



**POLAC ECONOMIC REVIEW (PER)
DEPARTMENT OF ECONOMICS
NIGERIA POLICE ACADEMY, WUDIL-KANO**



**EMERGENCY MANAGEMENT AND DISASTER RESPONSE AND THE PERFORMANCE OF
AKWA IBOM STATE FIRE SERVICE, NIGERIA**

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Abstract

The study examined emergency management and disaster response and the performance of Akwa Ibom State Fire Service, Nigeria. The objectives of the study were to investigate the effect of response time and resource availability on Performance of Akwa Ibom Fire Service, Nigeria. A survey research design was adopted for the study, with a sample of 128 respondents which was drawn from the population of 188 employees in the Akwa Ibom State Fire Service, Nigeria. The data collected were analysed using mean and standard deviation while a simple regression model was used in the testing hypothesis. The findings demonstrates that there is statistically significant effect of response time on the performance of Akwa Ibom State Fire Service, Nigeria .Also, resource availability showed statistically significant effect on the performance of Akwa Ibom State Fire Service, Nigeria .Hence, we conclude that emergency management and disaster response have statistically significant effect on the performance of a paramilitary organisation such as Akwa Ibom State Fire Service. We recommend that enhancing response time through optimal firefighting unit and staff deployment is essential to improving the Akwa Ibom State Fire Service's performance.Also, ensuring regular availability and upkeep of vital resources, such as fire vehicles, equipment, protective clothing, and water sources, is crucial to improving the performance of the organization.

Key words: Emergency Management and disaster response, Response Time, Resource Availability, Public Education and Preventative Programs, and Performance.

1. Introduction

Emergency management and disaster response are critical components of public safety, particularly in areas vulnerable to numerous threats such as fire, flood, and industrial accident. Disaster management in Nigeria is a shared duty of the federal, state, and local governments, with numerous organizations and agencies playing important roles during the response and recovery phases. The fire service is a critical component of state emergency management, responsible for preventing and managing fire outbreaks, performing rescue operations, and providing first-responder services during disaster. Akwa Ibom is known for its rapid urbanization, rising industrial sector, and growing population. These

conditions all contribute to the likelihood of disaster, particularly urban fire, accident on congested highways, and flooding during the rainy season. Given these concerns, the Akwa Ibom State Fire Service's duty has become critical in guaranteeing public safety, managing emergencies, and reducing disasters.

Nigerian emergency management has undergone several reforms since inception to enhance readiness, response effectiveness, and disaster recovery. Despite these initiatives, there are still issues with state-level fire services' capabilities. Sadiq (2012) and Ekonget *al.* (2024), asserts that although financing and organizational structure have improved since 1999, many fire stations, particularly those in Akwa Ibom

State, still face challenges related to a lack of staff, antiquated equipment, and limited resources.. These issues expose their ability to respond to disasters quickly and efficiently, raising questions about their effectiveness in emergencies. Inadequate finance is one of the major factors influencing the performance of Nigeria's fire service. Abubakar and Kathuria (2020) noted that fire organizations in Nigeria frequently operate under tight budgetary restrictions. The lack of funding impedes the acquisition of new firefighting equipment, personnel training, and the expansion of fire service infrastructure. As a result, response times to fire outbreaks and other emergencies are frequently delayed; leading to avoidable damage and loss of life (Kiranet *al.* 2020) Another difficulty for the Akwa Ibom State Fire Service is the lack of a systematic disaster management strategy. While the state has a disaster management agency, the integration between it and the fire service is frequently weak. Adefisoye and Arum (2021) contended that, some collaboration among government entities in flood management, insufficient institutional capacity hinder enhanced service delivery. Drabek and McEntire (2002) posited that coordination is frequently difficult but necessary for successful response operations.

Other crucial aspects that influence the organization's effectiveness include training and capacity building. While the state fire service provides basic firefighting training, emergency management necessitates specialized abilities beyond basic firefighting, spanning a wide range of disasters such as chemical spills, traffic accidents, and flooding (Wachira & Smith, 2013).

