

ASSESSMENT OF FIRE SAFETY AWARENESS OF OCCUPANTS AND DEVELOPERS IN RESIDENTIAL BUILDINGS IN MAKURDI METROPOLIS

¹Elijah. A. Hime and ²Imborivungu, Terkimbi Emmanuel

¹Department of Vocational and Technical Education, Benue State University

²University of Agriculture Makurdi, Demonstration Secondary School

Email: emmyterk@gmail.com, akaakaseh@gmail.com

ABSTRACT

The study was carried out to assess fire safety awareness of occupants and developers in residential buildings in makurdi metropolis. Two research question and one hypothesis were formulated and tested at 0.05 level of significant. The study adopted descriptive survey research design with the total population of 1267 for the study. The sample of 221 occupants, 24 registered builders and 33 registered architects was selected using simple random sampling and purposive sampling techniques respectively. A self-developed questionnaire was employed to collect data for the study and was validated by experts. Upon successful validation the instruments were trial tested in a pilot study. The reliability coefficient of the instruments was 0.78. The data collected was analysed using descriptive statistics and t-test. The findings revealed that, the extent of fire safety awareness acquired by occupants and developers is very low and that there is a significant difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis (P -value 0.000 is less than 0.05 at $df=357$ and $t=4.80$). The study recommended that Fire safety awareness should be intensified by fire safety officers and other relevant agencies to improve on fire safety education of occupants and developers and also to arrest fire disasters in residential buildings in Makurdi Metropolis, developers should educate the clients on issues of fire safety in residential buildings these could be done through workshops and seminars.

INTRODUCTION

The incidences of fire disasters are becoming worrisome and alarming in Nigeria and Benue State in particular. Properties worth billions of naira are lost as a result of fire incidents, injuries

of various degrees, deformity of human beings and loss of lives is the implication of residential fire yearly. According to Amernic (2008) and Sikkim Manipal University Distance Education (2013), fire safety education is the general safety precaution expected of residents regardless of whether they are residential occupants, commercial, government and industrial buildings. The importance of fire safety among residential occupants cannot be over emphasized because it appears most fire incidents occur in residential buildings. The Editorial Board, Punch News Paper (2012) says over 90 percent of fire outbreaks in Nigeria are caused by human negligence. There are some little habits that could spark fire at homes or offices. Some people, for instance, plug their irons in electric sockets and go on to attend to other things. Some use candles at home but fail to put them out when going to bed or leaving the house. Some light a match stick and throw it near inflammable materials. There are still some who leave food and grease to accumulate on their gas cookers. These bad practices are indicators of the need to educate the people about fire safety so that they can be aware of this fire practice and implementing the safety act to minimize fire outbreaks.

The FRN Fire Safety Act (2004) also stipulates that fire awareness campaign and life safety education to the general public should be carried out to ensure full implementation of Fire Safety Act in residential buildings in Nigeria. It is expected that the menace of fire will be minimized if there is compliance to fire safety code by the residents of homes. Despite the laudable objectives of the Act which formed the minimum standard for assessment of fire safety implementation in residential buildings in Nigeria, it appears that most residents in Nigeria are not aware of the act or the code let alone its implementation in prevention and control of fire in residential buildings.

Federal Emergency Management Agency United States Fire Administration, National Fire Data Center (1997) identify low levels of fire safety education as contributing to fire risk and suggests that those with little education are less likely to grasp the full import of public fire safety education messages. Low literacy levels may also inhibit the ability to read instruction manuals and warning labels for cooking and heating devices, increasing the

chance that they will be used incorrectly and in a manner that increases the risk of fire. Based on the numerous cases of fire incidences it is important to create awareness or educate the populace. This is because the creation of awareness and public education could help the general public and occupants of the residential buildings in Makurdi metropolis towards the implementation of fire safety measures as contained in the act.

According to Commonwealth of Massachusetts (2014), the Fire Data and Public Fire Education Unit manage all public fire and safety education programs in the Office of the State Fire Marshal. Technical assistance is provided to local fire departments, health educators, medical and public health professionals, classroom teachers, elder service providers, community and service organizations and others interested in life safety education. Workshops, seminars and conferences are often organized to sensitize the general public and the occupants of buildings on causes of fire incidents and ways of preventing fire incidents. In Nigeria, the Fire Safety Act which translated to the Code has remained a document and nothing is seen to be done to educate the residents or the public and even to enforce the code.

