

Original Article

FACTORS INFLUENCING FIREFIGHTING OPERATIONS AMONG FIRE SERVICE PERSONNEL IN RIVERS STATE

Ifeoma Nkechi Okwudili

Department of Human Kinetics, Health and
Safety Education, Ignatius Ajuru
University of Education, Rivers State

Abstract: This study investigated the correlates of firefighting operations among fire service workers in Rivers State. A descriptive cross sectional survey design was adopted for the study with a population of 356 which were all included in the study. The instrument for data collection was a structured questionnaire with reliability coefficient of 0.86. Collected data were coded and analyzed with the aid of Statistical Products for Service Solution (SPSS) version 23 using Pearson Correlation. The result of this study illustrated that firefighting operation was significantly related to availability of equipment ($n = 349$; $r = 0.66$; $p < 0.05$), availability of firefighting substances ($n = 349$; $r = 0.63$; $p < 0.05$), availability of adequate water ($n = 349$; $r = 0.75$; $p < 0.05$), and communication ($n = 349$; $r = 0.50$; $p < 0.05$). This study concluded that the firefighting operation was determined by several factors. It was recommended among others that, management of firefighting service in the ministry of special duties ensure availability of protective devices for effective utilization of firefighting operations in order to reduce the chances of accidents and other occupational related problems.

Keywords: Availability, Factors, Firefighting, Correlates, Rivers State

Introduction

Prevention of fire outbreak is sometimes difficult in human surrounding because of their daily activities which requires the use of fire for several purpose. Thus, fire firefighting as an essential tool to put out fire and stop further damages to lives and properties must not be taken lightly. This is because, when fire outbreak is not put to check, there is always an escalation and further damage. Firefighting is one of the world's most honoured but hazardous operations. Fire outbreak has contributed a critical consequence for human society due to the damage it causes to buildings and infrastructure. Also, a large number of people lose their lives or become seriously injured as a result of fires. According to World Health Organization (WHO) statistics, more than 300,000 deaths are caused annually by fire-induced burns and more than 95 percent of these deaths occur in low- and middle-income countries (LMICs).

Fire outbreaks are not welcome because they disturb our production function, cost money, and may involve loss of lives, loss of property more and more attention is been focused on fire prevention in the form of optimizing the

Original Article

reliability control and safeguarding of not only production facilities, but also the offices, workshops, residential accommodation. According to Dutton (2002), fire departments (also known as the “fire Brigade” or “fire service”) are the most common local level disaster management resource in the world. This is as a result of fire is the most common daily hazard at the community level almost anywhere in the world. The earliest fire service organizations were singular in function, but over time, many country fire departments have increased their strength to address a wider range of both regular and rare hazards (Fent, 2017).

Availability of equipment, depends on a wide range of basic and technical equipment to conduct fire suppression, rescue emergency, medical and other services. Stowell (2015) reported that, lack of communication regarding emergency call affects the firefighting institutions; thereby effective fire department rely on three different forms of communication. The first is the emergency notification system, which enables the public to inform the fire station of an emergency. The second communications system is the use of radios which allows responders to talk to each other and to command center. The third system is one that allows responders to communicate with the public. The age of workers are the days, weeks, months and years they live which may influence the effective firefighting operations. Older fire fighters may have less strength in firefighting while the younger workers is full of energy) and strength in firefighting. However, ages are likely to influence firefighting operation in the workplace or fire departments. In the light of this, Akintayo (2013) reported that workers who worked for less than five (5) days per week and younger age are more effective in firefighting operations.

In fact, our building is designed in such a way that should enable fire fighters to reach the further point in a residential building, most cases, fire fighters find it difficult to access the building and availability of water around the building. The building should provide with fire main (stand pipe) that reduces hose-run distance, the provision of sprinkler system may enable distance to be extended. Therefore, getting an adequate flow of water and access on the fire quickly will prevent the fire spreading beyond the compartment of fire origin.

In Rivers State, fire outbreak the third in three days, hit Bonny/Bille jetties of Nembe waterside, creek Road Port Harcourt city local Government Area (LGA), Rivers State, pregnant woman, three children feared dead, other victims sustained various degrees of burns and boars and other properties razed reported by (Vanguard, 2021). During the past years, there has been frequent fire outbreak in the camps in Monguno L.G.A in Bornu State. The fire outbreak is the major reason of displacement with the camp and generally triggered by cooking close to shelters, smoking, and burning of the bush surrounding the camp. The best efforts at preventing fires, fires do occur from time to time. The application of preventing effective measures to control or limit fire damages are therefore part of the daily operations of firefighting. Fire protection is traditional seen as integrated application of fire prevention, protection and firefighting measures aimed at minimizing the number and extent of fire and explosions. Consistent reported cases of fire outbreak in the city of Port Harcourt are not properly handles and the response of fire service personnel are too poor resulting into fatalities and damages to properties. It is against this background that this study is examined the correlates of effective firefighting operations among workers in fire serving institutions in Rivers State. The study provided answers to the following research questions

1. What is the relationship between availability of equipment and firefighting operations among fire service workers in Rivers State?
2. What is the relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State?