Furthermore, public education about fire prevention and disaster preparedness remains an important concern. Reinhardt and Chatsiou (2019) and Kim *et al.* (2020) highlighted the importance of education in disaster preparedness and risk reduction. Disaster education seeks to give individuals the knowledge and skills they need to adopt protective measures, respond effectively to catastrophes, and reduce susceptibility (Toraniet *al.*, 2019).

Technological developments could greatly improve emergency response operations, especially in the aspect of early warning systems, communication, and

disaster monitoring. Even while modern technology has the potential to improve readiness and response capabilities, the state Fire Service, like many other state agencies in Nigeria, has difficulty implementing and integrating them into its operations. Opportunities for improvement are presented by technological breakthroughs. During humanitarian emergencies, information and communication technologies (ICTs) can increase productivity (Oni, 2020). Natural catastrophe prediction, response, and recovery can be facilitated by technologies like social media, IoT, and remote sensing (Krichen *et al.*, 2023).

Political issues also have an impact on the State's public fire safety management performance. Political leadership has a big influence on resource allocation and economic development, which affects public services (Ekpoet *al.* ,2024). Effective fire safety management systems are essential, but several issues, including shifting administrative objectives and governmental leadership, can make it difficult to implement them. Different administrations may prioritize emergency management differently, which could result in varying degrees of support for the fire. Additionally, response time is equally a significant aspect of fire service efficacy, with faster responses associated with lower property losses and better safety outcomes (Halpern *et al.*, 1979; Arnsbargeret *al.*, 2019).

The performance of fire services has been continually improving due to operational efficiency and technological developments. Key Performance Indicators (KPIs) are essential for assessing performance in fire service organizations (Bakhrom, 2024). It is frequently assessed using matrices such as firefighter safety, successful training programs, response time, resource availability, public education, preventative initiatives, and incident resolution time. The study measures performance through public education and prevention initiatives, while emergency management and disaster response are evaluated based on resource availability and response time.

The essence of emergency management and disaster response are to limit the effects of emergencies and disasters, especially in the case of fire outbreaks. However, in Akwa Ibom State, the fire service's response to emergencies has been reported to

confront many obstacles, affecting its ability to save lives, protect property, and ensure prompt responses. These issues include limited equipment, insufficient training, inadequate financing, delayed responses, and a lack of cooperation among disaster management authorities.

Furthermore, the rising frequency and intensity of fire, which are often exacerbated by environmental and urbanization factors, puts further strain on the fire service's capability. As a result, there are considerable gaps in the fire service's effectiveness in managing emergencies, resulting in increased fatalities, property devastation, and a general loss of public trust in the fire service's ability to protect communities. Addressing these concerns is critical for increasing the overall effectiveness of fire service operations and fatalities resilience in Akwa Ibom State. Available literature highlights several studies conducted on emergency management and disaster response and performance of fire service organizations but to the best knowledge of the researcher, studies carried out using the dimensions of emergency management and disaster response such as response time and resource availability in one model to examine organizational performance and its implications seem rare in management literature. On the strength of these contending issues, this study was carried out to examine the effect of emergency management and disaster response on the performance of the Akwa Ibom State Fire Service.

The main objective of this study was to examine the effect of emergency management and disaster response on the performance of Akwa Ibom State Fire Service. The specific objectives were to:

- i. Investigate the effect of response time on the performance of Akwa Ibom State Fire Service.
- ii. Examine the influence of resource availability on Performance of Akwa Ibom State Fire Service. The following research questions become pertinent to the study:
 - i. How does response time affect the performance of Akwa Ibom State Fire Service?

- ii. Can resource availability affect the Performance of Akwa Ibom State Fire Service?

To achieve the objectives, it was hypothesized thus:

- i. Response time has no significant effect on the performance of Akwa Ibom State Fire Service.
- ii. There is no significant effect of resource availability on performance of Akwa Ibom State Fire Service.