According to U.S fire administration (2008) fire safety education is defined as the means of providing to the occupants and developers of residential buildings information or facts about fire risk and prevention measures to be taken to avoid or reduce to the barest minimum the occurrence of fire disaster in residential homes. The goal of fire safety education is to inform the occupants, developers and public to take precautions to prevent potential harmful fires and how to escape or survive fire disaster in residential buildings in case of its occurrence.

Fire safety education is a proactive method of reducing emergencies and the damage caused by fire in residential buildings. Supporting the view of U.S fire administration, Michael, Bloomberg, Mayor and Salvatore (2010) said, public fire safety education or awareness is necessary for developers and occupants of residential buildings because it reduces the rate of fire incidents in residential buildings. It also helps fire safety department to collect and document information of disasters that they have encountered and lessons learnt as prerequisites for

preparedness for conquering future residential building fire disasters. Therefore, fire fighting departments should ensure that fire safety education activities are carried out to the door steps of occupants and developers to reduce fire disaster in residential buildings.

Michael, Bloomberg, Mayor and Salvatore (2010) asserts that the repetitive incidents of fire disasters over the years despite the legal, institutional and policy framework, suggests that without fire safety education, proper implementation of fire safety measures that will adequately prevent, control and mitigation fire disaster in residential buildings will continue to be a mirage. The number of deaths and property damage by fire disaster is on the increase in Nigeria and particularly in Benue State despite introduction of fire safety act by the federal Republic of Nigeria since 2004. Firehouse (2005) stated that fire disaster was at the increase in US, Scandinavian countries and Switzerland, but the case was not the same in the European countries and Japan because there was increase in budgetary provision for fire safety education of the public. Fire safety education covers all; the young, the old, developers and occupants. Workshops should be conducted to educate the general public on the need to implementing fire prevention and fire safety measures in accordance with fire safety act/code, the effects of fires, how to deal with it and prevent it.

New York City Fire Department (2013) affirms that one of the fundamental missions of the fire department is to protect the lives and property of residents and developers through fire safety education programs. This is aimed at reducing fire deaths and injuries and property damage by focusing on prevention, identifying and rectifying unsafe behaviors. To achieve this aim, Fire safety educators conduct training, provide lectures and fire safety demonstrations in schools, public places and at community free of charge. The training sessions address the common causes of fire and fire injuries in homes, as well as provide information on how to prevent fires and what to do in case of fire.

Amanda (2009) asserts that many fire related fatalities are as a result of poor decision making on the part of the occupants,

saying that attention should be directed towards modifying occupants' behavior, raising awareness among occupants regarding their relative risk and what they can do to better protect themselves from harm in their homes. Agreeing with the above opinions, Bello, (2010) and Griffin (2011) suggests four key elements to any effort aimed at providing fire safety in residential buildings, the elements are summarize with the acronyms PODS, which includes Prevention, Occupant awareness and Training, Detection, Alarm, and Suppression. Prevention activities deals with fire safety interior finishes and furnishings while reducing ignition sources such as smoking, candles, cooking, and faulty electrical appliances.

Prevention activities could only reduce the number of fire incidents in residential buildings, for it is not possible to remove all fire hazards in residential buildings by prevention means. The second element is occupant awareness and training, it offers the opportunity to educate the masses about prevention activities in which they are to implement and what actions they can take in response to a fire incidents. Griffin (2011) third element is detection and alarm, the primary reason for these systems is to provide fire and smoke detection leading to early warning to occupants of intending fire disaster in a building. The limitation of detection and alarm systems is that they work primarily with intending fire disaster that is slowly developing and confined so that if occupants heed the warning they are able to safely avoid the hazards of the fire. The possibilities of occupants not heeding the warning and facing the fire that is spreading rapidly are weaknesses of detection and alarm system. As a result of this weakness automatic fire suppression is a desirable addition to fire detection and alarm. Finally, the fourth element of fire suppression systems is fire sprinklers. It will be discuses in detailed under fire prevention measures.

Fire disasters in residential buildings are on the increase year after year even in houses with detections and alarms, this clearly shows that effective training and education might have played a role in preventing these deaths by arming occupants of homes with prevention knowledge, response actions, and a better understanding of the importance of fire protection systems in

their residences (Council of Canadian Fire Marshals, 2002). Fire safety awareness and training will mitigate fire disaster which occurs as a result of smoking cigarettes, candles and open flames, cooking appliances, as well as faulty electrical appliances. Complete elimination or control of potential fuels and ignition sources is not practical in residential buildings. However, the use of active and passive fire prevention and creating awareness will be sufficient to prevent or reduce fire disaster in residential buildings.