Original Article

3. What is the relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State?

4. What is the relationship between communication and firefighting operations among fire service workers in Rivers State?

Hypotheses

The following null hypotheses were formulated and tested at 0.05

1. There is no significant relationship between availability of equipment and firefighting operations among fire service workers in Rivers State.

2. There is no significant relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State.

3. There is no significant relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State.

4. There is no significant relationship between communication and firefighting operations among fire service workers in Rivers State.

Methodology

A descriptive cross sectional survey design was adopted for the study as the research design. The population of the study comprised of all personnel working in firefighting service in Rivers State. They are Rivers State Fire Service (120), Federal Fire Service (60), University of Port Harcourt Fire Service (68), Total Oil Company Fire Service (32), Shell Petroleum Development Company Fire Service (60) NLNG Fire Service (30), Agip Company Fire Service (24) totaling three hundred and fifty-six personnel (356) for the study. The sample size for this study was 356. The census sampling was adopted. The population of 356 was adopted as the sample size for the study because the population is at the reach of the researcher and can be used for the study.

The instrument for data collection was structured questionnaire titled Questionnaire on Correlates of Firefighting Operation among Fire Fighters (QDFFOFF), with a reliability coefficient 0.86. This instrument is in three sections A, B, and C. Section A depicts information on socio-demographic variables of the respondents such as age, gender, year of service, level of education. Section B focused on firefighting operations on a modified four-point Likert scale of always, sometimes, rarely and never while section C focused on the correlates with twenty-five items also on a modified four-point Likert scale of strongly agree, agree, disagree and strongly disagree such as availability of equipment, availability of firefighting substances, availability of adequate water, and communication. The questionnaire was self-administered to the respondents. Collected data were coded and analyzed using Statistical Products for Service Solution (SPSS) version 23.0). The research questions and hypotheses were analyzed using Pearson Correlation at 0.05 level of significance.

Original Article

Results

The results of the study are shown below:

Table 1: Pearson Correlation showing relationship between availability of equipment and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of equipment	of Remark
Firefighting	Pearson correlation	1	0.66	Moderate positive relationship
	N	349	349	
Availability of equipment	Pearson correlation	0.66	1	
	N	349	349	

Guide: 0.00-0.25 = very low, 0.26-0.45= low, 0.46-0.65 = moderate, 0.66-0.85 = high and 0.85 above is very high relationship

Table 1 showed the Pearson correlation between availability of equipment and firefighting operations among fire service workers. The result showed a correlation coefficient, $r = 0.66$ indicating a moderate positive relationship availability of equipment and firefighting operations. Thus, the relationship between availability of equipment and firefighting operations among fire service workers in Rivers State was moderate.

Table 2: Pearson Correlation showing relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of firefighting substances	of Remark
Firefighting	Pearson correlation	1	0.63	Moderate positive relationship
	N	349	349	
Availability of firefighting substances	Pearson correlation	0.63	1	
	N	349	349	

Guide: 0.00-0.25 = very low, 0.26-0.45= low, 0.46-0.65 = moderate, 0.66-0.85 = high and 0.85 above is very high relationship

Table 2 showed the Pearson correlation between availability of firefighting substances and firefighting operations among fire service workers. The result showed a correlation coefficient, $r = 0.63$ indicating a moderately positive relationship availability of firefighting substances and firefighting operations. Thus, the relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State was moderate.

Original Article

Table 3: Pearson Correlation showing relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of adequate water	of Remark
Firefighting	Pearson correlation	1	0.75	High positive relationship
	N	349	349	
Availability of adequate water	Pearson correlation	0.75	1	
	N	349	349	

Guide: 0.00-0.25 = very low, 0.26-0.45= low, 0.46-0.65 = moderate, 0.66-0.85 = high and 0.85 above is very high relationship

Table 3 showed the Pearson correlation between availability of adequate water and firefighting operations among fire service workers. The result showed a correlation coefficient, $r = 0.75$ indicating a high positive relationship availability of adequate water and firefighting operations. Thus, the relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State was high.

