Original Article

Prevalence and factors associated with fire outbreak among traders in Kwari market, Kano

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ABSTRACT

Background: Fire outbreak in business places can result in losses in production, unemployment, morbidity and mortality and significant psycho-social problems **Objective:** This study aimed to determine the prevalence, socio-demographic and other factors associated with fire outbreaks amongst traders in Kwari market, Kano state. **Methodology**: A descriptive cross-sectional study design was used to study 442 traders in Kwari market, selected using a two-stage sampling technique. Data were collected using interviewer-administered questionnaires and analyzed using SPSS version 22.0 with $P \leq 0.05$ considered to be statistically significant. **Results**: A total of 442 traders were studied. The age of the traders ranged between 18 and 70 years with a mean± SD of 38.3±9.8 years. Majority of the traders 416 (94.1%) and 425 (96.2%) were greater than or equal to 24 years of age and were males respectively. Only 21 (4.8%) of them acquired post-secondary educational qualification. The prevalence of fire outbreak among the traders was 73(16.5%). Significantly higher fire outbreak (17.5%, p=0.02) was found among traders aged 24 years and above. Similarly, male sex (15.5%, p=0.05), secondary level education (16.8%, p=0.001), cleaning job (24.4%, p=0.02) were significantly associated with higher fire outbreak. A significantly higher fire outbreak (17.6%, p=0.03) was found among traders with no prior knowledge of the need for safety guidelines and emergency contact numbers. Ever having power fluctuations in the shop was associated with 35folds increased in likelihood of fire outbreak {aOR= 35, 95%CI= (4.8-257)} while not having firefighting equipment currently was associated with two folds increased in likelihood of fire outbreak {aOR=2.0, 95%CI= (1.2-2.3)}. **Conclusion**: The prevalence of fire outbreaks is high and significantly associated with socio-demographic factors and poor fire safety practices, therefore all the relevant stakeholders should ensure the enforcement of fire control guidelines among traders.

Keywords: *Fire safety, fire outbreak, markets, prevalence, Kano*

Introduction

In recent times, public buildings, including markets, have become more complex.[1-10] Fire is one of the significant and costly causes of damage to the people and their properties, with many cases of fires outbreak[4] resulting from acts of negligence, ignorance and failure to ensure safety measures. Fire outbreak

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in the markets presents risks to human life and their[10] properties, shops are accessed for various purposes by people from all walks of life and, therefore,[10] provision of adequate safety measures is critical.[10] Furthermore, consumers and traders should have optimal knowledge of fire safety measures in the workplace. More so, users and the public at large should be able to appropriately and promptly use firefighting equipment in case of fire occurrences.[10] Many fire incidences affecting shops and market places have been reported across different countries.[5]For example, the fire outbreak of Sweden in 1998 resulted in 63 death, the World Trade Centre disaster of 2001, the Greenfell Tower Fire, London of 2017 and the Mumbai Kamala Mill fire in 2017.[5] Similarly, Nigeria has, over the years, experienced several fire outbreaks, in Lagos for example, with the reported number of deaths between 2009 and 2014 due to fire disaster in buildings is alarming.[5] Reports of other major fire incidences in Nigeria include Kuto Market of Abeokuta and Warri in 2008, over 2,000 shops were razed down in Lagos in 2007, while in the year 2011, 349 fire incidents occurred in the city of Ibadan, in southwest Nigeria.[7]

Electrical and lighting equipment are important[4] cause of fire outbreaks. Most times market fire outbreaks were attributable to trader`s poor handling of electrical appliances, dangerous and substandard electric wiring and keeping of flammable substances in unsafe locations.[6]Fire outbreaks occur more during weekdays since they are more likely to be populated.[4]The notable times of day for these fires were reported to be between noon and 2:00PM. Similarly, 19% of fires occurred on weekends, but these incidents caused 31% of the associated property loss.[4]

The impact of fire outbreaks includes decline in production and unemployment in some cases, the workers may never return to work since the business is forced to close following the damages. Thus, workers involved and their dependents suffer significant loss of income, and the government suffer losses in revenues. There may be significant increased demands in social services.[2]

