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CHALLENGES IN ENERGY SUPPLY AND INFRASTRUCTURAL DEVELOPMENT IN DEVELOPING COUNTRIES

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Theme:

CHALLENGES IN ENERGY SUPPLY AND INFRASTRUCTURAL DEVELOPMENT IN DEVELOPING COUNTRIES

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CONTENTS

Foreword

The school of Engineering and Engineering Technology, Federal University of Technology, Minna, Nigeria is an internationally acclaimed institution established in the year 1984. The school strives to enhance the dissemination of knowledge in all aspects of Engineering and other related fields and shares ideas with national and international organisations through conferences, workshops, symposia, lectures and journal publications.

The 3rd Biennial Engineering Conference is part of a continuing series of conferences organised by School of Engineering and Engineering Technology, Federal University of Technology, Minna. The conference is a forum for scientists, academics, researchers, engineers, practitioners, policy makers, private sector and companies to present their research results and findings, state-of-the art technologies, products and services. The conference theme: Challenges in Energy Supply and Infrastructural Development in Developing Countries is quite unique and has attracted participants from South Africa, Malaysia, United Kingdom and Nigeria. In addition to the main theme of the conference the following sub-themes were also chosen as a guide to contributing authors for the conference.

1. Emerging Trends in Engineering materials
2. Renewable Energy and Sustainability.
3. Water resources and Environmental Engineering.
4. Advances in Nuclear Energy Technology
5. Local Contents and Capacity Development
6. Advances in Sciences and Technical Education for Infrastructural Development.

115 papers were received and subjected to peer review. The review process was undertaken by at least two experienced and respected individuals. Out of the 115 papers submitted for consideration, 73 were accepted and recommended for publication in the book of proceedings, 38 papers were accepted for oral presentation only and 4 papers were rejected. We hope that the papers published in this book of proceedings will address the problems of challenges in energy supply and infrastructural development especially in the developing countries.

On behalf of the local organizing committee, I wish to seize this opportunity to appreciate all our contributing authors for their interest in our conference. We also thank our reviewers for finding time to review the papers on time free of charge; your understanding of academic citizenship is highly appreciated.

Engr. Dr Abdulkareem Ambali Saka
Chairman LOC

Acknowledgments

The chairman members of the Local organizing committee (LOC) of the 3rd Biennial Engineering Conference wish to express our gratitude to the Vice Chancellor, and the management of Federal University of Technology (FUT), Minna, the Dean and all staff of the School of Engineering and Engineering Technology (SEET), for the moral, financial and material support given to us during this edition of the conference. We equally thank the entire University Staff and all of you who, in one way or the other contributed to the success of this conference. We wish to appreciate the financial support received from Scientific Equipment Development Institute (SEDI), Minna under the leadership of Engr. (Dr) Abdulkadir B Hassan. We also wish to appreciate those that their contribution came after we have gone to press.

A Comparative Analysis of Fire Incidences in Domestic and Public Buildings during Military and Civilian Era in Kwara State, Nigeria (1990 – 1999; 2000 - 2009)

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Abstract: Fire disaster in both domestic and public buildings in Nigeria has been seen as an environmental disaster and a threat to lives and properties and above all, seriously hinders infrastructural development in Nigeria. This paper aimed at undertaking an exploratory study of relationship between the type of political dispensation and the frequency and causes of fire outbreak in Kwara State with a view of examining trends in fire outbreaks in Kwara State of Nigeria, in relation to the use of building and the causes of reported fire incidents from 1990 to 1999 and 2000 – 2009, representing military era and civilian era respectively. The relationships between these variables were determined using simple regression analysis and t-test. By comparison, the proportion of such fires that occurred in public buildings was not significant ($F<\alpha$ at 0.05) in the two eras and that of domestic buildings was significant ($F>\alpha$ at 0.05) in the two eras in Kwara State. Electrical faults were found out to be a significant cause of fire outbreak in the two eras. It was concluded that the greater proportion of fire outbreaks in the two eras: (i) is due to electrical faults, and (ii) occurs in domestic building rather than public buildings. This paper then recommended among others that special team of researchers should be set up by the Kwara State government to investigate the reasons why electrical faults fire and domestic buildings fire are more frequent and at the same time find a lasting solution to reduce it to the barest minimum.