According to FRN, Fire safety code (2013) the content of occupants' awareness and training for appropriate fire prevention includes recognition of potential ignition sources and hazardous situations, decision process as to whether an occupant should fight a fire or flee it, fire behavior including the flashover phenomenon, fire escape plan and how fire protection systems such as smoke detection and fire alarm system technologies in a building will react. Longcore and Rossiter (2008) provide an overview of the New York State Fire Safety Act, showing that fires do occur from common behaviors, such as decorating residential buildings with combustible materials, improperly disposing of smoking materials, and having candles in sleeping areas. Longcore and Rossiter (2008) suggest that the description of fire protection systems, how the systems could be operated and the expected behavior of the occupants in times of fire disaster should be the content of fire safety education. Longcore and Rossiter (2008) also did not state the effective method of passing information to the occupants of residential buildings. Matthew (2007) and Milshtein (2008) argue that occupants of residential buildings should be educated on the need to install in their homes fire alarms to a security services network communication system that alert the police or fire department for an intending fire disaster. They stated further that face to face education of occupants by the fire fighters should be carried out to achieve the above content.

Kennedy (2007) advocate the use of pamphlet carrying prevention information such as do not overload electrical outlets, use cooking equipment properly, understand and obey fire alarm warnings, there is a strong link between alcohol and residential

fire deaths during fire safety education. Monnikowski and Gray (2009) suggest that occupants should be trained on the use of fire extinguishers, smoke filled trailer walkthrough, access to fire department equipment and control room burn in effort to raise fire safety awareness of the occupants of residential buildings.

Graffin (2011) and Jide (2009) stated that fire safety education should not just be a voluntary work but the main duty of fire fighting officer. Institute of Safety Professionals of Nigeria (2014) was inaugurated in August 1980, charged with the responsibility of creating fire safety awareness through information dissemination, courses, seminars, audits and publications, thus promoting, encouraging and improving occupational method and procedures in the industries, public sector and institutions. Griffin outlined teaching techniques and materials for fire safety education as; self assessment instrument, experience based discussion, care given activities, games, lecture, stimulations and role playing. The materials for effective teaching of fire prevention in residential buildings include posters brochures, flyers, films and slides tapes. Griffin (2011) described lectures as an effective means of reaching a small to mid-size group of people, which should include discussion and demonstration. Because the lecture/demonstration is passive, the observer needs to be made active to maximize learning adding, whenever possible, demonstrate a technique and try to get the audience to practice with you. Films is described as having the ability to pull us totally into what we are viewing, heart as well as mind, he further stated that they can draw out of us a feeling response to a particular problem, which in turn can impel us to action. The slide tape is described by Graffin as another effective tool using audio-visual materials to enhance learning. The slide tape is a device that projects changing still images linked to a audio tape that either narrates the images or plays background music. Duplicating this tool with newer technology could be accomplished by projecting an automated PowerPoint. Graffin called a projection of still images set to music a potential emotional blockbuster and possibly an excellent way to summarize and conclude a fire safety presentation.

Fire safety education can be effective if properly planned by fire safety educators. According to U.S. Fire Administration Report

(USFA, 2008) states that fire steps are taken into consideration while planning for public fire safety education. The five steps include conducting a community risk assessment, developing community partners, creating an intervention strategy (which includes education, engineering controls, and enforcement), implementing the program, and evaluating its effectiveness. Ott (2001) teaching children fire safety is extremely important, they know what to do around flames and in case of a fire disaster in residential buildings. Fire safety will teach children not to play with fire for it will negatively affect their lives and their property.

Purpose of the Study

The purpose of this study is to assess fire safety awareness of occupants and Developers in residential buildings in Makurdi Metropolis. Specifically the study seeks to determine;

1. The extent of fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis
2. The extent of fire safety awareness acquired by developers of residential buildings in Makurdi Metropolis

Research Questions

The study aims at answering the following research question;

1. What is the extent of fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis?
2. What is the extent of fire safety awareness acquired by developers of residential buildings in Makurdi Metropolis?