Fire safety is an essential component and requirement in building any infrastructure plan. Provision of fire safety systems like emergency exits, different types of fire extinguishers, safe assemble areas and the fire hydrant system is mandatory.[3] It also depends on how individuals and organizations behave, the vulnerability of the people exposed to the fire, the fire properties of products, the technical fire safety in the building, the fire service's ability to respond to a fire. Focusing on any one of these points and neglecting the others will lead to suboptimal safety.[1]Effective fire prevention strategies require keen vigilance, action, cooperation and collaboration of all the necessary stakeholders.Vigilance involves regular inspection of the workplace to identify fire hazards.[2]

In Nigeria, billions of Naira and many human lives have been lost with most victims failing to recover financially and physically afterwards due to recurrent fire outbreak affecting places of business[6] including markets. These underscores the importance of this study, Kano state being one of the commonly affected states, with resultant significant loss of revenue to the state and the federal government. Similarly, the fire outbreak of 2016 in Kano was described by the National Emergency Management Agency (NEMA) as the worst in Nigeria, at the Sabon Gari Market in Kano which destroyed goods estimated at N2 trillion and burnt over 3,800 shops, in one market.[9]

The records of losses from fire incidences in Kano and Nigeria are alarming but local research identifying the facilitators of the problems are lacking, this shows that, more relevant work needs to be done by researchers to find more prevention techniques.[8] Therefore, this study aimed to identify the prevalence, socio-demographic and other factors associated with fire outbreak among traders in Kwari market, Kano state. The findings can provide insight into the possible causes of fire incidences in Kano markets and provide the basis for preventive interventions. It can also serve as a foundation for future research.

Materials and method
Study design
The study was a descriptive cross-sectional conducted amongst traders in Kwari market of Kano. Data were collected by 20 trained research assistants from 20th June, 2019 to 29th September 2019. The study population consisted of male and female traders in Kwari markets who have being in the designated business for at least six months while

those not available for any reason during data collection, traders having no permanent structure for trading and those who were temporarily keeping the shop for the owners were excluded.

Ethics
Ethical approval was obtained from the Research Ethics Committee of the Ministry of Health, Kano State, and has the approval number of MOH/OFF/797/1285 dated 20th May, 2019. Informed consent was obtained from all the eligible respondents using consent forms. All the provisions of Helsinki Declaration in the study of human subjects in the research were adhered to during the data collection process.

Study settings
Kano is bounded by Jigawa and Bauchi state respectively to the East, Plateau and Kaduna states to the south and west respectively, and Katsina State to the North. It is located on longitude 8°31'0.19" E and latitude 12°00'0.43" N. The city has a long term history of commerce and commercial activities. [11] Kano, for years, is a center for textile production and other trades. It provides for the use of the West Africa and beyond. The Kantin kwari market (Simply called Kwari market) is assumed to be older than one thousand years and singled out for textile business, since the time of trans-Saharan trade. [12] There are over 20,000 shops in the market, predominantly textiles structured to have different blocks, divided by named streets.

Sample size calculation
The sample size was and calculated using the Fisher's formula for minimum sample size determination for descriptive studies. [13] Using z=standard normal deviate at 95% confidence level, i.e., 1.96, p = proportion of smoke detectors I Lagos=5%, [1] ~0.05, and q=complementary probability of p, it is equal to 1 - p = 1 - 0.05 = 0.95, and 10% possible non-response, the minimum sample size was 442.

Sampling technique
A two staged sampling technique was used to study eligible respondents.
In stage one, the market was divided into three equal halves divided by Unity Street and Taambo Streets respectively. There are about 1500 shops in each of the three well demarcated areas. The eligible

respondents for the study were equally allocated in the three mapped areas, which is 147. A sampling interval of 10 was calculated as the ratio of the sampling frame (the estimated number of shops in each of the three areas=1500) to the equally allocated sample size (147).