KEYWORDS: *Fire, Domestic/Public building, Electrical fault, Gas fault, military/civilian era.*

1.0 INTRODUCTION:

1.1 Background of the Study

According to Harmathy (1985), a building is a multi-functional agent of environmental change, which acts principally as the modifier of the natural environment. Domestic buildings are buildings, which accommodate an individual or a family, a permanent place for resting, sleeping, eating and keeping personal property. These can be in the form of bungalows, storey buildings, flats and huts of various architectural designs. On the other hand, a public building is one of the following kinds: mosques, churches, school buildings, ministries or government office buildings, market buildings, hospitals, hotels and restaurants among others.

According to Oyeyode (2003) fire is the result of flammable material being combusted and the essential ingredient for the propagation of fire is air, which is sufficient to start ignition or means of ignition and oxidation. The University of Gulph (2003) also described fire as the oxidation of substances often with the evolution of heat and light in varying degrees of intensities and this supports the contribution of Aqua Group (1984) that fire has a triangle which includes fuel, high temperature and oxygen. This fuel in the triangle and oxygen will rapidly ignite once in contact with heat. This is supported by Adeleke (1993) that the slightest contact of highly inflammable liquid contents, such as gasoline (petrol), paraffin (kerosene), or gas with fire brings explosive services of destruction, inferno and loss of lives and property. In the light of the above there is a great need for any building design to incorporate fire safety measures to serve as

preventive and protective precautionary measures to safeguard lives and property. Fig. 1 below gives the Fire Triangle as illustrated by Aqua Group (1984)

Figure 1: Fire Triangle **Source:** Aqua Group (1984)

The modern fire department engages extensively in fire prevention. Fire can be prevented by using fire detecting devices or smoke detectors as well as fire warning devices (fire alarm). According to McKay (1993), early detection and warning of an outbreak are essential to prevent or reduce loss of lives and if extensive damage and complete burn down are to be avoided. Stein et.al (1986) added that fire alarm system serves primarily to protect lives and secondarily to prevent property loss. Since buildings vary in occupancy, flammability, types of construction and value, the fire alarm system must be tailored to the need of a specific facility. Therefore, 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 or smoke or flame detection type as pointed out by Shield et.al. (1987). Ernst & Peter (2002) reported that there are automatic and non-automatic fire detectors and they must be installed in sufficient numbers and be suited to the general arrangement of the area to be monitored. They must also be selected according to fire risk and must be mounted in such a way that whatever parameter change triggers the alarm, can be easily sensed.

Some modern smoke detectors now in use are photoelectric and ionization detectors. Photoelectric detectors use small light source, which shines its light in to a dark chamber not normally exposed to light. This dark chamber contains a photocell to detect light. When smoke particles enter the sensing chamber, light is reflected off of them and into the sensing chamber. This causes the alarm to trigger. Ionization detectors use small amount of radioactive material to make the air within sensing chamber conduct electricity. Microscopic smoke particles will enter the detector chamber and trigger the alarm (Wikipedia Free Encyclopedia, 2006).

According to Wikipedia Free Encyclopedia (2006) fire extinguishers are classified according to their use on the four or five classes of fire as explained below.

Class A fires consist of normal combustibles such as paper, cloth, rubber and many plastics. Water extinguishers 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.

Class K fires involve cooking oils. Though, by definition Class K is a sub-class of Class B.

The National Building Code (2006) added that all buildings and structures shall also be graded in accordance with the degree of fire hazard as contained in Part 1, Section 7 of the National Fire Code. The National Building Code (2006) stressed further, under the Building Construction Classifications, that all buildings and structures erected or to be erected, altered or extended in height or area shall be classified in any one or in a combination of the five construction types (Type 1 to 5) defined in Table 1:

Table 1: Types of Construction-Fire Resistive Requirements (in Hours)

