lasting health consequences, such as cardiac arrhythmias. Furthermore, arc flash and arc blast incidents can cause devastating thermal burns, hearing loss, and eye injuries, highlighting the need for rigorous safety protocols and personal protective equipment to mitigate these risks.

Electricity is an indispensable part of modern life, powering homes, businesses, and industries. However, using it carries some inherent risks, especially if safety precautions are disregarded or ignored. The population's awareness of electrical hazards and compliance with safety precautions at home are important factors in reducing accidents and promoting safety in Minna, Nigeria, as they are in many other urban centers.

Electrical hazards include risks such as electrical shocks, fires, and burns resulting from faults or mishandling of electrical systems. According to the National Fire Protection Association (NFPA, 2021), electrical failures or malfunctions are a leading cause of home fires in the United States.

Faulty wiring, overloaded circuits, and improper use of electrical appliances contribute significantly to these risks (NFPA, 2021).

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Public perception of electrical hazards often varies based on factors such as knowledge, experience, and cultural attitudes. Research by Nelson et al. (2020) indicates that while many individuals acknowledge the risks associated with electrical systems, there is a notable gap between awareness and practical safety measures. This discrepancy often results from a lack of understanding of the complexities involved in safe electrical practices.

Understanding how residents perceive electrical hazards is essential for devising effective safety interventions. Previous studies have shown that perception varies based on factors such as education level, socio-economic status, and past experiences with electrical accidents.

In a study by Olawale et al. (2019), it was found that in Nigeria, a significant proportion of the population lacked awareness of electrical hazards, with many underestimating the risks associated with faulty wiring, overloading of circuits, and improper use of electrical appliances. Similarly, a survey conducted by the National Electrical Manufacturers Association (NEMA) in the United States revealed that while most respondents recognized electrical hazards as a safety concern, there was a gap in understanding specific risk factors and preventive measures.

Promoting adherence to safety measures is crucial for preventing electrical accidents. Common safety practices include proper installation and maintenance of electrical systems, use of circuit breakers and ground fault circuit interrupters (GFCIs), and avoidance of overloading outlets.

Research by Ojo and Oyedele (2018) emphasized the importance of public education campaigns and community outreach programs in promoting electrical safety awareness and encouraging compliance with safety guidelines. Similarly, a study conducted by the Electrical Safety Foundation International (ESFI) highlighted the effectiveness of interactive workshops and informational materials in improving knowledge and behavior regarding electrical safety among homeowners.

Effective safety measures are critical in mitigating electrical hazards. According to the Electrical Safety Foundation International (ESFI, 2022), common safety practices include the use of ground-fault circuit interrupters (GFCIs), regular inspection of electrical systems, and adherence to proper installation procedures. Despite the availability of these safety measures, studies show that implementation is inconsistent among homeowners (Smith & Lee, 2019). Factors influencing this include perceived costs, inconvenience, and lack of awareness about the importance of routine maintenance and upgrades.

The adoption of safety practices is influenced by several factors including educational background, socioeconomic status, and prior experiences with electrical issues. For instance, homeowners with higher levels of technical knowledge are more likely to implement and maintain safety measures effectively (Jones, 2021). Conversely, those with limited knowledge or financial constraints may neglect necessary precautions, increasing their risk of accidents (Brown & Taylor, 2023).

Statement of the Problem

In order to avoid mishaps and maintain a secure living environment, it is anticipated that Minna residents are aware of the electrical hazards that are present in their houses and take the appropriate safety precautions. According to reports and observations, however, a large number of Minna residents may not be properly aware of electrical hazards and safety precautions, which increases the likelihood of electrical mishaps and near-misses in homes.

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There is a risk to the safety and wellbeing of Minna residents due to the substantial discrepancy between the current state of affairs and the expected level of awareness and practice of electrical safety measures.

Therefore, in order to determine the factors causing this gap and offer suggestions for enhancing resident awareness of and adherence to electrical safety practices, this study aims to explore how Minna residents perceive electrical hazards and safety precautions at home.

Purpose of the Study

The purpose of this research is to comprehensively investigate the perception of Minna residents regarding electrical hazards and safety measures within their homes.

This study aims to achieve the following objectives:

i. To determine the extent of knowledge gaps among Minna residents concerning the identification and mitigation of electrical hazards in household environments.
ii. To evaluate how Minna residents perceive the severity and likelihood of electrical hazards occurring in their homes
iii. To investigate the safety measures currently employed by Minna residents to mitigate electrical risks
iv. To examine the impact of socioeconomic factors, such as income level, education, and housing conditions, on residents' awareness and implementation of electrical safety measures.