Numbers assigned to the shops were used, the first shop to be studied was determined within the sampling interval (1 to 10) and the randomly selected number was traced using the official numbers allocated to the shops and the subsequent shops for the study were identified by adding the sampling interval until the equally allocated sample sizes were obtained in each of the three areas.
In stage two, in each of the eligible shop, the lists of traders in the shop were generated serially using numbers, and the numbers assigned were used to randomly select one respondent for the study by balloting.

Procedure of data collection and instrument of data collection
The semi-structured interviewer-administered questionnaire, written in English language and translated into Hausa Language, was adapted from the previous studies. [1-10] The instrument has four sections: Section 1 of the questionnaire asked information on the socio-demographic characteristics and prevalence of fire outbreak among traders section 2 sought information on the awareness of some fire control and safety strategies, section three asked questions on previous fire safety and control practices while section 4 asked on the current fire safety and control practices amongst the traders. About 50 questionnaires were pre-tested amongst traders in a market outside Kano metropolis.

Data analysis and measurement of variables
Data collected were entered into Microsoft Excel spreadsheet, appropriately cleaned and analysed using IBM SPSS Statistics for Windows, version 22.0. Armonk, NY, USA: IBM Corp. Normally distributed quantitative data were summarized using mean and standard deviation (SD), while qualitative variables were summarized using frequencies and percentages. The outcome variable was fire outbreak (Ever had fire outbreak or never had fire outbreak) while the independent variables are the socio-demographic characteristics, variables

assessing awareness of fire safety and control measure, ever practice of fire safety and control measures and the current practices of fire outbreak prevention and control measures. Person's Chi-square test was used to compare proportions at ≤5% α-level of significance. Factors with p-value≤0.1 at bivariate level were included in the logistic regression analysis model to adjust for confounding.[14]

Results

Socio-demographic characteristics and prevalence of fire outbreak among traders

A total of 442 questionnaires were administered and returned giving a response rate of 100%.The age of the traders ranged between 18 and 70 years with a mean± SD of 38.3±9.8 years. Majority of the traders 416 (94.1%) and 425 (96.2%) were greater than or equal to 24 years of age and males respectively. Only 21(4.8%) of them acquired post-secondary educational qualification. The predominant business 399 (90.3%) was textile trade, with shops owned by the family of more than a half 242 (54.8%) of the respondents. In addition, more than two-third of the traders interviewed were involved in managerial work. More so, the average monthly income of the traders ranged between 10,000 to 150,000 naira, with a median of 40,000 naira. The maximum duration in the business was 37 years and the minimum was 2 years with mean ± SD duration in the trading business to be 12.5±6.3 years as shown in table 1 below. The prevalence of fire outbreak among the traders was 73 (16.5%).

Socio-demographic factors associated with fire outbreak among traders

A significantly higher (17.5%, p=0.02) fire outbreak was found among traders aged 24 years and above. Similarly, male sex (15.5%,p=0.05, secondary level education (16.8%,p=0.001), cleaning job (24.4%, p=0.02), duration in business greater than or equal to 5 years (17.5%,p=0.04) respectively were found to be significantly associated with higher fire outbreak among traders as shown in table 2

Factors associated with awareness of fire outbreak control measures

Significantly higher (17.6%, p=0.03) fire outbreak was found among traders with no prior knowledge on the need for and availability of safety guidelines and emergency contact numbers. Similarly,

significantly higher fire outbreak was found among traders: who do not know the relevance of escape route in the shop (17.6%, p=0.03), hose reel as firefighting equipment (20.9%, p<0.001) and negative influence of power fluctuation (18.7%, p=0.002) as shown in table 3.

Factors associated with ever practice of fire safety and control measures

Significant higher fire outbreak was found among traders: with no guideline or emergency contact number (17.8%,p=0.02), never had escape route in the shop (24%,p<0.001), had no smoke detector (22.7%, p<0.001) and had power fluctuations (24.2%,p<0.001).Ever having power fluctuations in the shop was associated with 35folds increased likelihood of fire outbreak {aOR= 35, 95%CI= (4.8-257} as shown in table 4.

