STATE (LOCAL) JOURNALS

JOURNAL 21

Environmental Technology & Science Journal (ETSJ)

Volume 2 Number 2 November, 2007 ISSN 2006-0439

Shittu, A. A.

Pages 139-146

JOURNAL PAPER 21

PUBLISHED BY:
School of Environmental Technology,
Federal University of Technology,
P.M.B 65, Minna, Nigeria.

Environmental Technology and Science Journal (ETSJ)
Vol. 2. No. 2, November 2007. ISSN No. 2006-0459

Vol. 2. No.2, November 2007. ISSN No. 2006-0459

*All Correspondence should be addressed to the **Editor-In-Chief**, Environmental Technology and Science Journal (ETSJ), School of Environmental Technology, Federal University of Technology, Minna, Nigeria. E-mail. etsjournal2006@yahoo.com*

Environmental Technology & Science Journal (ETSJ)
Vol. 2. No.2, November 2007, ISSN-2006-0459

Table of Contents

Fire Outbreak in Domestic and Public Buildings of Niger State: A Comparative Analysis of Military and Civilian Era (1993 –1998 and 1999 - 2004)

Shittu, A. A.
Department of Quantity Surveying,
Federal University of Technology, Minna, Nigeria
E-mail: aishatabdulahi2007@yahoo.com

Abstract
This paper undertook an exploratory study of relationships between the type of political dispensation (military or civilian), and the frequency and causes of fire outbreaks in Niger State, using simple linear regression analysis. The results showed that fires in domestic buildings were significantly more frequent during civilian dispensations. The paper recommended further research into this finding, and suggested that fire inspections of households should be rigorously pursued. Property rates could be tied to the level of compliance with fire safety regulations.

KEYWORDS: Fire, Domestic building, Public building, Electrical fault, Gas fault.

1.0 INTRODUCTION:

Buildings should possess the requirements to provide conducive and sheltered environment, which the occupants use for dwelling, working, storage, worship, training, meeting or transaction purposes, thus acting as a multi-functional agent of environmental change (Harmathy, 1985). Domestic buildings accommodate an individual or a family, and serve as a permanent place for resting, sleeping, eating and keeping personal property. Public buildings are, on the other hand, one of the following kinds: mosques, churches, school buildings, ministries or government office buildings, market buildings, hospitals, hotels, restaurants etc. They are constructed for the purpose of official transactions between or among persons usually living in different homes. All types of buildings are subject to the occurrence of fire, which is the oxidation of a substance often with the evolution of heat and light in varying degrees of intensities. According to the Chambers Twentieth Century Dictionary, fire is a mass of burning matter as of fuel, flame incandescence or conflagration. The slightest contact of inflammable substances, such as gasoline (petrol), paraffin (kerosene), and natural petroleum gas with fire, results in explosive destruction, inferno and loss of lives and properties, Adeleke (1993).

This study was conducted in Niger State, which was created in 1976, from the defunct North-western State. The State covers a land area of about 76,360,903 square kilometers

with population of 2,421,581. Farming is the major occupation of inhabitants of Niger State; 85% of the active labour force is engaged in farming. The major ethnic groups in the State are Nupe, Hausa and Gwari and the State is bordered to the North by Zamfara State, North-west by Kebbi State, South-west by Kwara State, North-east by Kaduna State and South-east by Federal Capital Territory, Abuja.

1.1 Survey of Previous Works:

Mogbo (1999) authored a paper in N.I.Q.S. journal on the environment and fire incidence in Nigeria; while Shittu (2001) studied fire outbreaks in domestic and public buildings of Kwara State; it was discovered that the amount of financial loss due to fire on the average in Kwara State for the period 1990 to 1999 was about 4% of the capital expenditure (=N= 14,548,694.00). As a result of these, calls have been made to the government and individuals to take necessary and urgent action to reverse or halt this situation. The problem of fire in Nigerian homes and surroundings is of natural importance, Omata (1991).