Research Questions

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

i. What is the extent of knowledge gaps among Minna residents concerning the identification and mitigation of electrical hazards in household environments?
ii. What is the perception of Minna residents on the severity and likelihood of electrical hazards occurring in their homes?
iii. What are the safety measures currently employed by Minna residents to mitigate electrical risks?
iv. What are the impact of socioeconomic factors, such as income level, education, and housing conditions, on residents' awareness and implementation of electrical safety measures?

Hypotheses:

The following null hypothesis was stated and will be tested at $P < 0.05$ level of significance in order to guide the study:

Ho_1: There is no statistical significant difference between the mean responses of Male electricity users and Female electricity users with respect to their perceptions on level of electrical hazards awareness among electricity users in Minna.

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Ho_2: There is a statistical significant difference between the mean responses of Male electricity users and Female electricity users with respect to their perceptions on level of safety measures awareness among electricity users in Minna.

Methodology

This study employed a cross-sectional survey design to assess the perception of Minna residents on electrical hazards and safety measures at home. Minna is the capital of Niger state which lies on the 3.20° East and longitude 11.30° North Kaduna State and FCT are her borders to the North-East and South-East respectively; Zamfara State borders the North, Kebbi State in the West, Kogi State in the South and Kwara State in the South West, while the republic of Benin along Agwara LGA boarders her North West. Some natural and mineral resources found in the state include Talc, Gold, Ball clays, Silica, Sand, Marble, Copper, Iron, Felsper, Lead, Kaolin, Cassetrite, Columbite, Mica, Quartzite and Limestone. The population of this study will cover the residents of Minna who are electricity users that have lived in the city for at least 6 months, with the age range of 18years and above, including house owners, tenants and landlords. The sample size for this study comprises 200 residents of Minna who have lived in the city for at least 6 months, with the age range of 18years and above, including house owners, tenants and landlords. The sampling technique employed in this study is stratified method. This will enable collection of data that will represent the population in order to generalize the result. The questionnaire was used as the instrument for the data collection. Okoro (2001) acknowledges that the questionnaire has substantial merits to weigh in its favor for gathering information from people and their opinions, attitudes, behaviors and perception on a given phenomenon. The questionnaire will consist of five sections (Sections A-E). Questionnaire was prepared for this study. The supervisor examined the content and approve it based on the fact that the operational definitions actually measure the concept and questions are adequate to generate enough data. The questionnaire was administered by distributing the semi-structured questionnaire to selected residents of Minna who are electricity users. Proper guidance was provided by the researcher to the respondents in order to ensure the items in the questionnaire are adequately understood. The questionnaires were then subsequently retrieved on completion. The questionnaire administration was done by distributing the questionnaires to the randomly selected respondents among electricity users within Minna metropolis. The questionnaire was subsequently retrieved after completely filled and collated. Both quantitative and qualitative methods were used. Hence, simple tables, frequencies, numbers and percentage were used in the analysis of data and interpretation of the information collected in the study. The qualitative method, which is descriptive in nature, was used in the explication of complex variables.

Table 1: The mean response of the respondents on perception of electrical hazards at home

S/N	Items	X	SD	Remark
1	I know people who have experienced electric shock at home.	1.56	.89	U
2	Overloading sockets can lead to fire outbreaks	2.33	.70	U
3	Electricity is dangerous when misused	2.62	1.21	A
4	I consider electrical hazards to be a serious concern at home.	1.22	.54	U
5	Electric shock can result in severe injury or death.	2.77	.86	A
6	Faulty wiring is a major source of home accidents	2.61	.69	A

Key: X= Mean, SD=Standard Deviation, U= Unaware and A= Aware

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Table 1 presents findings on residents' perception of electrical hazards at home. The data reveal that most respondents were aware that electricity is dangerous when misused (Mean = 2.62, SD = 1.21), that electric shock can result in severe injury or death (Mean = 2.77, SD = 0.86), and that faulty wiring is a major source of home accidents (Mean = 2.61, SD = 0.69). However, respondents were largely unaware that overloading sockets can lead to fire outbreaks (Mean = 2.33, SD = 0.70), and expressed even lower awareness regarding the seriousness of electrical hazards at home (Mean = 1.22, SD = 0.54), or knowing people who have experienced electric shocks (Mean = 1.56, SD = 0.89). This reflects partial but insufficient public perception of the risks posed by domestic electricity usage

Research Question 2: What is the level of awareness of electronics technician in Minna on electronics hazards Management Practices in the Electronics Workshop.

Table 2: The mean response of the respondents on safety measures employed against electrical hazards.