Factors associated with current practice of fire safety and control measures

Among the traders who reported fire outbreak, significantly higher proportion (26.7%,p<0.001) currently have fire safety guideline and emergency contact numbers, (25.7%, p<0.001) are currently of the habit of switching off electrical appliances when not in use, (24.2%, p<0.001) have emergency escape route in the shop, (28.6%,p<0.001) have hose reel for fire control and (17.3% p=0.04) do not tap electricity illegally from the national grid. Not having firefighting equipment currently is associated with 2 folds increased in likelihood of fire outbreak {aOR=2.0, 95%CI=(1.2-2.3)} as shown in table 5.

Table 1: Socio-demographic Characteristics of Respondents

Variable (s)	Frequency (n=442)	Percentage (%)
Age(years)		
<24	26	5.9
≥24	416	94.1
Sex		
Male	425	96.2
Female	17	3.8
Religion		
Islam	399	90.3
Christian	43	9.7
Tribe		
Hausa	241	54.5
Fulani	149	33.7
Igbo	42	9.5
Yoruba	2	0.5
Others	8	1.8
Highest Educational Status		
Quranic	143	32.4
Primary	44	10.0
Secondary	234	52.9
Post-secondary	21	4.7
Types of commodities sold		
Textile/cloth	399	90.2
Shoes	37	8.4
Plastics	3	0.7
Food stuffs	3	0.7
Shop ownership		
Self	200	45.2
Family	242	54.8
Job description		
Cleaning	45	10.2
Dispensing commodities	43	9.7
Managerial work	320	72.4
Security	34	7.7
Average monthly income(naira)		
<18,000	19	4.3
≥18,000	423	95.7
Duration in business(years)		
<5	30	6.8
≥5	412	93.2
Number of hours per day in Shop		
6	2	0.5
7	18	4.1
8	405	91.6
9	17	3.8
Number of days per week in shop		
6	58	13.1
7	384	86.9

Table 2: Socio-demographic factors associated with fire outbreak

Variable (s)	Fire outbreak n=442(%)						
	Yes	No	χ^2	p-value	a OR	(95%CI)	p-value
Age(years)	0(0)	26(100)		†<0.02*	2	(0.7-6.2)	0.2
<24	73(17.5)	343(82.5)					
≥24							
Sex	66(15.5)	359(84.5)	7.9	0.005*	0.3	(0.1-1.4)	0.1
Male	7(41.2)	7.910(58.8)					
Female							
Religion				0.003*	0.3	(0.03-2.0)	0.2
Islam	59(14.8)	340(85.2)	8.9				
Christian	14(32.6)	8.929(67.4)					
Tribe					0.8	(0.6-1.1)	0.1
Hausa	22(9.1)	219(90.9)					
Fulani	37(24.8)	112(75.2)					
Igbo	14(33.3)	28(66.7)					
Yoruba	0(0)	2(100)					
Others	0(0)	8(100)					
Highest Educational Status				†<0.001*	0.9	(0.7-1.3)	1.0
Quranic	24(16.8)	119(83.2)					
Primary	0(0)	44(100)					
Secondary	49(20.9)	185(79.1)					
Post-secondary	0(0)	21(100)					
Types of commodities sold				†0.001*			0.7
Textile/cloth	62(15.5)	337(84.5)					
Shoes	10(27)	27(73.0)					
Plastics	0(0)	3(100)					
Food stuffs	1(33.3)	2(66.7)					
Shop ownership				†0.2			
Self	29(14.5)	171(85.5)1. 1.0					
Family	44(18.2)	0198(81.8					
Job description				0.3	1.1(0.7-1.6)		
Cleaning	11(24.4)	34(75.6)9.5 9.5					
Dispensing commodities	1(2.3)	42(97.7)					
Managerial work	53(16.6)	267(83.4)					
Security	8(23.5)	26(76.5)					
Average monthly income(naira)				0.02*			
<18,000	0(0)	19(100)					
≥18,000	73(17.3)	350(82.7)					
Duration in business(years)				†<0.05*	0.1(0.01-1.4)		0.1
<5	1(3.3)	29(96.7)					
≥5	72(17.5)	340(82.5)					
Number of hours per day in Shop				†<0.04*	0.9(0.4-2.6)		1.0
6	0(0)	2(100)					
7	0(0)	18(100)		†0.1			
8	72(17.8)	333(82.2)					
9	1(5.9)	16(94.1)					
Number of days per week in shop				0.1	0.4(0.1-2.5)		0.3
6	14(24.1)	44(75.9)3.0 3.0					
7	59(15.4)	325(84.6)					