	TYPE 1	TYPE 2	NON - COMBUSTIBLE		TYPE 3		TYPE 4	TYPE 5	
BUILDING ELEMENT	Fire resistive 4 sec	Fire resistive 4 sec	1 - hr	N	1 - hr	N	H.T	1 - hr	N
Exterior bearing walls	12.2.8.9	12.2.8	1	N	429.8	429.8	429.8	1	N
Interior bearing walls	3	2	1	N	1	N	1	1	N
Exterior non-load bearing walls	4 sec 12.2.8.9	4 sec 12.2.8	1 sec 12.2.8	N	429.8	429.8	429.8	1	N
Structural frame	3	2	1	N	1	N	1 or H.T	1	N
Partitions-permanent	12	12	12	N	1	N	1 or H.T	1	N
Shaft enclosures	2	2	1	1	1	1	1	1 12.2.1 .7	1 12.2.1.7
Floors-ceilings/floors	2	2	1	N	1	N	H.T	1	N
Roofs-ceilings/roofs	2 sec 12.2.10.7	1 sec 12.2.10.7	1 sec 12.2.10. 7	N	1	N	H.T	1	N
Exterior doors and windows	Sec 12.2.8.9	12.2.8.9	12.2.8.9	12.2.8.9	12.2.8	12.2.8	12.2.8	12.2.8	12.2.8

Source: National Building Code (2006)

The need for the study arises from the great deal of concern expressed by well-meaning Nigerians from National dailies, television as well as previous studies by Mogbo (1998), Anyawata (2000), Shittu (2001), Shittu (2007) and Shittu (2009). Mogbo (1998) researched on the environment and fire incidence in Nigeria; Anyawata (2000) researched on the incidence of fire outbreaks in the Niger – Delta; 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 (i.e. =N= 14,548,694,960). 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 and this paper moves along that direction of studying fire trend and suggesting ways to mitigate the threat and damages of fire to lives and property.

The problem of fire in our homes and surroundings is a bottleneck issue that has set people working round the clock to find a probable lasting solution to this problematic child (Omata, 1991). Therefore a situation where human lives are lost, valuables damaged and the scenic configuration of our social environment destroyed is a problem that no sound mind can ignore.

Some instances of fire outbreak in Nigeria include the Jos Central market fire, the Onitsha market fire, the burning down of the office of academic building of the Federal Polytechnic Bida, the inferno that razed down the great ooosa house of Ibadan, the Sheik Abubakar Gumi Central Market fire in Kaduna, the instances of fire disaster which affected both office and academic buildings of the Federal Polytechnic Offa during a crisis between the students and the community in year 2000, the Sokoto Central Market Fire of year 2006, the Kaduna Sharia crisis involving great fire outbreak and destruction of lives and properties, the Ife – Modakeke communal clashes in Osun State and the recent Offa – Erin-Ile communal clashes in Kwara State which resulted in serious outbreak leading to destruction of lives and properties.

Another serious and memorable incidence of fire outbreak in Nigeria was the fire which struck the six – storey building of the Nigerian Port Authority (NPA) in Marina on Thursday the 19th day of June, 2008. The fire was suspected to have been caused as a result of willful act to loot the building or conceal crime committed (arson) as reported by Odueme & Ebimomi (2008) quoting some workers of NPA who said "they are the one who set the place on fire to cover their loots because of the president's visit. It's obvious that it is just an attempt to burn vital incriminating documents that can nail them." Odueme & Ebimomi (2008) added that incidents of suspicious fire disasters in Government's establishments are not strange in Nigeria. The Nigerian Telecommunications Limited (NITEL) headquarters in the same Marina was gutted by mysterious fire in the early 80s during the Second Republic and just last year the Ibadan branch of the Central Bank of Nigeria (CBN) was up in flame leading to loss of several vital documents. In the same vein, it was reported that fire outbreaks in Nigeria records 1,000 deaths and 7,000 fire accidents annually (Leadership Newspaper in www.leadership.ng, 2012). One of such cases is shown in the Appendix as Figure 2.