Table 4: Pearson Correlation showing relationship between communication and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Communication	Remark
Firefighting	Pearson correlation	1	0.50	High positive relationship
	N	349	349	
Communication	Pearson correlation	0.50	1	
	N	349	349	

Guide: 0.00-0.25 = very low, 0.26-0.45= low, 0.46-0.65 = moderate, 0.66-0.85 = high and 0.85 above is very high relationship

Table 4 showed the Pearson correlation between communication and firefighting operations among fire service workers. The result showed a correlation coefficient, $r = 0.50$ indicating a moderate positive relationship between communication and firefighting operations. Thus, the relationship between communication and firefighting operations among fire service workers in Rivers State was moderate.

Table 5: Pearson Correlation showing Significant relationship between availability of equipment and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of equipment	of Remark
Firefighting	Pearson correlation Sig.	1	0.66	H ₀ rejected
	N	349	0.00* 349	
Availability of equipment	Pearson correlation Sig.	0.66	1	
	N	0.00* 349	349	

*Significant; $p < 0.05$

Original Article

Table 5 showed the Pearson correlation between availability of equipment and firefighting operations among fire service workers. The findings of the study showed that there was a significant relationship between availability of equipment and firefighting operations ($n = 349$; $r = 0.66$; $p < 0.05$). Thus, the null hypothesis which stated that there is no significant relationship between availability of equipment and firefighting operations among fire service workers in Rivers State was rejected.

Table 6: Pearson Correlation showing Significant relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of firefighting substances	of Decision
Firefighting	Pearson correlation Sig.	1	0.63	H_0 rejected
	N	349	0.00* 349	
Availability of firefighting substances	Pearson correlation Sig.	0.63	1	349
	N	0.00* 349	349	

*Significant; $p < 0.05$

Table 6 showed the Pearson correlation between availability of firefighting substances and firefighting operations among fire service workers. The findings of the study showed that there was a significant relationship between availability of firefighting substances and firefighting operations ($n = 349$; $r = 0.63$; $p < 0.05$). Thus, the null hypothesis which stated that there is no significant relationship between availability of firefighting substances and firefighting operations among fire service workers in Rivers State was rejected.

Table 7: Pearson Correlation showing Significant relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Availability of adequate water	of Decision
Firefighting	Pearson correlation Sig.	1	0.75	H_0 rejected
	N	.	0.00* 349	
Availability of adequate water	Pearson correlation Sig.	0.75	1	349
	N	0.00* 349	.	

*Significant; $p < 0.05$

Table 7 showed the Pearson correlation between availability of adequate water and firefighting operations among fire service workers. The findings of the study showed that there was a significant relationship between availability of adequate water and firefighting operations ($n = 349$; $r = 0.75$; $p < 0.05$). Thus, the null hypothesis

Original Article

which stated that there is no significant relationship between availability of adequate water and firefighting operations among fire service workers in Rivers State was rejected.

Table 8: Pearson Correlation showing significant relationship between communication and firefighting operations among fire service workers in Rivers State

Variables		Firefighting	Communication	Decision
Firefighting	Pearson correlation Sig.	1	0.50	H ₀ rejected
		.	0.00*	
	N	349	349	
Communication		0.50	1	
	Pearson correlation Sig.	0.00*	.	
	N	349	349	

*Significant; p<0.05

Table 8 showed the Pearson correlation between communication and firefighting operations among fire service workers. The findings of the study showed that there was a significant relationship between communication and firefighting operations (n = 349; r = 0.50; p<0.05). Thus, the null hypothesis which stated that there is no significant relationship between communication and firefighting operations among fire service workers in Rivers State was rejected.

Discussion of findings

The findings of the study showed that there was a significant relationship between availability of equipment and firefighting operations (n = 349; r = 0.66; p<0.05). The result of this study is expected because personal protective equipment utilization is last stage of hazards control and prevention as it safeguards the worker to reduce the risk in firefighting operations. Consequently, if this equipment is not available, firefighters may decline any operation when the need arise. The result of this study is in agreement with findings of Kim et al (2019) which revealed that there was a significant correlation among firefighters who remove PPE and experience of heat-related illness (p<0.05). Saccinto et al, (2011) added that firefighters with previous injuries are more likely to report to be exposed (p < .05) and to be in danger (p < .05) to occupational risks and to report less compliance with individual protective devices (p < .05). Park et al (2014) revealed that the use of personal protective equipment reduces the chances of burns and scalds and other firefighting related injuries among workers. Eastlake, et al (2015) in their view that workers with negative lifestyle are more likely to exhibit poor safety practices during firefighting operations. It is plausible because availability and use of personal protective equipment is last hope for safety of workers in firefighting operations. Personal protective equipment utilization helps to reduce the rate of exposure to occupational risks and prevent accidents. As at the time of this study, there was prior studies that contradict with findings of this study. Hence, availability of personal protective equipment constitutes a correlate of firefighting operations.