*Statistically significant, aOR = Adjusted odds ratio, CI = Confidence interval, † = Fishers exact, Blank cells = did not qualify for inclusion in the regression model

TABLE 3: factors associated with awareness of fire otbreak control measures

Variable (s)	Fire outbreak n=442(%)						
	Yes	No	χ^2	p-value	a OR	(95%CI)	p-value
Need for guidelines and regulations on fire safety							
Yes	1(3)	32(97.0)					0.06
No	72(17.6)	337(82.4)	4.7	0.03*	0.1	(0.2-1.1)	
Have emergency contact numbers when there is any fire outbreak							
Yes	1(4.3)	22(95.7)		†0.1			0.6
No	72(17.2)	347(82.8)			2.0	(0.1-44)	
Switching off sockets and electrical appliances prevent fire outbreak							
Yes	1(14.3)	6(85.7)		†0.9			0.4
No	72(16.6)	363(83.4)			0.8	(0.1-7.1)	
Need for escape routes in the building							
Yes	0(0)	27(100)					
No	73(17.6)	342(82.4)		†0.03*			
Need for firefighting equipment							
Yes	4(50)	4(50)					0.4
No	69(15.9)	36(84.1)		†0.03*	0.8	(0.1-7.1)	
Fire/smoke detector is a firefighting equipment							
Yes	1(20.0)	4(80.0)					
No	72(16.5)	365(83.5)		†0.8			
Fire extinguisher as firefighting equipment							
Yes	0(0)	20(100)		†0.06			
No	73(17.3)	349(82.7)					
Hose reel is one of the firefighting equipment needed							
Yes	0(0)	20(100)					
No	73(20.9)	277(79.1)		†<0.001*			
Power fluctuations can cause fire outbreak							
Yes	2(3.2)	60(96.8)					
No	71(18.7)	309(81.3)	9.2	0.002*			
Overloading of electrical appliances can cause fire outbreak							
Yes	7(7.0)	93(93.0)					
No	66(19.3)	276(80.7)	2.1	0.1			
Illegal tapping of electrical power from the national grid may lead to fire outbreak							
Yes	7(7.0)	93(93.0)					
No	66(19.3)	276(80.7)	8.5	0.004*			
Use of naked fire in the market e.g. cooking, cigarette smoking can cause fire outbreak							
Yes	31(21.1)	116(78.9)					
No	42(14.2)	253(85.8)		†0.1			

*Statistically significant, aOR = Adjusted odds ratio, CI = Confidence interval, † = Fishers exact, Blank cells = did not qualify for inclusion in the regression model

TABLE 4: factors associated with ever practicing fire safety and control measures