2. Literature Review

2.1 Conceptual Definitions

2.1.1. Emergency management and Disaster Response

Emergency management and disaster response have undergone tremendous evolution, with a focus on resilience and collaboration. Recent study focuses on the evolution of emergency management and disaster response, emphasising the need of coordination, readiness, and resilience. Effective communication and coordination among stakeholders, such as government agencies, non-governmental organisations, and communities, is critical for disaster management success (Muhammad Ardiansyahet *al.*, 2024; Oh & Lee, 2020). The use of modern technology like artificial intelligence, drones, and geographic information systems has considerably enhanced catastrophe predicting, response, and recovery efforts (Shawe, 2023; Abid et al., 2023). Studies also highlight the move towards community-based resilience and the importance of public awareness programs in cultivating a preparedness culture (Muhammad Ardiansyahet *al.*, 2024). The shifting landscape of emergency management research displays a greater emphasis on mitigation, sustainability, and adaptability to new issues such as climate change (Oh & Lee, 2020). Moreover, the creation of intelligent emergency management systems that make use of AI methodologies and historical data improves decision-making and resource distribution in times of disaster (Shawe, 2023; Abidet *al.*, 2023).

2.1.2 Response Time

Response time is a significant aspect in fire service efficacy, with faster responses associated with lower property losses and better safety outcomes (Halpern *et al.*, 1979; Arnsbarger *et al.*, 2019). Fire service strive to shorten response times through a variety of techniques, including the use of rapid intervention vehicles (RIVs), which have been proven to cut response times by an average of 53 seconds per call (Guldviket *et al.*, 2022). Turnout times, travel times, and geographical location are all factors that influence response times, with rural locations typically seeing longer response times than metropolitan areas (Arnsbarger *et al.*, 2019; Hassler *et al.*, 2023). Estimated response times, commonly employed for planning purposes, tend to underestimate actual response times, particularly in urban municipalities and areas with formalised cooperation agreements (Hassler *et al.*, 2023). Continuous review and enhancement of response time estimation methodologies is essential for efficient resource allocation and emergency service planning (Arnsbarger *et al.*, 2019; Hassler *et al.*, 2023).

2.1.3. Resource Availability

The availability of resources is essential to fire service organisations' operational efficacy and efficiency. Sufficient funds, manpower, and equipment have a direct impact on response times and the calibre of services rendered during emergencies. Delays in response times and decreased safety for firefighters and the communities they serve can result from a lack of resources. To improve firefighter involvement and safety, researchers recommend investing in safety-specific job resources, improved triage procedures, and focused resource utilisation (Cannuscio *et al.*, 2015; Smith & Dyal, 2016; Averill *et al.*, 2008). Investments in infrastructure, technology, and training are also necessary to guarantee that fire services can adjust to changing difficulties, including wildfires brought on by climate change (Oecd Environment Directorate, 2024; Neary *et al.*, 2019). Therefore, strategic planning and strong resource allocation are necessary for the efficient handling of fire-related situations. Mohanty & Mithal (2022), argued that managing fires in changing

climates requires more funding and an integrated strategy.

2.1.3 Performance

Performance of fire service organizations is increasingly improving as technology, training, and management tactics have advanced. Recent studies show that technical breakthroughs and management tactics lead to significant gains in fire service performance. Modernisation strategies, such as Integrated Personal Development Systems and Integrated Risk Management Plans, have resulted in improved performance in organization (Andrews 2010). AI-integrated fire alarm and detection systems have transformed fire safety, providing improved accuracy, early detection, and predictive analytics capabilities (Mohammad, 2023). However, obstacles persist, as illustrated by the impact of several disasters on routine emergency response performance. French *et al.*, (2020), stress need for building dynamic resource capabilities, data-driven inquiry, focused responder training, and community participation to maintain effective routine incident operational performance during disaster.