1.2 Study Area

This study was carried out in Kwara State of Nigeria which was created on the 27th of May, 1967 as one of the twelve states that replaced former four regional structures – the northern, western, mid-western and eastern region – in the country. Kwara State is situated between parallels 11^0 7^1 and 11^0 45^1 north latitude and 2^0 45^1 and 6^0 40^1 east longitude. It has an elongated shape running from west to east and covering an area of about 31,000 sq.m. It occupies a strategic position in the country as it is situated about midway between the northwest and southwest. The State as River Niger as its natural boundary along its northern and eastern region and shares a common internal boundary with Niger State in the north, Kogi State in the east, Oyo State and Osun State in the

south and international boundary with the Republic of Benin in the west.

1.3 Problem Statement

Tiamiyu (2012) reported that Fire Service in Kwara State suffers from insufficient personnel and this poses the Service major problem and that property estimated at over =N=1.67 billion were lost to 179 fire incidents recorded in Kwara between January and December, 2012 in both domestic and public buildings.

Nigeria has experienced about six civilian dispensations since 1960; crisis resulting in to conflicts are the challenges some of these dispensations have faced (Shittu, 2007). 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.

In the light of these, this paper focused on the incidence of fire outbreak in Kwara State between two periods of 1990-1999 and 2000-2009 representing military era and civilian era respectively in domestic and public buildings and with electrical and gas faults as causes of fire, since it was discovered from the studies of Shittu (2007) and Shittu (2009) that electrical and gas faults are major causes of fire in Nigeria. The selection of these periods will allow inferences to be drawn as to whether fire outbreak characteristics differed significantly between the periods. The conclusions of this paper will form a good 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 will also be buttressed.

1.4 Purpose of the Study

This study aims to undertake an exploratory study of relationship between the type of political dispensation and the frequency and causes of fire outbreak in Kwara State.

To achieve the aim, the following objectives were set out:

i. To determine the relationship between total number of fires and the number of fire cases in each building type considered in each of the eras.
ii. To determine the relationship between the total number of fires and the number of fire cases due to each of the causes considered in each of the eras.
iii. To determine the statistical difference existing in the number of recorded fire cases between the military and civilian era.

To test the research question statistically, this paper employs the following pair of hypotheses:

i. There is no significant relationship between the total number of fires and the number of fire cases in each of building types considered in each of the eras.
ii. There is no significant relationship between the total number of fires and the number of fire cases due to each of the causes fire considered in each of the eras.
iii. There is no significant difference in the number of recorded fire cases between the military and civilian era.

2.0 METHODOLOGY:

This study employed the use of quantitative research methodology. The data used for this paper are statistical data (secondary data) on recorded fire cases compiled by Kwara State Fire Service, Ilorin, and thus led to the following limitations:

i. The researcher could not pin-point little discrepancies where they may arise.

ii. The researcher could not ascertain how many fire cases incident on domestic and public buildings were caused by either electrical or gas faults but only the total causes on both building types were recorded in the data and these were used for analysis as recorded.

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 Fircalev Vs Pubfev etc. This paper assures 5% significance test as test of statistical significance. Hence for any value of P or T 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.

DATA PRESENTATION:

The data collected and used for analysis in this study are presented in Tables 2 and 3 below:

TABLE 2: FIRE STATISTICS IN KWARA STATE (1990 TO 1999)

Year	Fircalmt	Dombfmt	Pubfmt	Elecfmt	Gasfmt
1990	107	34	1	10	2
1991	142	53	7	43	4
1992	160	70	11	73	4
1993	128	38	0	24	1
1994	77	25	4	17	0
1995	45	9	0	8	0
1996	67	33	7	21	1
1997	84	32	5	21	3
1998	78	30	15	23	0
1999	73	44	8	26	0
TOTAL	**961**	**368**	**58**	**266**	**15**

SOURCE: Kwara State Fire Service, Ilorin (2000)

KEY:

Fircalmt.....Number of fire calls in Kwara State during military era

Dombfmt.....Number of fires in Domestic buildings of Kwara State during military era

Pubfmt.....Number of fires in Public buildings of Kwara State during military era

Elecfmt..... Number of fires caused by electrical faults in Kwara State during military era

Gasfmt..... Number of fires caused by gas faults in Kwara State during military era

TABLE 3: Fire Statistics in Kwara State (2000 to 2009)