Modern fire departments engage extensively in fire prevention, which is effected by the use of fire or smoke detecting devices as well as fire alarms. Early detection and warning of an outbreak are essential to prevent or reduce loss of lives and if extensive damage and complete burn down (McKay, 1993). Stein et.al (1986) added that fire alarm systems primarily protect lives, and secondarily prevent property loss. Since buildings vary in occupancy levels, flammability, types of construction and value, the fire alarm system must be tailored to the need of a specific facility. Residential fire alarm system should provide sufficient time for evacuation of the residents and for appropriate counter measures to be initiated. Wood (1986) contributed that an automatic fire detection system may not be needed if the installation is always manned or where the power supply is always disconnected when premises are not occupied. Fire detectors can be of heat, smoke or flame detection type, Shield (1987).

Some modern smoke detectors now in use are photoelectric and ionization detectors. Photoelectric detectors employ a small light source in a dark chamber which contains a photocell. When smoke particles enter the sensing chamber, light is reflected off them, thus triggering the alarm. Ionization detectors use small amounts of radioactive material to make the air within sensing chamber conduct electricity. Fire extinguishers are classified according to their use on the four classes of fire.

Class A fires consist of normal combustibles such as paper, cloth, rubber and many plastics. Water extinguisher are typically applied to such fires.

Class B fires are caused by flammable liquids such as gasoline, grease and cooking oils. Suggested extinguishers employ Carbon dioxide (CO2).

Class C fires involve energized electrical equipments, and suitable extinguishers are based on their ability to be non-conductive.

Class D fires involve metals such as potassium, magnesium, titanium and sodium; Extinguishers for Class D usually employ sodium chloride as an agent.

1.2 Statement of **Research Problem**

Nigeria has experienced 5 civilian dispensations since 1960; some of these have been fraught with crisis resulting in conflicts. Such conflicts have involved the destruction of lives and properties through the criminal use of fire. A point of interest against this background is whether the frequency and characteristics of fire outbreaks differ significantly between military and civilian political dispensations. To test this research question statistically, this paper employs the following pair of hypotheses:

H1: There is no significant relationship between the total number of fire cases and the number of fire cases in each of the types of buildings considered for this paper in each of the two eras.

H2: There is no significant relationship between the total number of fire cases and the number of fire cases due to each of the causes considered in the two eras.

This paper thus focuses on fire outbreak in Niger State within the two periods of 1993-1998 and 1999-2004. The selection of these periods will allow inferences to be drawn as to whether fire outbreak characteristics differed significantly. The conclusions of this paper might form the basis for further research to identify what aspect of political dispensations impact negatively on fire outbreaks. The need for necessary legislation or amendments to public policy might also be buttressed.

The data used for this paper are statistical data on recorded fire cases compiled by the Niger State Fire Service, Minna, and so the researcher could not pin-point little discrepancies where they may arise. Due to the nature of the raw data received, the researcher could not ascertain how many fire cases incident on domestic and public buildings were caused by either electrical faults or gas faults.

2.0 METHODOLOGY:

The relationships between the variables in the data collected were determined using Regression Analysis, the Correlation coefficient (R-square) and the test of significance (T-test and F-test). The regression analysis taking into account data in which variables are observed simultaneously in relation to a particular thing (i.e. bivariate data) e.g. Fircalmt Vs Dombfmt and Fircalcv Vs Pubbfcv etc. This paper assures 5% significance test as chi-square test of

significance. Hence for any value of P from 0.00 to 0.05 there is significance in the test but for values greater than 0.05 there is no significance in the test.