2.1.4. Public Education and Preventative Programs

Public education and preventive initiative are critical for improving fire service effectiveness and ensuring community safety. Taylor *et al.* (2019) argue that successful fire prevention techniques considerably reduce fire incidences, emphasising the significance of focusing on vulnerable populations like the elderly. Clare *et al.* (2012) show that firefighter-led door-to-door education campaigns in high-risk neighbourhoods reduced the frequency and severity of home fires while improving smoke detector activation during occurrences. Frattaroliet *et al.* (2011) urged for comprehensive fire and life safety education efforts, emphasising the fire service's role in public health and the importance of a coordinated prevention strategy. Furthermore, Reinhardt and Chatsiou (2019) found that community education programs resulted in a significant decrease in accidental dwelling fires, encouraging resilience

2.2. Theoretical Framework

The disaster lifecycle theory, often referred to as the disaster management cycle, offers a methodical framework for understanding the order in which a crisis occurs. Preparation, response, recovery, and mitigation are the four interrelated stages of the disaster management cycle (Klein & Irizarry, 2020). This paradigm directs emergency managers' planning efforts and aids researchers in organising findings (Neal, 1997). The strategy emphasises how critical it is to manage risks prior to a disaster and guarantee efficient response and recovery procedures following one. For more than 30 years, the effects of disasters have been explained and managed using this cycle (Coetzee & Niekerk, 2012). According to Upadhyayet *al.* (2020), the post-disaster phase entails response and recovery, whereas the pre-disaster phase concentrates on mitigation and preparedness. Both lean and agile principles are beneficial in each phase, although agility is more important in the response phase (Upadhyayet *al.*, 2020). The cycle highlights how these phases are interdependent and how crucial it is to determine the best places to decouple lean and agile approaches (Upadhyayet *al.*, 2020). Applying the disaster life cycle theory to emergency management provides important insights into planning and disaster management at all stages, from preparation and prevention to recovery and enhancing emergency preparedness.

2.3. Empirical Review

Ardiansyah, *et al.* (2024) investigated the impact of Disaster Management and Emergency Response: Improving Coordination and Preparedness. The study aimed to analyse current disaster management and emergency response methods with the goal of improving coordination and readiness. The study evaluated existing tactics and identifies areas for improvement using qualitative analysis. Findings indicated a significance effective of coordination among disaster management stakeholders, including government agencies, non-governmental organisations, and community groups. The study also emphasized the importance of preparedness measures in reducing the impact of disasters and supporting quick response operations

Otun (2023) conducted a study on the analysis of fire station location and road condition on service response time in Ogun West Senatorial District, Ogun State, Nigeria. The study's objective was to investigate the ideal location and the impact of road conditions on fire service response time in Nigeria's Ogun West Senatorial District. The data for the L-A models are based on the coordinates of the 509 communities and four fire stations, as well as the road network in the study area. The study found out that optimizing fire station sites and maintaining adequate road conditions can cut response time by 61.62% from 18.97 minutes to 11.69 minutes.

Oruonyeet *al.* (2021) examined the challenges of emergency management and response in Nigeria: a case study of FCT Emergency Management Agency (FEMA), FCT Nigeria. The study evaluated the type and pattern of emergencies and disaster that frequently occur in the Federal Capital Territory (FCT), assessed how well FEMA responds to emergencies in the FCT, and identifies the difficulties faced by the FCT's Federal Environmental Management Agency. Data was gathered using both primary and secondary sources. Data analysis was done using descriptive statistics. The findings showed that, among other things that flooding and traffic accidents are the most common in the region.

Olasunkanmi (2019) conducted a spatial analysis of disaster statistics in selected Nigerian cities. The study examined disasters in Lagos, Port Harcourt, and Kaduna, Nigeria. Data was obtained using questionnaire and in-depth interview with disaster stakeholders, including local communities' leaders, NEMA workers, and victims, in disaster-prone areas chosen. Finding revealed that fire, flood, building collapses, and windstorms posed significant hazards to life and property in Lagos, Port Harcourt, and Kaduna, Nigeria.