Year	Fircalcv	Dombfcv	Pubfcv	Elecfcv	Gasfcv
2000	121	48	6	40	6
2001	106	35	10	35	2
2002	113	67	12	38	4
2003	159	78	16	50	5
2004	95	50	10	15	1
2005	101	55	12	20	1
2006	78	40	9	17	5
2007	72	36	17	25	2
2008	106	51	8	30	2
2009	79	25	10	28	1
TOTAL	**1030**	**485**	**110**	**298**	**29**

SOURCE: Kwara State Fire Service, Ilorin (2010)

KEY:

Fircalcv.....Number of fire calls in Kwara State during civilian era

Dombfcv..... Number of fires in Domestic buildings of Kwara State during civilian era

Pubfcv..... Number of fires in Public buildings of Kwara State during civilian era

Elecfcv..... Number of fires caused by electrical faults in Kwara State during civilian era

Gasfcv..... Number of fires caused by gas faults in Kwara State during civilian era

3.0 RESULTS AND DISCUSSIONS:

3.1 Discussion of Results for Regression Analysis

It was revealed from the Regression Analyses 1 and 5 presented in Table 4 that there exists a linear, positive, strong and significant relationship between the total number of recorded fire cases and the number of fire outbreak in domestic buildings in Kwara State in both the military and civilian eras with respective coefficient of determination (R^2) values of 73% and 67% while the respective probability values were 0.002 and 0.004. The null hypothesis was therefore rejected in both cases because the respective F-calculated value of 21.92 and 15.93 was greater than the F-tabulated value of 5.32. This slightly differs from the findings of Shittu (2007) were total number of fire cases was significantly related to domestic building fires only during the civilian era in Niger State.

Regression Analyses 2 and 6, from Table 4, shows that there exists a linear, positive, weak and non-significant relationship between the total number of recorded fire cases and the number of fire outbreak in public buildings in Kwara State in both the military and civilian eras with a relatively low respective R^2 values of 2.1% and 1.1% while the respective probability values were 0.693 and 0.772. The null hypothesis was therefore accepted in both cases because the respective F-calculated value of 0.168 and 0.09 was lower than the F-tabulated

value of 5.32. This finding is in line with the study of Shittu (2007) were a significant relationship was also observed between number of fires and number of public building fires in Niger State during the military and civilian era.

The relationship between total number of fire cases and the number of fires caused by electrical faults was also found out to be linear, positive, strong and significant for both military and civilian eras from Regression Analyses 3 and 7 presented in Table 4. The respective R^2 value observed was 61% and 66% while the respective probability values observed were 0.007 and 0.004. The null hypothesis was therefore rejected in both cases because the respective F-calculated value of 12.67 and 15.48 was greater than the F-tabulated value of 5.32. This also slightly differs from the findings of Shittu (2007) were total number of fire cases was significantly related to electrical faults fires only during the civilian era in Niger State.

The relationship between total number of fire cases and the number of fires due to gas faults was discovered to be linear, positive, strong and significant during the military era from Regression Analysis 4 as presented in Table 4. The R^2 value observed was 52% while the probability value observed was 0.014. The null hypothesis was therefore rejected in this case because the F-calculated value of 9.84 observed was greater than the F-tabulated value of 5.32. The relationship between total number of fire cases and the number of fires due to gas faults was, on the other hand, discovered to be linear, positive, weak and not significant during the civilian era from Regression Analysis 8 as presented in Table 4. The R^2 value observed was 25% while the probability value observed was 0.14. The null hypothesis was therefore accepted in this case because the F-calculated value of 2.061 observed was lower than the F-tabulated value of 5.32. These findings also slightly differ from the findings of Shittu (2007) were total number of fire cases was significantly related to gas faults fires only during the military era Niger State.