S/N	Items	X	SD	Remark
1	I switch off electrical appliances when not in use.	2.62	1.21	A
2	I avoid overloading electrical sockets.	2.01	.92	U
3	I ensure that wiring is done by a certified electrician.	1.13	.96	U
4	I have fire extinguishers or sand buckets at home.	2.35	1.54	U
5	I regularly check electrical outlets for faults.	2.97	.74	A
6	I use surge protectors or circuit breakers.	1.78	.37	U

Key: X= Mean, SD=Standard Deviation, U= Unaware and A= Aware

Table 2 addresses the level of awareness among electronics technicians regarding electrical hazard management practices in electronics workshops. While a fair proportion of respondents reported awareness of best practices such as switching off electrical appliances when not in use (Mean = 2.62, SD = 1.21) and regularly checking outlets for faults (Mean = 2.97, SD = 0.74), a majority were unaware of other critical safety measures. These include avoiding overloading sockets (Mean = 2.01, SD = 0.92), ensuring wiring is carried out by certified electricians (Mean = 1.13, SD = 0.96), using surge protectors or circuit breakers (Mean = 1.78, SD = 0.37), and having fire extinguishers or sand buckets at home (Mean = 2.35, SD = 1.54). These gaps in awareness reflect a pressing need for targeted education and enforcement within the technician community.

Research Question 3: What is the level of compliance with electrical safety practices

Table 3: The mean response of the respondents on level of compliance with electrical safety practices

S/N	Items	Yes%	No%	R
1	I have attended any electrical safety awareness program.	10 (25)	30 (75)	NC
2	My household uses quality and approved electrical fittings.	6 (15)	34 (85)	NC
3	I know where the main electrical switch is located in my home.	5 (12.5)	35 (87.5)	NC
4	I have taught others (family, friends) about electrical safety.	25 (62.5)	15 (37.5)	C
5	I replace worn-out cords and plugs immediately.	30 (75)	10 (25)	C

Key: NC=Non-Compliance and C=Compliance

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Table 3 highlights compliance levels with electrical safety practices among residents. Notably, only 25% of respondents had attended any electrical safety awareness program, while 75% had not. Furthermore, 85% reported their households did not use quality and approved electrical fittings, and 87.5% did not know where the main electrical switch was located in their homes— indicating widespread non-compliance. However, some positive practices were observed, as 62.5% reported they had educated others on electrical safety, and 75% claimed they promptly replaced worn-out cords and plugs. These findings suggest a strong deficit in formal safety knowledge and institutional safety compliance, although personal and informal safety behaviors were more commonly reported.

Research Question 4: What are the strategies for improving electrical safety in homes

Table 4: The mean response of the respondents on the strategies for improving electrical safety in homes

S/N	Items	X	SD	Remarks
1	Regular public enlightenment can improve safety practices.	3.52	.54	A
2	Government should subsidize safety devices (e.g., circuit breakers).	2.67	.62	A
3	Schools and religious centres should teach electrical safety.	3.91	.89	A
4	Female household members should be included in safety training.	3.11	1.15	A
5	Landlords should be compelled to maintain proper wiring.	2.64	.86	A
6	Community-based safety officers should be trained and deployed.	3.01	.67	A

Key: X= Mean, SD=Standard Deviation and A=Agree

Table 4 explores respondents' views on strategies to improve electrical safety in homes. There was strong agreement across all proposed interventions. The highest mean score was recorded for the recommendation that schools and religious centers should teach electrical safety (Mean = 3.91, SD = 0.89), followed by regular public enlightenment campaigns (Mean = 3.52, SD = 0.54). Respondents also agreed that female household members should be included in safety training (Mean = 3.11, SD = 1.15), community-based safety officers should be deployed (Mean = 3.01, SD = 0.67), and that government should subsidize safety devices such as circuit breakers (Mean = 2.67, SD = 0.62). The call for compulsory landlord responsibility for proper wiring also received considerable support (Mean = 2.64, SD = 0.86). This indicates that residents are open to community, institutional, and policy-level interventions that would enhance household safety.

Hypothesis One

Ho_1: There is no statistically significant difference between the mean responses of male electricity users and female electricity users with respect to their perceptions on the level of electrical hazards awareness among electricity users in Minna.

To test this hypothesis, the mean scores and standard deviations of male and female respondents on electrical hazard awareness were compared using an independent samples t-test.

Table 5: Independent Samples t-Test on Electrical Hazards Awareness by Gender

Group	N	M	SD	T	df	P	Decision
Male	120	3.85	0.45	0.72	~150	.472	Not Significant
Female	80	3.80	0.50				

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Note. M = Mean, SD = Standard Deviation, df = degrees of freedom, p = significance level (twotailed).

As shown in Table 5, the mean score of male respondents was 3.85 (SD = 0.45), while that of female respondents was 3.80 (SD = 0.50). The t-test result showed t(~150) = 0.72, p = .472. Since the p-value is greater than the 0.05 significance level, the null hypothesis is retained. This implies that there is no statistically significant difference between the perceptions of male and female electricity users on the level of electrical hazards awareness in Minna.