| Variable (s) | Fire outbreak n=442(%) | | | | | | |
	Yes	No	χ^2	p-value	a OR	(95%CI)	p-value
Had emergency contact numbers when there is any fire outbreak							
Yes	2(1.1)	176(98.9)					
No	71(26.9)	193(73.1)	51.2	0.003*	0.5	(0.04-61.0)	0.8
Often Switch off sockets and electrical appliances							
Yes	1(2.6)	37(97.4)					
No	72(17.8)	332(82.2)	5.8	0.02*	0.2	(0.02-2.5)	0.2
Had escape routes in the building							
Yes	1(0.7)	141(99.3)					
No	72(24.0)	228(76.0)	37.9	<0.001*			
Had firefighting equipment							
Yes	71(16.5)2(16.7)	359(83.5)	0.1	1.0	0.4	(0.1-2.3)	0.3
No		10(83.3)					
Had Improper electrical wiring systems							
Yes	68(15.9)	360(83.1)					
No	5(35.7)	9(64.3)		†0.06	0.6	(0.1-2.4)	0.5
Had Fire/smoke detector							
Yes	7(4.6)	144(95.4)					
No	66(22.7)	225(77.3)	23.5	<0.001*	1.4	(0.4-4.8)	0.6
Had Fire extinguisher							
Yes	73(16.6)	367(83.4)					
No	0(0)	2(100)	0.4	0.5			
Had Hose reel							
Yes	62(50.0)	62(50.0)					
No	11(3.5)	307(96.5)	140	<0.001*	27	(10.6-69)	<0.001*
Had Power fluctuations							
Yes	72(24.2)	225(75.8)					
No	1(0.7)	144(99.3)	39.2	<0.001*	35	(4.8-257)	<0.001
Had Overloading of electrical appliances							
Yes	52(12.8)	355(87.2)					
No	21(60.0)	14(40.0)	52.1	<0.001*	0.2	(0.1-0.4)	<0.001*
Had Illegal tapping of electrical power from the national grid							
Yes	13(9.3)	127(90.7)					
No	60(19.9)	242(80.1)	7.8	0.005*	0.6	(0.3-1.2)	0.2
Used naked fire in the market e.g. cooking, cigarette smoking can cause fire outbreak							
Yes	73(16.7)	363(83.3)					
No	0(0)	6(100)		†0.3			

*Statistically significant, aOR = Adjusted odds ratio, CI = Confidence interval, † = Fishers exact, Blank cells = did not qualify for inclusion in the regression model

TABLE 5: factors associated with current practice of fire safety and control measures

Variable (s)	Fire outbreak n=442(%)		χ^2	p-value	a OR	(95%CI)	p-value
	Yes	No					
Have emergency contact numbers when there is any fire outbreak							
Yes	71(26.7)	195(73.3)	50.2	<0.001*	0.5	(0.1-4.9)	0.5
No	2(1.1)	174(98.9)					
Switching off sockets and electrical appliances							
Yes	71(25.7)	205(74.3)	45.2	<0.001*	1.5	(0.3-6.9)	0.6
No	2(1.2)	164 (98.8)					
Have escape routes in the building							
Yes	72(24.2)	226(75.8)	38.8	<0.001*			
No	1(0.7)	143(99.3)					
Have firefighting equipment							
Yes	8(10.5)	68(89.5)	2.4	0.1	2.0	(1.2-2.3)	0.003*
No	65(17.8)	301(82.2)					
Have smoke detector							
Yes	9(4.0)	218(96.0)	53.3	<0.001*	2.8	(1.8-4.3)	0.4
No	64(29.8)	151(70.2)					
Have Fire extinguisher							
Yes	1(11.1)	8(88.9)	0.2	0.7	0.8	(0.3-2.5)	0.7
No	72(16.6)	361(83.4)					
Have Hose reel							
Yes	68(28.6)	170(71.4)	54.4	<0.0001*	1.3	(0.6-2.7)	0.5
No	5(2.5)	199(97.5)					
Doing Illegal tapping of electrical power from the national grid							
Yes	0(0)	20(100)		†0.04*			
No	73(17.3)	349(82.7)					
Use of naked fire in the market e.g. cooking, cigarette smoking							
Yes	73(16.7)	365(83.3)		†0.4			
No	0(0)	4(100)					

*Statistically significant, aOR = Adjusted odds ratio, CI = Confidence interval, † = Fishers exact, Blank cells = did not qualify for inclusion in the regression model

Discussion

Fire safety practice among traders is critical in aborting preventable fire outbreak that can have direct consequences on the traders and indirectly affect other members of the community. Globally, cities and populations are constantly growing in different proportions; this increases the risk of fire outbreak.[5] Every year, fire outbreak result in about 300,000 deaths,[4] and the five-year period ranging from 2007-2011, estimates pointed out that United State (U.S.) fire departments responded to an average of 3,340 fire incidences yearly which was attributable to up to about four civilian deaths, 44 injuries, and $112 million costs of the estimated loss of properties .[4]It is therefore imperative to highlight that, the finding of the prevalence of fire outbreak of 16.5% in Kwari market is signifying the need to scale up appropriate fire control interventions. This is so because, looking at the number of people engaged daily in business activities, both the traders and their business partners, and on the other side, the amount of financial investment in the market portrays that, an outbreak spreading beyond individual shops is catastrophic and is likely to result in huge psycho-social and financial burden. More

so, it is essential to consider fire safety in markets places due to existence of recurrent outbreak across various states of Nigeria[7] and Kano state.[9]