3. Methodology

3.1 Research Design

This study used a survey research design. The population of the study consisted of 188 employees from Akwa Ibom Fire Service, drawn from the nominal rolls of the organization's 35 fire stations. Also, the unit of analysis included all of the

organization's employees. The sample size of the study was 128 and was determined using Taro Yamane formula for sample size determination. This study used simple random sampling techniques. The proportionate sampling method was used to determine the number of questionnaire administered per fire station.

3.2 Data and Sources

The data were collected from 35 fire stations in Akwa Ibom State using questionnaire which was designed to align with the independent and dependent variables. It was also graded on a modified 4-point scale, ranging from strongly agree (SA)-4, agree (A)-3, Disagree (D)-2, and Strongly Disagree (SA)-1.

3.3 Model Specification

The following models were formulated to test the null hypotheses formulated for the study. The models stated that response time and resource availability are the function of Performance measured by education and preventive initiatives in Akwa Ibom Fire Service and stated as:

Hypothesis 1 and 2

$$P = f(RT) \quad (1)$$

$$P = f(RA) \quad (2)$$

$$P = X_0 + X_1RT_1 + e \quad (3)$$

$$P = X_0 + X_1RA_1 + e \quad (4)$$

Where:

P= Performance

X_0 = Intercept or constant

RT = Response Time

RA = Resource Availability

X_1 = Coefficient of the independent variable

e = Error term

3.4 Method of Data Analysis

The data collected were analyzed using both descriptive statistics and regression analyses. The descriptive statistics adopted was mean and standard deviation while simple linear regression was used to test the null hypotheses formulated for the study.

4. Results and Discussion

4.1 Descriptive Statistics of Questionnaire

The data collected indicated that out of 128 copies of questionnaire administered, 121 were correctly filled and returned in usage form which forms the basis for this analysis.

Table 1: Descriptive Statistics of Questionnaire

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Response Time	121	1.00	4.00	1.9008	1.01164
Resource Availability	121	1.00	4.00	1.9008	1.08324
Performance	121	1.00	4.00	1.9091	1.23153

Source: Researcher's Computation (2024)

Table 1 indicates the mean score of greater than 1, and minimum score of 1 and the maximum score of 4 respectively. This implies that the questionnaire was distributed and disperses clearly with skewness. The maximum score of 4 and standard deviation of

1.01164 further revealed that more average indicated that response time and resource availability were clearly measured.

4.2 Data Analysis

Table 2: The Simple Regression Analysis on the Effect of Response Time on Performance of Fire Service in Akwa Ibom State

Model Summary ^b						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
1	.728 ^a	.531	.527	.84723	2.183	
Model Fit						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	96.582	1	96.582	134.552	.000 ^b
	Residual	85.418	119	.718		
	Total	182.000	120			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.223	.164		1.358	.177
	Response Time	.887	.076	.728	11.600	.000

Table 2 shows the simple linear regression analysis on the effect of response time on performance of Akwa Ibom State Fire Service. The results reveal R^2 -value of .553, Beta coefficients of .887, T-value of 11.600, F-value of 134.552, Durbin Watson coefficients of 2.183, P-value of .000. This implies that 55.3 % change has been accounted for by response time in Akwa Ibom State Fire service. The result is supported by beta coefficients of .888 which reveals that to every 1 unit increase of response time, there is 88.8% increase in performance of Akwa Ibom State fire service. Also, the T-value of 11.600 reveals the differences in the means which implies that the response time influence performance positively in state fire service. However, to evaluate the presence of autocorrelation, the Durbin Watson Statistic was

computed and result yield the coefficients of 2.183 which implies that there is absent of serial correlation in the model , meaning that the residuals are no conflicting and the independent variable acted independently to affect the performance of Fire service. Furthermore, the result shows F-value of 134.552, meaning that the model is fit to evaluate the interaction between response time and performance of Akwa Ibom State fire Service. Therefore, since the P-value of .000 lies below the alpha value of 0.05 confident levels in social sciences, it can be affirmed that the null hypothesis which states that response time has no significant effect on performance of Akwa Ibom State fire service is rejected and the alternative accepted, meaning that response time significantly and positively affect performance of Akwa Ibom State Fire service.