Research Hypothesis

The following research hypothesis will be tested at 0.05 level of significant;

H_{01} : There is no significant difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis

Research Design

The study adopted descriptive survey research design. The total population of 1267 which include occupants, architects and builders (1,107 occupants, 120, builders and 40 architects). The sample of 221 occupants, 24 registered builders and 33 registered architects was selected using simple random and purposive

sampling techniques respectively. A self-developed questionnaire called "Fire-Safety Implementation in Residential Buildings Questionnaire" (FIRBQ) was the instrument the researcher employed to collect data for the study. The content and face validity of instruments was carried out by two experts in Building Construction, Department of Vocational and Technical Education, Faculty of Education, Benue State University Makurdi and one research expert in the Department of Educational Foundation, Faculty of Education, Benue State University Makurdi. Cronbach Alpha formula was used to determine the reliability coefficient of the instruments which was found to be 0.98. The data collected was analysed using descriptive statistics (mean, standard deviation and simple percentage) and t-test. It was done with the aid of SPSS computer package at 0.05 level of significance.

Research Question One

What is the extent of fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis?

S/No	Statement	N	SD	\bar{x}	Remarks
1	Automatic fire detector are part of fire alarm that raise sound for intending fire outbreak	221	1.12	2.26	Disagree
2	Smoke detectors gives early warning in case of smoke for occupants to evacuate	221	1.07	2.11	Disagree
3	Flame detectors are installed in rooms containing materials that burn without smoke	221	0.70	1.71	Disagree
4	Fire extinguishers should be at least four in a three bedroom flat	221	0.79	1.64	Disagree
5	Fire extinguishers could be used to put off fire when it expired	221	1.02	1.02	Disagree
6	Escape routes are meant for evacuation in case of fire out break	221	0.97	1.97	Disagree
7	Fire hydrants are used to extinguish all kinds of fire in the house	221	0.65	1.85	Disagree
8	Automatic fire sprinkler is the most active means of extinguishing fire	221	0.98	2.14	Disagree
9	Fire dampers resist the passage of heat smoke and flames	221	0.89	2.06	Disagree
10	Fire buckets cannot put off fire in a residential building	221	0.98	2.19	Disagree
11	Fire doors resist flames, heat and smoke in times fire out break to ensure occupant evacuation	221	0.93	1.91	Disagree
12	Fire sign are important in a residential building as means of communication fire issues to occupants	221	0.91	2.02	Disagree
13	Maintenance of fire detection is not necessary in my house	221	0.74	1.75	Disagree
14	Maintenance of fire sprinkler in my house is not important	221	0.88	1.91	Disagree
15	Maintenance of Portable fire extinguishers in my house is important	221	1.03	2.10	Disagree
16	If there is an electric fire (class C fire) use water to put it off	221	0.86	1.80	Disagree
17	Water can be used to extinguished class A fire	221	0.89	1.94	Disagree
18	Fire extinguisher can be used to put off class B fire	221	2.63	2.57	Agree
19	Use dry sand and powder extinguishing agent to put off class D fire	221	0.89	2.13	Disagree
20	Fire outbreak in the kitchen as a result of cooking oil or animal fats can be extinguished using fire extinguisher	221	0.85	2.03	Disagree

Table 1: Mean scores of fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis.

Table 1 shows the mean scores responses of respondents on fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis. The mean scores of the following responses strongly agree, agree, disagree and strongly disagree were summed up to get the mean score for each item. The mean score of 2.50 was set as a bench mark to ascertain decision on indicators of occupants and developers extent of fire safety awareness. The response of the respondents on each item will be

significant at 2.50 mean score and not significant when it is less than 2.50.

From table 1 item 1-17, 18 and 20 shows disagree, meaning that occupants disagreement on the items while item 18 indicated agree by the respondents. This shows that fire safety awareness acquired by occupants of residential buildings in Makurdi Metropolis is very low.

Research Question Two

What is the extent of fire safety awareness acquired by developers of residential buildings in Makurdi Metropolis?

Table 2: Mean scores of fire safety awareness acquired by developers of residential buildings in Makurdi Metropolis.