3.0 DATA PRESENTATION:

The data used in statistical analysis are given in the tables below:

TABLE 1: Fire Statistics in Niger State during the Military Era

Year	Number of Fire Calls	Number of Fires in Domestic Buildings	Number of Fires in Public Buildings	Number of Fires due to Electrical faults	Number of Fires due to Gas faults
1993	135	46	24	24	41
1994	94	24	8	50	2
1995	49	19	6	22	2
1996	69	40	13	35	2
1997	60	33	14	41	0
1998	75	40	4	36	0
TOTAL	482	202	69	208	47

SOURCE: Niger State Fire Service, Minna, (2006)

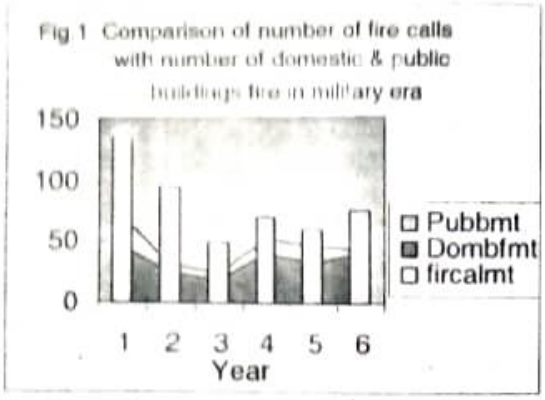
TABLE 2: Fire Statistics in Niger State during the Civilian Era

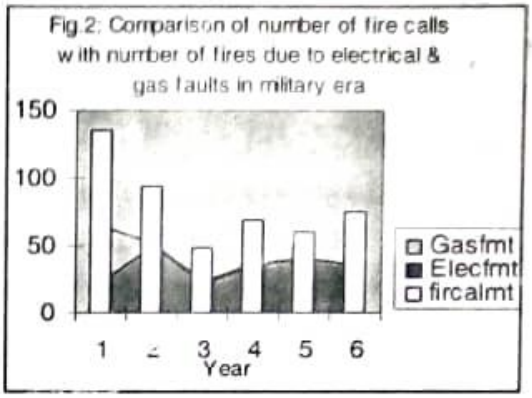
Year	Number of Fire Calls	Number of Fires in Domestic Buildings	Number of Fires in Public Buildings	Number of Fires due to Electrical faults	Number of Fires due to Gas faults
1999	81	38	19	36	3
2000	72	39	17	33	1
2001	82	30	34	42	2
2002	117	89	13	96	0
2003	108	103	3	97	0
2004	105	101	2	100	0
TOTAL	565	400	88	404	6

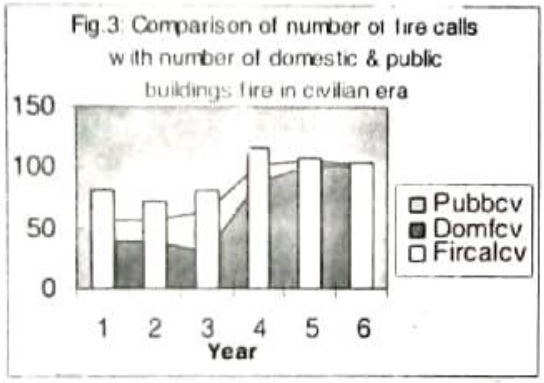
SOURCE: Niger State Fire Service, Minna, (2006)

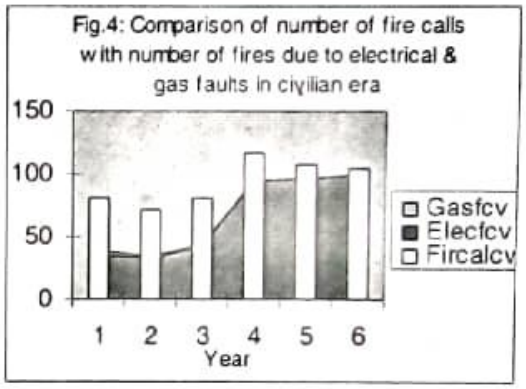
4.1 Descriptive Analyses of Data:

The descriptive analyses of the data collected are summerised in the charts below.