The findings of the study showed that there was a significant relationship between availability of firefighting substances and firefighting operations (n = 349; r = 0.63; p<0.05). The result of this study is expected because such substances are needed for a successful operation hence, if they are not made available, the consequence is that firefighting operations may not be carried out successfully. The result of this study is in line with studies of

Original Article

Kim, et al (2019) which revealed that firefighters who work for needs firefighting substance. Firoozeh, et al, (2017) illustrated that firefighter's work ability depends on the working category in the operation which determine the rate of exposure to occupation risk and other health problems. Nazari, et al (2018) added that the exposure of workers to heat related illness was based on different categories in firefighting service. Kahn et al (2015) added that casual workers in firefighting operation tend to show poor safety practice and non-compliance with safety measure resulting into firefighting-related illness. Bos et al, (2004) revealed that work status of firefighters was based on the physical demand and energetically demand activities constituting the prevalence of injuries such as knee, ankle, skin burn among others. It is plausible because workers at lower category or status are more likely to exhibit poor safety behaviours during firefighting operations while the higher cadre workers might take firefighting service more seriously. As at the time of this study there was no prior studies that was found contrary with outcome of this current study. Hence, work status constitutes a correlate of effective firefighting operations. The findings of the study showed that there was a significant relationship between availability of adequate water and firefighting operations ($n = 349$; $r = 0.75$; $p < 0.05$). The result of this study is required because firefighting operation is a major technical and professional service that combat emergency condition such as fire outbreaks. The consequence is that, inadequate availability of the work leads to irresponsiveness of the fire fighters. The result of this study is in credence with studies of Tadesse et al (2016) which revealed that workers in firefighting operations exhibit good utilization of safety devices to reduce the chances of accidents and fire related injuries. Kumar et al. (2016) indicated that there was high level of utilization of firefighting safety devices during operation to minimize exposure to hazards/risks. Kahn et al, (2017) affirmed that good proportion of firefighters are more likely to comply with safety related standard operating system to improve and promote the health and safety status of workers. Kahn et al, (2015) indicated that most of the workers in firefighting service who utilize safety measures are more likely to suffer for heat related illness. Kim et al (2019) indicated that good proportion of firefighters (74.8%) who experience symptoms of heat related illness does not utilize personal protective devices which exposes them to danger during response to emergency. Park et al (2014) buttressed that good proportion of workers utilizes firefighting protective devices during operations such as water proofness, leather gloves, thermal comfort, helmet, coat pocket and self-breathing apparatus among others. It is plausible because firefighting operation is carried out during emergency to safe live and reduce damage to property. There were no prior studies that are in contrary with outcome of this present findings.

The findings of the study showed that there was a significant relationship between communication and firefighting operations ($n = 349$; $r = 0.50$; $p < 0.05$). The result of this study is expected because communication enable effective spread of information among workers from the superior to the least level of staff in firefighting service. The consequence is that, when there is poor response, operations will not be effective. The result of this study is in credence with findings of Phelps, et al (2018) which illustrated that communication in firefighting operation determine the level of commitment, preparation and cooperation during operations. Souri et al, (2019) affirmed that communication was significantly correlated with the safety performance of firefighting among workers. Yankson et al, (2021) in their study, it buttressed communication among workers such as junior and senior staff provide effective cooperation and safety firefighting operations. It is pertinent to note that communication provide a synergy between workers in the firefighting services to enhance efficient operations because it reduces the chances of accidents in the workplace. Communication in firefighting service a one of the powerful tools that

Original Article

encourage workers to work with understanding and consciousness of safety practices. Gadget used for communication need to be made available for workers to enable interpersonal communication and feedback during firefighting operation.

Conclusion

The study concluded that the firefighting operations among fire service workers in Rivers State was determined by certain factors such as: availability of equipment, availability of firefighting substances, availability of adequate water, and communication. There is need to optimize the resources expected to carry out firefighting services in order to promote health and safety welfare of workers and foster effective service delivery.

Recommendations

Based on this outcome of this study, the following recommendations were made:

1. Management of firefighting service in the ministry of special duties should ensure a high extent of availability of all necessary resources for effective firefighting operations.
2. The government should employ more fire fighters who will work morning and night shift for effective service delivery as, some fire incidents could occur during the night hours.
3. Ministry of special duty through firefighting department to organize regular training of staff and firefighters on different methods of firefighting operations ensure requisite understanding and familiarity with the modern standard of safety practices.
4. Safety agencies should also carry out public awareness on how to communicate fire outbreak on time and appropriately, this is necessary because communication influenced firefighting operations to a high extent.