Table 3: The Simple linear Regression Analysis on the effect of resource availability on performance of Akwa Ibom State Fire service.

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
1	.512 ^a	.262	.256	1.06255	1.967	
Model Fit						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	47.646	1	47.646	42.202	.000 ^b
	Residual	134.354	119	1.129		
	Total	182.000	120			

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	.803	.196		4.105
	ResourceAvailability	.582	.090	.512	6.496

Source: Researcher's Computation (2024)

Table 3 shows the simple linear regression analysis on the effect of resource availability on performance of Akwa Ibom State Fire Service. The results reveal R^2 – value of .262, Beta Coefficients of .582, T-value of 6.496 F-value of 42.202, Durbin Watson coefficients of 1.962, P-value of .000. This implies that 26.2% % change has been accounted for by resource availability in Akwa Ibom State Fire service. The result is supported by beta coefficients of .582 which reveals that to every 1 unit increase of resource availability, there is 58.2% increase in performance of Akwa Ibom State fire service. Also, the T-value of 6.496 reveals the differences in the means which implies that the resource availability affect performance positively in state fire service. However, to evaluate the presence of autocorrelation, the Durbin Watson Statistic was computed and result yields the coefficients of 1.962 which implies that there is absent of serial correlation in the model, meaning that the residuals are no conflicting and the independent variable acted independently to affect the performance of Fire service. Furthermore, the result shows F-value of 42.202, meaning that the model is fit to evaluate the interaction between resource availability and performance of Akwa Ibom State fire Service. Therefore, since the P-value of .000 lies below the alpha value of 0.05% confident levels in social sciences, it can be concluded that the null hypothesis which states that resource availability has no significant effect on performance of fire service is rejected and the alternative accepted, meaning that resource availability significantly and positively affect performance of Akwa Ibom State Fire service.

4.4 Discussion of Finding

The finding of hypothesis one indicated that response time has significant effect on performance of Akwa Ibom State fire service. This shows that the interaction between response time and performance was positively correlated. This finding was in line with

the work of Halpern et al., (1979) and Arnsbarger et al (2019) who maintained that response time is a significant aspect in fire service efficacy, with faster responses associated with lower property losses and better safety outcomes. Also, the finding of hypothesis two revealed that resource availability has significant effect on performance of Fire Akwa Ibom State Fire Service. This showed that the result has predictive power to explain the link between resource availability and performance of Akwa Ibom State fire service. The finding is in agreement the work of Cannuscio et al., 2015; Smith & Dyal, 2016; Averill et al., 2008) who postulated that the availability of resources is essential to fire service organisations' operational efficacy and efficiency. They suggested that sufficient funds, manpower, and equipment have a direct impact on response times and the nature of services rendered during emergencies.

5. Conclusion and Recommendations

The interaction between response time and resource availability showed a significant and positive effect on performance of Akwa Ibom State Fire Service. It can therefore be concluded that the dimensions of emergency management and disaster response significantly associated with the performance of Akwa Ibom State Fire service. Thus, it was recommended that:

- enhancing response time through optimal firefighting unit and staff deployment is essential to improving the Akwa Ibom State Fire Service's performance. The state government ought to spend money on a dispatch and communication system that is more effective and includes automated response algorithms and real-time GPS tracking of fire trucks. It would also cut down on travel time during emergencies if fire stations were placed strategically in high-density regions that are susceptible to fire hazards.

ii. ensuring regular availability and upkeep of vital resources, such as fire vehicles, equipment, protective clothing, and water sources, is crucial to improving the Akwa Ibom State Fire Service's performance. Establishing dependable water supply systems at strategic areas and allocating consistent funds for the purchase of cutting-edge firefighting apparatus,

including fire hoses, rescue tools, and fire trucks, should be top priorities for the state government. The effectiveness of the fire service in reacting to and preventing fire accidents will also be increased by putting in place a preventive maintenance schedule for all firefighting apparatus and infrastructure.

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