4.2 Discussion of Results:

The relationship between the number of fire outbreaks and the number of fire outbreak in domestic building was linear, positive, very weak and not significant in the military era in Niger State. R-square value observed was 32%, while Probability value was 0.24. The null hypothesis was accepted. On the other hand, the relationship between total number of fires and number of fires in domestic buildings in the civilian era was linear, positive, very strong and significant with R-square value of 82% and Probability value of 0.01. The null hypothesis is rejected in this case. The trends were depicted in chart as Figures 1.

The relationships between the total number of fire outbreaks and the number of fires in public buildings of Niger State in both the military and civilian era were linear, positive, slightly weak and not significant; R-square values

observed were 49% and 40% respectively, while the Probability values were 0.12 and 0.18 respectively. The null hypotheses were, therefore, accepted respectively. These trends were also shown in Figure 2.

A linear, positive, very weak and non-significant relationship existed between the total number of fire outbreaks and the number of fire outbreak due to electrical faults in the military era with a very low R-square value of 5.2% and Probability value of 0.89. The null hypothesis is therefore accepted. The relationship between total number of fires and electrical faults fires in the civilian era, however, was linear, positive, very strong and significant, with a very high R-square value of 92% and Probability value of 0.003. The null hypothesis here is rejected. Figure 3 reveals these trends.

The relationship between the total number of fire outbreaks and the number of fires due to gas faults in the military era was linear, positive, very strong and significant, R-square value observed was 76% while Probability value was 0.02. The null hypothesis was rejected. On the other hand, a linear, positive and non-significant but strong relationship existed between total number of fires and fires due to gas faults in the civilian era, with R-square value of 56% and Probability value of 0.09. The null hypothesis was, therefore, accepted. The trends were depicted in chart as Figure 4 .

The results suggest that under civilian political dispensations, fire outbreaks in domestic buildings form a significant component of the total number of the total number of fires recorded. Electrical faults count as the most significant cause of such fires as well. Political dispensations under the military recorded the more consistent trends in fires due to gas faults. Public buildings did not display any noticeable changes in trend during both periods. These results are summarised in table 3.

TABLE 3: Summary of Analysis

Exp No	Variables		Type of Model	Observations					Inferences		
	X	Y		Regression Equation	R^2	F_{cal}	F_{tab}	P_{value}	Strength of Relationship	Rem	Action On Hyp
1	Firealm	Dombfrm	Linear	Dombfrm= 18.21 + 0.19 Firealm	32%	1.91	7.71	0.24	Weak	NS	Accept Ho

2	Fircal mi	Pubbf mi	Linear	Pubbfmi = -1.76 + 0.17 Fircalmi	49%	3.82	7.71	0.12	Slightly Weak	NS	Accept Ho
3	Fircal mi	Elect mi	Linear	Elecfmi = 36.64 - 0.03 Fircalmi	5.2%	0.02	7.71	0.89	Very Weak	NS	Accept Ho
4	Fircal mi	Gasf mi	Linear	Gasfmi = -29.67 + 0.46 Fircalmi	76%	12.75	7.71	0.02	Strong	SS	Reject Ho
5	Fircal cv	Domb fcv	Linear	Dombfcv = -95.03 + 1.72 Fircalcv	82%	17.88	7.71	0.01	Strong	SS	Reject Ho
6	Fircal cv	Pubbf cv	Linear	Pubbfcv = 53.68 - 0.41 Fircalcv	40%	2.72	7.71	0.18	Slightly Weak	NS	Accept Ho
7	Fircal cv	Elect cv	Linear	Elecfcv = -98.93 + 1.77 Fircalcv	92%	45.55	7.71	0.003	Strong	SS	Reject Ho
8	Fircal cv	Gasfc v	Linear	Gasfcv = 5.93 - 0.052 Fircalcv	56%	5.13	7.71	0.09	Strong	NS	Accept Ho