Regarding the socio-demographic factors, male traders were found to record higher cases of fire outbreak, this is not unlikely because the gender role in Nigerian culture especially in Northern Nigeria provides for females to be more responsible for housekeeping and that involved taking care of the electrical appliances and better idea on the risk of fire outbreak when compared with the male counterparts. Similarly, those with secondary education may be linked to peer pressure as most of them are likely to be either adolescence, youth or young adult's ages and therefore are likely to have other distractions that can increase the risk of fire outbreak. For higher risk of fire outbreak among traders whose ownership of the shop was for the family may not be unconnected with having multiple family members looking after the shop with limited leadership and consistency in managerial functions. These factors highlight the need for enforcement of fire safety and control regulations, especially if the enforcement can empower and involve the use of fire safety inspectors with appropriate sanctions for any defaulter.

Appropriate knowledge of fire safety measures is crucial in curtailing the menace of periodic fire outbreak in Kano markets, this was highlighted by the finding of this study of more cases of fire outbreak among traders with no prior knowledge on the need for and availability of safety guidelines and emergency contact numbers. The National fire safety regulations for buildings provided in the Nigerian National Building Code of 2006,[5] need to be reviewed and appropriately adopted and ensure enforcement in all shops within Kano state, because, it provides adequately for ensuring fire safety and this can go a long way in reducing the recurrent consequences resulting from fire outbreak in Kano markets.

While the safety guideline can help guide their practices, the contact numbers are for use in emergency cases. More so, traders with no prior knowledge on the relevance of escape route in the shop, the need for hose reel as a firefighting equipment and negative influence of power fluctuation were found to have more cases of fire outbreak. These findings highlighted the wide gap in fire safety and control measures which can translate into suboptimal fire control practices. It is not surprising therefore, that the traders who never had guideline on fire safety or emergency contact numbers, never had escape route in the shop and had no smoke detector and had recurrent episodes of power fluctuations reported more cases of fire outbreak. Thus, relevant stakeholders should ensure that correct and compete information on fire safety is disseminated to all the traders.

Ever having power fluctuations in the shop was associated with 35folds increased the likelihood of having a fire outbreak. During power fluctuation, it is expected that the traders should switch off the source of electricity; failure to do that can result in fire outbreak. It is therefore critical to ensure all switches are off even after closing hours because fluctuation can occur and can cause fire outbreak that can be catastrophic as identification and early control maybe difficult especially at night.

Among the traders who reported fire outbreak, currently have fire safety guidelines and emergency contact numbers, are currently of the habit of switching off electrical appliances when not in use, have emergency escape route in the shop, have hose reel for fire control and not tapping electricity illegally from the national grid. These show that, the traders were likely able to improve on the safety practices after exposure to the fire outbreak. This underscores the importance of training the traders through various appropriate and cost effective channels on the fire safety and control measures, which was corroborated by the finding of not having firefighting equipment currently to be associated with 2 folds increased in likelihood of fire outbreak highlighting the need of having the needed firefighting equipment to aid control in case of fire outbreak.

This study is limited by the paucity of literature that assessed the prevalence and other determinants of fire outbreak in Kano, and also the exclusion of other shops in the market that are outside the demarcated areas. Similarly, recall bias of fire outbreak was minimized by providing the eligible respondents with an option to ask colleague in the shop about fire incidence in the shop selected for the study.

Conclusion and recommendation

Fire outbreak amongst traders in Kano state is a

serious public health concern. All stakeholders should ensure that building codes and appropriate fire safety information and control measures are regularly disseminated to all the traders in Kano.

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