

# Kitchen Location and Chances of Escape during Fire Outbreak in Residential Buildings

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**Abstract**— One way of measuring escape potential is in terms of the number of possible routes from any room to a location of safety, while the existence of an escape route is a basis for analyzing the necessary conditions for egress; other factors must be consider in the location of escape route in a residential building. This paper takes a look into contributions of kitchen location within residential buildings to the occupants' chances of escape during fire outbreak emanating from the same location. Structured questionnaires were administered to students of Architecture, practicing professionals in building industry and occupants of a selected estate in the study area. Respondents were required to examine each item on the questionnaires and indicate their degree of acceptance or non-acceptance on a 5-point Likert scale. The results were analysed using percentages, chi-square and rank order tables. Based on the findings of the study, it was concluded that Kitchen is one of the parts of a house where fire usually starts before spreading to the other parts and its location can inhibit occupants escape. The paper suggests appropriate location of kitchen in residential buildings, by creating awareness among professionals especially architects and future architects so as to reduce trapping of occupants during fire outbreak emanating from the kitchen.

**Index Terms**— Kitchen location, Escape, Burglar proof, Trapping, Fire outbreak, loss of life

## 1 INTRODUCTION

Despite the importance uses of fire it poses great risks and challenges to humans, it remains a potentially destructive force in people's life. It causes significant damage, serious injuries and loss of life. From history, man has been able to know that fire has been in existence. However, fire had various effects especially with the advancement of technology but due to curiosity of man to extract benefit from fire; the usage of fire makes fire to be seen as a useful friend and also an awesome enemy. Study had shown that, one person died every 21/2 hours as a result of fire while another will sustained injury in every 30 minutes in the United State America in 2010 [1]. An estimate of 85% of fire casualties occurred in residential buildings in 2009 [1]. According to the report by US fire department in 2010, there were 384,000 residential fires with 2,640 casualties excluding fire fighters, and 13,350 injuries [1]. In Malaysia, according to the (FRDM) fire statistics 2005 to 2007, the recorded casualties was 221 and 268 injuries with an estimated loss of more than 2.4 billion MYR. The year 2007

was recorded to have the highest number of fire casualties, loss of properties and damage of building. More than 3,447 representing 17% of the 20,225 fire incidences were in building fires with the rate increase from 2005 to 2007 [2].

Table 1: Fire statistics in Malaysia from 2005-2007

Year	Fire call	Effect of fire		Estimated Loss (MYR)
		Death	Injured	
2005	31,138	70	115	794 Mil
2006	18,913	71	86	760 Mil
2007	20,225	80	67268	865 Mil
<b>Total</b>	<b>70,276</b>	<b>221</b>		<b>2.4 Bil</b>

(Source: Salleh and Ahmad, 2009)

In Nigeria today, recent and past experiences to extensive loss of lives and properties from incessant fire outbreak, are indicative of some obvious haste to tackle the problem. Residential buildings frequently go up in flames basically as a result of absence of fire safety awareness in the country. The culture of fire safety is yet to take roots here as a panacea to frequent and deadly house fires. Most homes in Nigeria are not equipped with smoke detectors that can detect fire outbreaks at early stages [3]. Despite the enormous annual

loss to fire in the country, smoke detectors are largely shunned by Nigerians. "The elites are unaware of the safety benefits of smoke detectors while the ordinary citizens are overwhelmed by poverty and other challenges of daily life".

According to [4]. "In Nigeria, houses have burglary proof installed on their windows, doors and sometimes the verandah. This is a security measure aimed at preventing robbers from gaining access into the house. It is also observed that morbidity and mortality in burn, when it occurs in the home tend to be higher where the burglar proofs are in use. This is because escape of the inhabitants of a house, who commonly gets trapped by these rigid non-removable metals in cases of house fire, becomes very difficult" The chance of escape has seriously affected by the used on iron grill in all doors and windows [5], in trying to deal with the security situation without thinking on how people evacuate in case of fire outbreak. However, the most important part of the building safety in fire outbreak is chance to evacuate the building [6]. Most house fires result from cooking accidents in the kitchen [1]. Once a fire breaks out, it can envelop a room within minutes. Temperatures in the room may exceed 600°C (1100°F). While this heat alone would be deadly. The toxic gas in the smoke and the heat generated causes the majority of deaths and injuries due to carbon monoxide inhalation [7-11]. Therefore smoke and heat are the major causes of fire casualties in building fires.