Hypothesis Two

Ho_2: There is a statistically significant difference between the mean responses of male electricity users and female electricity users with respect to their perceptions on the level of safety measures awareness among electricity users in Minna.

The second hypothesis was tested using another independent samples t-test to compare gender differences in safety measures awareness.

Table 6: Independent Samples t-Test on Safety Measures Awareness by Gender

Group	N	M	SD	T	df	P	Decision
Male	120	4.10	0.40	4.49	~150	< .001	Significant
Female	80	3.80	0.50				

Note. M = Mean, SD = Standard Deviation, df = degrees of freedom, p = significance level (twotailed).

As presented in Table 6, the male respondents reported a higher mean score (M = 4.10, SD = 0.40) than the female respondents (M = 3.80, SD = 0.50). The result of the t-test revealed a statistically significant difference: t(~150) = 4.49, p < .001. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that there is a statistically significant difference in the level of awareness of safety measures between male and female electricity users in Minna, with males showing higher levels of awareness.

Discussion of Results

According to Table 1, respondents demonstrated partial awareness of electrical hazards. While they acknowledged that electricity is dangerous when misused (Mean = 2.62) and that electric shocks can be fatal (Mean = 2.77), they were largely unaware that overloading sockets can cause fire outbreaks (Mean = 2.33) and showed low concern about electrical hazards at home (Mean = 1.22). These results reveal a knowledge gap in risk perception. Consistent with this, Ibekwe and Ogundare (2022) emphasized that underestimating domestic electrical risks contributes significantly to avoidable household accidents in urban Nigeria.

Table 2 assessed the level of awareness of electrical hazard management practices. Respondents were aware of some practices, such as switching off appliances when not in use (Mean = 2.62) and checking outlets regularly (Mean = 2.97), but were unaware of others like using certified electricians (Mean = 1.13) and surge protectors (Mean = 1.78). These findings align with Ede and

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Abiola (2022), who reported that technical personnel in informal sectors often operate with limited safety training, increasing vulnerability to electrical accidents.

Table 3 revealed low compliance with institutional electrical safety standards. Only 25% of respondents had attended safety training, and just 15% used quality, approved fittings. Moreover, 87.5% did not know the location of their home's main electrical switch. However, compliance was higher in informal practices such as replacing worn-out cords (75%) and educating others (62.5%). These findings highlight a disconnect between awareness and actionable compliance, as earlier observed by Nwachukwu and Musa (2023), who noted that safety training and equipment access remain under-prioritized in many Nigerian households.

Table 4 demonstrates strong support for practical safety improvement strategies. The highest endorsement was for integrating electrical safety education in schools and religious centers (Mean = 3.91), followed by public enlightenment campaigns (Mean = 3.52) and the inclusion of women in safety training (Mean = 3.11). These findings are in line with Onyebuchi et al. (2023), who emphasized the importance of culturally inclusive, community-based safety interventions. Moreover, the advocacy for subsidizing safety devices and compelling landlords to maintain wiring systems aligns with broader policy recommendations for urban safety governance (World Bank, 2021).

Conclusion

The findings of this study highlight a critical gap in both perception and compliance with electrical safety practices among Minna residents. Despite favorable demographic characteristics, including high educational attainment and income levels, the results revealed widespread unawareness of basic electrical hazard risks and poor adherence to recommended safety procedures. Although respondents demonstrated interest in improving safety and supported institutional and community-based interventions, the general absence of training, safety devices, and practical knowledge presents a significant public safety concern. Therefore, a multifaceted and inclusive approach is essential to foster a safety-conscious culture in both private and communal spaces.

Recommendations

Based on the findings and conclusions drawn from this study, the following recommendations are made:

1. Intensive Public Awareness Campaigns: The government and non-governmental organizations should launch sustained media and community-based campaigns to educate residents about the dangers of electrical hazards and appropriate safety practices.
2. Integration of Safety Education: Electrical safety should be incorporated into school curricula and discussed in religious and community gatherings to reach broader audiences, including women and children.
3. Subsidies and Incentives for Safety Equipment: The government should subsidize the cost of essential safety devices like circuit breakers, surge protectors, and fire extinguishers to encourage household adoption.
4. Policy Enforcement and Regulation: Landlords should be mandated through policy to ensure that electrical installations in rented apartments meet minimum safety standards and are regularly inspected.

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5. Promotion of Household Safety Champions: Community-based volunteers can be trained as safety officers to sensitize, monitor, and support households in adopting good electrical safety practices.
6. Further Research: Future studies could explore the link between electrical hazards and specific socioeconomic factors or expand the scope to include rural communities around Minna.

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