REFERENCES

- Akintayo, W. L. (2013). Knowledge, attitude and practice on the use of personal protective equipment by traditional resist fabrics workers in Abeokuta, Nigeria. Kuwait Chapter of Arabian. *Journal of Business and Management Review*, 7(2), 27-41.
- Bos, J., Mol, E., Visser, B., & Frings-Dresen, M. (2004). Risk of health complaints and disabilities among Dutch firefighters. *International Archives of Occupational and Environmental Health*, 77(6), 373-382.
- Dutton, J. E., Ashford, S. J., Lawrence, K. A., & Miner-robino, K. (2002). Red light, green light making sense of the organizational context for issue selling, *Organizational Science* 13, 335-369
- Eastlake, A. C., Knipper, B. S., He, X., Alexander, B. M., & Davis, K. G. (2015). Lifestyle and safety practices of firefighters and their relation to cardiovascular risk factors. *Work (Reading, Mass.)*, 50(2), 285-294.
- Fent, W. K., Alexander, B., Roberts, J., Robertson, S., Toennis, C., Sammons, D., Benke, S., Kerber, S., Smith D., & Horn, G., (2017). Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures. *Journal of Occupational and Environmental Hygiene*, 14(10), 801 -814.

Original Article

- Firoozeh, M., Saremi, M., & Maleki. A., (2017). Demographic and occupational correlates of the work ability of firemen. *Journal of Occupational Health*, 59(2).
- Kahn, S. A., Palmieri. T. L., Sen, S., Woods, J., & Gunter, O. L. (2017). Factors implicated in safety-related firefighter fatalities, official publication of the American Burn Association, *Journal of Burn Care & Research*, 38(1), e83-e88.
- Kahn, S. A., Woods, J., & Rae, L. (2015). Line of duty firefighter fatalities: an evolving trend over time. *Journal of Burn Care & Research*, 36(1), 218-224.
- Kim, S., Kim, D. H., Lee, H. H., & Lee, J. Y. (2019). Frequency of firefighters' heat-related illness and its association with removing personal protective equipment and working hours. *Industrial Health*, 57(3), 370-380.
- Kuffour, R. A., (2020). Occupational health and safety challenges facing sanitary workers in Sekyere Central District in Ghana. *Journal of Environmental and Occupational Science*, 10(2), 17-26.
- Kumar SG, Dharanipriya A., & Kar, S. S, (2013). Awareness of occupational injuries and utilization of safety measures among welders in coastal South India. *International Journal of Occupational Environmental Medicine*, 4(4), 172-177.
- Nazari, G., MacDermid, J. C., Sinden, K. E., & Overend, T. J. (2018). The Relationship between Physical Fitness and Simulated Firefighting Task Performance. *Rehabilitation Research and Practice*, 32, 34176.
- Park, H., Park, J., & Lin, S. H. (2014). Assessment of firefighters' needs for personal protective equipment. *Fashion and Textiles*, 1, 8-13.
- Phelps, S., Drew-Nord, D., Neitzel, A., Wallhagen, M., Michael, B., & Oisaeng, H., (2018). Characteristics and predictors of occupational injury among career firefighters. *Workplace Health Safety*, 66(6), 291-301.
- Saccinto, E., Pietrantoni, L., Toderi, S., & Prati, G. (2011). Percezione dei rischi, uso dei DPI e infortuni tra i vigili del fuoco [Risk perception, use of PPE and injuries among firefighters]. *Giornale italiano di medicina del lavoro ed ergonomia*, 33(3), B40- B46.
- Stowell, J. R. (2015). Attributes of introductory psychology and statistics teachers. *Scholarship of Teaching and Learning in Psychology*, 1(3), 229–234.
- Souri, A., Ghiyasi, S., & Heidari, M. (2019). Investigation on safety knowledge, attitude, and performance (safety-KAP) among firefighters of operating units in Tehran, *Jundishapur Journal of Health Science*, 11(3), e86749.

Original Article

Tadesse, S., Kelaye, T., & Assefa, Y., (2016). Utilization of personal protective equipment and associated factors among textile factory workers at Hawassa Town, Southern Ethiopia. *Journal of Occupational Medicine and Toxicology*, 11, 6-9.

Yankson, I. K., Nsiah-Achampong, N. K., & Okyere, P. (2021). On-site personal protective equipment signage and use by road construction workers in Ghana: a comparative study of foreign- and locally-owned companies. *BMC Public Health*, 21, 23-29.

World Health Organization (2017). *Fire induced burns and death*. World Health Organization.