Key:
SS = Statistically Significant
NS = Not Significant
Fircalmi.....Number of fire calls in Niger State in Military Era
Dombfmi.....Number of fires in Domestic buildings of Niger State in Military Era
Pubbfmi.....Number of fires in Public buildings of Niger State in Military Era
Elecfmi.....Number of fires caused by electrical faults in Niger State in Military Era
Gasfmi.....Number of fires caused by gas faults in Niger State in Military Era
Fircalcv.....Number of fire calls in Niger State in Civilian Era
Dombfcv.....Number of fires in Domestic buildings of Niger State in Civilian Era
Pubbfcv.....Number of fires in Public buildings of Niger State in Civilian Era
Elecfcv.....Number of fires caused by electrical faults in Niger State in Civilian Era
Gasfcv.....Number of fires caused by gas faults in Niger State in Civilian Era

5.0 CONCLUSIONS AND RECOMMENDATIONS:

A greater frequency of fire outbreaks in domestic buildings were recorded during civilian dispensations (71% of total). Majority of such fires were caused by electrical faults, rather than gas faults. The role of gas faults in fire outbreaks is of importance under military dispensations, when it significantly correlates with the total number of fire outbreaks.

It appears prudent to recommend that further research be carried out on why civilian dispensations experience higher rates of fire outbreaks. Owing to the limitation of the secondary data employed, which did not identify the causes of fires in individual buildings, this paper calls for an overhaul of the data collection system of the Fire Service in Nigeria. The Government of Niger State should also direct attention to the reduction of frequency of fire outbreaks in domestic buildings, through appropriate policies.

6.0 SUGGESTED IMPLEMENTATION STRATEGIES

(1) The current civilian administration in Niger State should launch a priority campaign involving compulsory household fire inspections. Assessments for fixing rates of taxation on property might be tied to level of compliance with fire safety rules.

(2) The Fire Service of Niger State should be re-structured to include statisticians, who can record accurate and relevant data on fire outbreaks. The use of Information Technology in data collection should be prioritized.

ACKNOWLEDGEMENT:

Gratitude is due to Almighty God for the successful completion of this work. The contributions of the following persons/organisation are also gratefully acknowledged: Prof. T. C. Mogbo; Mr. AbdulGaniyu A. Oke; Niger State Fire Service, Minna, and all other people or bodies who have contributed to the success of this paper.

REFERENCES:

Adeleke, S. (1993). Fire: An Ambivalent Substance. ***The Herald***. 25th October. Pp12.

Harmathy, T. Z. (1985). ***Fire Safety: Science and Engineering***. Library Congress Catalogue-in-Publication Data, Baltimore. Pp357-409

McKay, J.K. (1973). ***Building Construction***. Metric Volume 4. Longman Group Limited Pp81-110.

Mogbo, T.C. (1998). The Environment and Fire Incidence in Nigeria: Implication on Public policy and Politics. ***The Quantity Surveyors***. A Journal of the N.I.Q.S. Vol 26, Jan/March, 1998. Pp31-36.

Omata, A.O. (1991). Fire Hazard in the Homes. ***New Nigerian***. 23rd March. Pp12.

Shield, T.J. et.al. (1987). ***Building and Fire***. Longman Group Limited, U.K. London. Pp166-167.

Shittu, A.A. (2001). ***An Analysis of Losses due to Fire Incidences in Residential and Public Buildings of Kwara State (1990-1999)***. Unpublished B.Tech. Thesis. Quantity Surveying Department, Federal University of Technology, Minna, Nigeria. Pp 1-20, 126-127.

Stein, B. et. al.(1986). ***Mechanical and Electrical Equipment for Buildings***. 7th Edition Vol.1. John Willy and Sons Inc. Canada. Pp696-700.

Wood, M.B. (1986). ***Fire Precautions in Computer Installations***. NCC Publication, the National Computing Centre Limited, Manchester, England. Pp15-23.

http://en.wikipedia.org/wiki/Fire