Kitchen is one of the parts of a house where fire usually starts before spreading to the other parts; it's location in a residential building without consideration for safeguarding of lives and properties during fire outbreak is a common practice in our society today; it blocks evacuation and inhibits egress. According to [12], the safeguarding of lives and properties being the object of precaution is achieved by preventing outbreak of fire or reducing their number, by minimizing the spread of fire in the event of an outbreak and by providing for safety and evacuation of the occupants"

## 2 METHODS

This research work was both an empirical and theoretical study. The empirical aspect involved analysis of data collected through distribution of questionnaire among architects, students of architecture, and occupants of some selected residential buildings, while the theoretical aspect involved a survey of relevant literature. All questionnaires were individually distributed and collected. The demographic data are shown below. Random sample sizes (n= 97, 32 and 10) required for population (N=130, 35 and 10) representation, the

population sample 97, 32 and 10, from the 130 number of students on ground in department of Architecture, Federal University of Technology, Yola 2010/2011 academic session, 35 from the number of professionals in the building industry and 10 from occupants of Resort Estate, Bajabure respectively, were based on [12].

The questionnaire had 8 items. Subjects were required to examine each item on the questionnaire and indicate their degree of acceptance or non-acceptance on a 5-point Likert scale from strongly agrees to strongly disagree. They were also required to rank the items according to its significance to the problems they were set out to solve.

## 3 RESULT

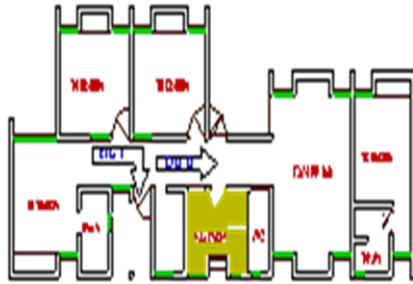
A total of 139 respondents were interviewed. The demographic characteristics of the respondents and status are shown in the table. One hundred and nineteen (85.6%) were males while 20 (14.4%) were females. The respondents mean age was 29.151±4.881 years. Ninety seven (69.8%) were students, while 32 (23%) were professionals and 10 (7.2%) were occupants of Resort Estate, Bajabure, Yola, Adamawa state.

Table 2 Demographic Characteristic of Respondents

Characteristics	Age	Number	Percentage %
Age in years(n= 139)	18 – 30	105	75.5%
	31-45	18	13.0%
	46- 60	16	11.5%
	Above 60	-	
Sex (n= 139)	Male	119	85.6%
	Female	20	14.4%
Profession (n= 32)	Architects	24	17.3%
	Engineers	2	1.4%
	Quantity Surveyor	2	1.4%
	Planners	3	2.2%
	Builders	1	0.7%
	Total	32	23.0%
Students (n= 97)		97	69.8%
Occupants (n= 10)		10	7.2%



A



B



C

Figure 1 (A,B,C) plan of the houses used for the case study

## 5. DISCUSSION

Based on result from the empirical study, it's clear that the kitchen in floor plan A as compared to the other floor plans for the case study appeared to be the most appropriate location of kitchen in residential houses. Therefore floor plan A could be used as a yardstick for determining the appropriate location of the kitchen. The involvement of Architects and other professional in the building industry in this study would probably enhance the design of residential houses, in respect of the appropriate kitchen location, since the awareness has been created. It has become a practice in most of the residential kitchen to have the escape route through the kitchen or very close to the kitchen side. . Therefore, it is necessary to avoid the use of burglary proofing in the kitchen windows or else an alternative means should be employed to supplement this practice. However, failure to design a kitchen in an appropriate location could lead to the continuation of the devastating effect of fire. Remember the most important aspect of building fire safety is the possibility for the

occupants to evacuate safely [6].

## 6. CONCLUSION

The Home Accident Surveillance System [13] published evidence that suggested existing housing legislation was failing to tackle many domestic conditions likely to give rise to harm. In view of some of the issues identified above, important implications for home safety, or whether a more fundamental review of evaluating housing conditions, based on empirical evidence; with regard to appropriate kitchen location which is paramount to the achievement of safeguarding of lives and properties during the fire outbreak. These have to be considered by architects at the design stage in order to prevent trapping during a fire outbreak. In Nigeria, many residential buildings have burglar proofs rigidly and permanently fixed, especially on windows and kitchens located close to the main entrance which also serves as the only exit during a fire outbreak. It is observed that during fire incidence emanating from the kitchen, lives and properties are lost as a result of the inability of the occupants to escape because of trapping by these rigidly and permanently fixed burglar proofs and the location of the kitchen.

## 7. ACKNOWLEDGMENT

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