

IMPLICATIONS OF FIRE OUTBREAKS FOR ENVIRONMENT FRIENDLY DESIGN AND CONSTRUCTION OF DOMESTIC BUILDINGS IN NIGERIA.

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ABSTRACT:

Achieving suitable environment-friendly design and construction of domestic buildings, which constitute the majority of building type in Nigeria, implies freedom from life-threatening hazards such as fires. The study was aimed at establishing the contribution of domestic fires to the annual tally of all types of fires. Official summaries of statistics of fire outbreaks in Nigeria constituted the research data. It was concluded that fire outbreaks in domestic buildings determined the trends in total fire outbreaks in Nigeria over the study period, the level of influence of domestic fires on total fires ranging between 90% and 99%. Significant reduction in numbers of domestic fires would reduce total fire outbreaks in the country. It was recommended that in the siting of Fire Stations, special consideration should be given to areas containing large concentrations of domestic buildings with the attendant high risk of fire.

INTRODUCTION

Fire outbreaks are occurrences in which uncontrolled combustions engulf buildings, furniture, people etc. Domestic fires occur in buildings used for residential and other purposes apart from industrial/commercial. These classifications are those used by both the Federal Fire Service and the Federal Office of Statistics, two statutory organizations that provide data on the various types of types of fires that occur in the country. The importance of fires in the Nigerian context is forcibly brought home to anyone who scrutinizes the statistics on fire outbreaks. The seriousness of the problem is however understated, given the fact that official statistics ignore the volume of losses due to unreported fires. These losses, mostly in the rural areas, are no doubt considerable. The print media are replete with reports of fire outbreaks, in residential houses, public buildings, and especially markets, on a daily basis.

Environment-friendly design and construction has to do with the provision of infrastructure that are (i) suitable for human use, and (ii) sustainable both in terms of the availability and costs of the resources required in their construction, use, maintenance and replacement. Suitability further implies freedom from life-threatening hazards. Fire outbreaks in domestic buildings constitute a very direct threat to the environment-friendly performance of buildings. In Nigeria, this threat is multiplied many times over by the fact that fire outbreaks in domestic buildings make up the majority of total fire outbreaks in any single year. Even more disquieting is the fact that this trend has been on the increase, both in Nigeria and other countries like the United Kingdom. In 1990 fires in domestic buildings made up 47% of all fires in the country. The figures for 1991 and 1992 stood at 85% and 81% respectively. (Cat, 1991; FOS, 1995).

Environment-friendly design and construction of buildings, particularly domestic ones, must ensure that such buildings pass muster in three areas: (i) susceptibility to fire, based on design and arrangement of spaces, (ii) fire resistance, deriving from materials and methods used for construction of the building, and, (iii) fire protection, both afforded internally by the performance of the structure. The ultimate aim of environment-friendly design and construction of buildings relative to fire is the prevention of fire outbreaks; where fires do occur, then the creation of enough time and safe passage for occupants to escape to safety, (Tindale, 1991).

The study derives its importance from two main sources. The first is the fact that domestic buildings constitute the majority of building type all over the country; in most cases commercial / industrial buildings are domestic buildings converted to such purposes. Secondly, the gathering of the countries of the world in Rio de Janeiro, Brazil and Pretoria, South Africa in 1992 and 2002 respectively highlighted the emphasis placed on the encouragement of sustainability of natural environments through the promotion of environment-friendly design and construction in all fields of human activity. The study covers domestic housing all over Nigeria. It follows without saying that all types of domestic buildings are covered by this study, no matter whether such buildings are located in urban or rural areas, made of concrete blocks, clay bricks or timber, are a single-roomed apartment or a multi-roomed mansion, (Mabogunje, 1968; Mogbo, 2000).

Within the context of environmental sustainability declarations, this study aims to establish the importance of fires outbreaks in domestic buildings as measured by the contribution of such fires to the total number of fire outbreaks in the country. The objectives of the study center on the generation of greater awareness of the threats posed by fire outbreaks to environment-friendly design and construction and the encouragement of more substantial action to combat this threat. To this end, it was hypothesized that domestic fire outbreaks have no significant effect on total fire outbreaks in Nigeria. By the very nature of the research data as secondary, published information, all deficiencies in collection and initial classification and analysis must of necessity be transferred to this study.

MATERIALS AND METHODS

Official summaries of statistics of fire outbreaks in Nigeria constituted the research data used for the analysis and were obtained from the following source.

- 1) Federal Office of Statistics, Minna, Niger State.