TABLE 4: Summary of Analysis

Analysis No.	Variables		Type of Model	Observations					Inferences		
	X	Y		Regression Equation	R^2	F_{cal}	F_{tab}	P_{value}	Strength of Relationship	Remark	Action On Hypothesis
1	Dombfmt	Fircalmt	Linear	Fircalmt = 25.52 +1.92 Dombfmt	73%	21.92	5.32	0.002	Strong	SS	Reject Ho
2	Pubfmt	Fircalmt	Linear	Fircalmt = 89.26 + 1.14 Pubfmt	2.1%	0.168	5.32	0.693	Weak	NS	Accept Ho
3	Elecfmt	Fircalmt	Linear	Fircalmt = 55.62 +1.52Elecfmt	61%	12.67	5.32	0.007	Strong	SS	Reject Ho
4	Gasfmt	Fircalmt	Linear	Fircalmt = 55.79 +21.22Gasfmt	52%	9.842	5.32	0.014	Strong	SS	Reject Ho
5	Dombfcv	Fircalcv	Linear	Fircalcv = 39.088 + 1.318 Dombfcv	67%	15.93	5.32	0.004	Strong	SS	Reject Ho
6	Pubfcv	Fircalcv	Linear	Fircalcv = 94.327 + 0.79Pubfcv	1.1%	0.09	5.32	0.772	Weak	NS	Accept Ho
7	Elecfcv	Fircalcv	Linear	Fircalcv = 47.695 +1.86Elecfcv	66%	15.48	5.32	0.004	Strong	SS	Reject Ho
8	Gasfcv	Fircalcv	Linear	Fircalcv = 22.38 + 1.95 Gasfcv	25%	2.68	5.32	0.140	Weak	NS	Accept Ho

Key:

SS = Statistically Significant

NS = Not Significant

3.1 Discussion of Results for Independent Sample T – Test

The Independent Sample T –test, presented as Table 5, was carried out in order to determine how the frequency of recorded fire cases in Kwara State statistically differed significantly between the military and civilian era. It was revealed from the T-test that there exists a non-significant difference in the number of fire incidents recorded during the military era and civilian era. This can be noticed from the respective average values of recorded fire cases of 91 and 103 cases over the period under review with a close margin. The null hypothesis was therefore accepted in this case because the T-calculated value of 0.488 observed was lower than the T-tabulated value of 1.734. Although from this average values it can still be noticed that fire cases occur more during the civilian era than the military era and this is also supported by the data presented in Tables 2 and 3 which indicates a total of 961 recorded fire cases during the military era as against a total of 1030 recorded fire cases during the civilian era. Recorded cases of domestic building fires, public building fires, electrical faults fires and gas

faults fires were higher during the civilian era than the military era as presented in Tables 2 and 3.

TABLE 5: Independent Sample T - Test

Variables			Observations						
Test No	X_1	X_2	Type of Model	Mean Values	T_{cal}	T_{tab}	P_{value}	Remark	Action On Hypothesis
1	Fircalmt	Fircalcv	Independent Sample	$X_1 = 96.10$ $X_2 = 103.00$	0.488	1.734	0.123	NSD	Accept Ho

Key:

NSD – No Significant Difference

4.0 CONCLUSIONS

It was discovered from this research results that a greater frequency of fire outbreak were recorded during the civilian dispensation giving a total of 961 recorded fire cases during the military era as against a total of 1030 recorded fire cases during the civilian era. A greater frequency of fire incidents in domestic and public buildings, and fires due to electrical and gas faults were recorded during civilian political dispensations. Majority of fire incidences were caused by electrical faults rather than gas faults. The role of gas faults in fire outbreaks is of importance under military dispensations because it significantly correlates with the total number of fire outbreaks in Kwara State.

It is therefore imperative to recommend that further research be carried out on why civilian dispensations experience higher frequency of fire outbreaks than the military dispensations. Due to the limitation of the secondary data employed, which did not identify the causes of fires in individual building types, this paper calls for an overhaul of the data collection system of the fire service in Nigeria. The Government of Kwara State should also direct attention to the reduction of frequency of fire outbreaks in domestic buildings, through appropriate policies, in order to conserve public infrastructure.

It appears prudent based on the above to recommend that the civilian administration in Kwara State should launch a priority campaign involving compulsory household fire inspections. Assessments for fixing rates of taxation on properties might be tied to level of compliance with fire safety rules. The use of Information Technology in data collection and management should also be prioritized.

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APPENDIX:

Figure 2: Picture Showing Firemen Trying to Put Out Fire during an outbreak of Fire in Nigeria

Figure 3: Picture Showing Firemen Trying to Put Out Fire during an outbreak of Fire in Ilorin, Kwara State.