S/No	Statement	N	SD	\bar{x}	Remarks
1	Automatic fire detector are part of fire alarm that raise sound for intending fire outbreak	57	3.12	3.26	Agree
2	Smoke detectors gives early warning in case of smoke for occupants to evacuate	57	3.07	3.11	Agree
3	Flame detectors are installed in rooms containing materials that burn without smoke	57	3.70	2.71	Agree
4	Fire extinguishers should be at least four in a three bedroom flat	57	3.79	2.64	Agree
5	Fire extinguishers could be used to put off fire when it expired	57	3.02	3.02	Agree
6	Escape routes are meant for evacuation in case of fire out break	57	2.97	3.97	Agree
7	Fire hydrants are used to extinguish all kinds of fire in the house	57	2.65	3.85	Agree
8	Automatic fire sprinkler is the most active means of extinguishing fire	57	2.98	2.14	Agree
9	Fire dampers resist the passage of heat smoke and flames	57	2.89	2.06	Agree
10	Fire buckets cannot put off fire in a residential building	57	2.98	2.19	Agree
11	Fire doors resist flames, heat and smoke in times fire out break to ensure occupant evacuation	57	2.93	3.91	Agree
12	Fire sign are important in a residential building as means of communication fire issues to occupants	57	2.91	3.02	Agree
13	Maintenance of fire detection is not necessary in my house	57	2.74	3.75	Agree
14	Maintenance of fire sprinkler in my house is not important	57	3.88	3.91	Agree
15	Maintenance of Portable fire extinguishers in my house is important	57	3.03	3.10	Agree
16	If there is an electric fire (class C fire) use water to put it off	57	2.86	3.80	Agree
17	Water can be used to extinguished class A fire	57	2.89	3.94	Agree
18	Fire extinguisher can be used to put off class B fire	57	2.63	2.57	Agree
19	Use dry sand and powder extinguishing agent to put off class D fire	57	2.89	2.93	Agree
20	Fire outbreak in the kitchen as a result of cooking oil or animal fats can be extinguished using fire extinguisher	57	2.85	2.95	Agree

Table 2 shows the mean scores responses of respondents on fire safety awareness acquired by developers of residential buildings in Makurdi Metropolis. The mean scores of the following responses strongly agree, agree, disagree and strongly disagree were summed up to get the mean score for each item. The mean score of 2.50 was set as a bench mark to ascertain decision on indicators of developers' extent of fire safety awareness. The

response of the respondents on each item will be significant at 2.50 mean score and not significant when it is less than 2.50.

From table 2 item 1- 20 shows Agree, meaning that developers' agreement on the items. This shows that fire safety awareness acquired by developers' of residential buildings in Makurdi Metropolis is very high.

Hypothesis One

H₀₁: There is no significant difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis.

Table 3: The t-test on the difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis.

Group	N	t	df	Sig	Decision Rule
Occupants	302	4.80	57	0.000	rejected
Developers		57			

P<0.05

The result in table 8 shows that P-value 0.000 is less than 0.05 at (df=357 and t=4.80). Therefore the null hypothesis was rejected, meaning that there is significant difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis.

Discussion of Findings

The findings from table 1 revealed that the extent of fire safety awareness acquired by occupants is very low and this is causing fire disasters in residential buildings in Makurdi Metropolis, this view is corroborated with the findings of Griffin, (2011) which states that the low rate of fire safety awareness is responsible for cases of fire disaster in residential buildings. The findings from table 2 revealed that the extent of fire safety awareness acquired by developers is better than that of occupants. This is possibly because, architects and builders are professionals in building design and construction and in most cases attend workshops and seminars where they do update their knowledge on fire safety issues.

The findings in table 3 established that there is a significant difference between fire safety awareness acquired by occupants and developers of residential buildings in Makurdi Metropolis. (P-value 0.000 is less than 0.05 at $df=357$ and $t=4.80$). This is because developers (architects and builders) are professional in the field of building construction; they acquire the knowledge of fire safety devices in the courses they offered, sometimes in workshops and seminar organized by their professional bodies such as Nigerian Institute of Architects' (NIA) and Nigerian Institute of Building (NIOB) while occupants have no such privileges unless if a workshop or seminar is organized by fire safety officers on fire safety facilities in residential buildings. According to FRN Fire Safety Act (2004) fire safety awareness campaign and life safety education should be organized by fire safety officers for the general public to ensure full implementation of Fire Safety Act in residential buildings in Nigeria thereby reducing to the barest minimum cases of fire disaster in residential buildings.

CONCLUSION AND RECOMMENDATIONS

In view of the findings the following recommendation is made by the researcher:

1. Fire safety awareness should be intensified by fire safety officers and other relevant agencies to improve on fire safety education of occupants to arrest fire disasters in residential buildings in Makurdi Metropolis.
2. Developers should educate the clients on issues of fire safety in residential buildings these could be done through workshops and seminars.

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