The research method employed graphical representation to describe the data collected inferential statistical techniques comprising simple linear regression and the analysis of variance served as tests of the hypothesis. Three parameters were used to test the contribution of domestic fire outbreaks to total fire outbreaks. These were (i) number of call for assistance made to the Fire Services, representing the number of fires that occurred, (ii) number of lives lost in reported fires, and (iii) estimated naira value of losses due to reported fires. Table 1 below provides a summary of the data collected and used for the study.

Table 1 Raw Data Used for the Research

Year	No. of Calls (Dom)	No. of Calls (Total)	No of Lives Lost (Dom)	No of Lives Lost (Total)	Values of Goods Lost (Dom)	Value of Goods Lost (Total)
N' million						
1990	468	1000	29	31	56.03	131.33
1991	1173	1386	56	64	239.38	298.90
1992	1412	1720	205	205	196.78	390.88
1993	358	867	29	47	2,558.61	2,733.64
1994	331	509	13	43	107.86	408.28
1995	221	411	4	41	159.11	344.64
Total	3963	5893	336	431	3,317.77	4,307.67

Source: Federal Office of Statistics, (1995). Annual abstract of statistics, Lagos, Nigeria: FOS, p156; Federal

Office of Statistics, (1997). Annual abstract of statistics. Lagos, Nigeria: FOS, P.175.

RESULTS AND DISCUSSIONS

Figure 1 below provides a graphical representation of the data collected and used for the study. In Table 2, the results of the analysis of the research data, using simple linear regression and analysis of variance are displayed.

Table 2: Influences of Domestic Fire Outbreaks on Total Fire Outbreaks in Nigeria (1990 – 95)

Exp No	Variables		Results of Experiment			Inference			
	X	Y	Regression Equation	R ² %	F _{tab}	F _{cal}	P Value	Strength of Relationship	Rmk
1	Dom Calls	Total Calls	TotCalls = 352.081 + 0.954 DomCalls	90	7.71	36.15	0.004	Very Strong	S
2.	Dom Lives	Total Lives	TotLives = 28.285 + 0.867 DomLives	97	7.71	129.03	0.000	Very Strong	S
3.	Dom Goods	Total Goods	TotGoods = 162.811 + 1.00 DomGoods	99.2	7.71	503.67	0.000	Very Strong	S

Key: NS= Not Significant; S = Significant data (2002).

Source: Researcher's analysis of research

It was observed in the first experiment above that 90% of the variations in total number of fires in the country were due to variations in the number of fires occurring in domestic buildings. Since the F_{calculated} value of 36.15 was significantly higher than the F_{tabulated} value of 7.71, buttressed by a probability value of 0.004, which was lower than the & value of 0.05 (5%). The existence of a strong relationship, displaying direct proportionality between the variables was proved. Similar scenarios emerge from experiments number 2 and 3. Stronger correlations were observed, between 97-99%; F_{calculated} figures exceeded by far the values for the values for the F_{tabulated} for the period of the study, changes in the following aspects of domestic fires produce identical changes in the same aspect of total fires; (i) the number of fire outbreaks annually (R²=90%), (ii) the number

of lives lost ($R^2=97\%$), and (iii) the value of financial losses ($R^2=99\%$). The only difference observable would be in the degree of magnitude of the derived change.

Overall, the results obtained here are in agreement with Catt (1991), writing on fire statistics in the United Kingdom. The majority of fires occur in domestic buildings, with a frightening regularity and predictability that has spurred the sponsorship of the Domestic Smoke Alarms Bill of 1991. The Bill intends to place 750,000 smoke detector alarms in specified domestic buildings at public expense. There has been no similar response in legislation to the threat posed by fires in domestic buildings in Nigeria.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions have been arrived at by this study: - (i) Fire outbreaks in domestic buildings determined the trends in total fire outbreaks in Nigeria over the study period. (ii) The level of influence of domestic fires on total fires ranges from 90% to 99%. (iii) An obvious corollary of this level of influence is that if domestic fires could somehow be curtailed or reduced significantly, such reduction would be reflected in total fire outbreaks in the country.

The following measures are therefore recommended in order to reduce significantly total fire outbreaks annually.

- First, special and greater attention should be paid to the capability of the Federal Fire Service to respond effectively to fires outbreaks in domestic buildings.
- Second, in the siting of Fire Stations, special consideration should be given to areas containing large concentrations of domestic buildings with the attendant high risk of fire.
- Third, the National Assembly should as a matter of urgency revisit existing laws dealing with fire in buildings.
- Fourth, effective policing of construction sites by Metropolitan Development Agencies should be stepped up to ensure compliance with applicable laws on fire protection in buildings. Further research should establish optimum radii for effective response by Fire Stations relative to population of such areas.

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