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Assessment of Emergency Preparedness and Response of Healthcare Workers in a Teaching Hospital in Uyo, Nigeria

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Abstract

The aim of the study is to assess the emergency preparedness and response of healthcare workers at the Teaching Hospital in Uyo, Southern Nigeria. Emergency preparedness was depicted by emergency training, planning, logistics, triage system, and surge capacity. These are the independent variables. Emergency response was assessed through promptness and responsiveness. These represent dependent variables. The study employed a cross-sectional and inferential research design. Purposive sampling was used to select the teaching hospital in the State, the University of Uyo Teaching Hospital, Akwa-Ibom. Data collection involved questionnaires and a checklist. Data analyses included descriptive statistics, Pearson's correlation, Multiple linear regression, and Principal Component Analysis (PCA). Descriptive results showed a moderate level of emergency preparedness across the sampled hospital, using five controlled variables, with weighted mean scores of 3.86, 3.96, 3.13, 3.13, and 3.43, respectively. Conversely, emergency response was moderate among healthcare workers in terms of promptness and responsiveness, with weighted mean scores of 3.74 and 3.76, respectively. Multiple linear Regression modeling yielded Goodness of fit R^2 Values, for promptness was 0.977 and 0.975 for responsiveness. Analysis of variance (ANOVA) between planning and promptness, as well as triage and promptness, yielded positive significance ($p < 0.0001$ and $p = 0.000$, respectively). However, ANOVA for each of these controlled variables, training ($p = 0.394$), logistics ($p = 0.198$), and surge capacity ($p = 0.664$) with respect to promptness, yielded no significant results. Also, ANOVA between planning and responsiveness, as well as logistics and responsiveness, yielded positive and significant results: planning ($p < 0.0001$), logistics ($p = 0.000$). However, ANOVA for each of these controlled variables, training ($p = 0.692$), triage system ($p = 0.065$), and surge capacity ($p = 0.532$) with respect to respon-

siveness yielded no significant results. For the demographic analyses, the PCA showed that healthcare workers with 11 - 15 years' work experience showed a strong association with all the controlled constructs except for planning, which had a good association with healthcare workers who had more than fifteen years' work experience. Gender had minimal influence on perception. In conclusion, the hospital demonstrated a good level of emergency preparedness and response, although training and surge capacity did not yield any significant results on promptness and responsiveness. It was recommended that hospital management focus on enhancing surge capacity and training.

Keywords

Emergency Preparedness, Emergency Training, Planning, Logistics, Triage and Surge Capacity, Emergency Response, Promptness, Responsiveness, Teaching Hospital, Uyo

1. Introduction

Emergency response in healthcare settings often requires decisions before complete information is available. In emergency departments, inpatient bottlenecks, ambulance arrivals, staffing gaps, and delays in diagnostics or transfers can quickly compromise patient outcomes. In broader public health and disaster response, timely information is equally critical: real-time data systems are already applied in healthcare to patient monitoring, disease prediction, and hospital resource optimisation [1], while sensor- and Internet-of-Things-based emergency information systems have been proposed to provide responders with real-time situational awareness during disasters and public health emergencies [2]. Emergencies may arise from natural hazards, such as earthquakes, floods, landslides, and volcanic eruptions, or from human-caused incidents, including structural failures, terrorism, chemical poisoning, and fire [3]. Effective hospital emergency management depends on prompt decisions and immediate action during the first minutes of an incident. First responders may include police, fire services, medical teams, neighbours, security personnel, and designated emergency officials [3]. Emergency management is especially complex in urban hospitals because urbanisation increases exposure to hazards and creates new patterns of risk in both developing and developed countries [4].

Because hospitals provide continuous and complex clinical services, they must prepare for both internal and external emergencies [4]. This study focuses on external emergency preparedness and response in a teaching hospital in Uyo, Nigeria. Assessing readiness for external crises requires attention to mass casualty care, contaminated-patient management, bioterrorism response, patient and staff protection, continuity of emergency care, safety policies, response procedures, and evacuation planning.

Emergency preparedness in healthcare facilities is essential to protect patients,

staff, and communities during crises [5]. Hospitals, therefore, need comprehensive all-hazards plans supported by regular hazard vulnerability analyses to identify risks and guide preparedness activities.

Hospitals should also involve regulatory and accrediting agencies in emergency planning and address legal risks, including negligence, discrimination, and criminal culpability [6]. Although many healthcare facilities have focused more on external than internal emergencies, balanced investment in both areas is necessary for effective preparedness [4].

In Nigeria, poor emergency preparedness and response have contributed to severe losses during floods, fires, and other urban emergencies. For example, Kano State recorded 936 deaths from fire outbreaks between 2008 and 2012, reflecting inadequate preparedness and response among traders and hospital workers [7].

The consequences of inadequate hospital emergency preparedness are severe. Weak planning and poor resource allocation can lead to loss of life during emergencies and disasters [8]. Inadequate preparedness can also reduce public trust, expose patients and health workers to additional risks, and create wider social consequences [9]. On this basis, the current study assesses how emergency preparedness influences the responsiveness and promptness of healthcare workers in a teaching hospital in Uyo.

The objectives are to:

i) Determine the level of emergency preparedness (training, planning, logistics, surge capacity, and triage) of the sampled hospital.

ii) Evaluate the level of emergency response (promptness and responsiveness) of the healthcare workers in the sampled hospital.

iii) Carry out multiple regression analysis to assess the goodness of fit as a measure of the degree of relationship between control variables and the dependent variables (promptness and responsiveness) in the sampled hospital.

2. Methodology

2.1. Research Design

The research design adopted in this study was a combination of a cross-sectional descriptive design and inferential statistics. The cross-sectional design was adopted to determine the level of external emergency preparedness of the hospital and the level of response of the healthcare workers in the hospital to emergencies. Inferential statistics were equally adopted to carry out comparative analysis on control variables with respect to the dependent variables using Analysis of Variance (ANOVA). Similarly, it was also used to carry out regression analysis.

2.2. Study Area

The study area is Akwa Ibom State in the Niger Delta, southern region of Nigeria. Akwa Ibom State is one of the 36 states in Nigeria, located in the South-South geopolitical zone. The state was created in 1987 by the Federal Military Government

of Nigeria. The state was carved out of the former Cross River State. It is located in the coastal southern part of Nigeria, bordered by Cross River State to the east, Rivers State and Abia State to the west, and the Atlantic Ocean to the south. It has 31 local government areas, with Uyo as the state capital. According to the National Population Commission [10], the state had a population of 3,902,051 (approximately 3.9 million) at the 2006 Population and Housing Census. More recent estimates suggest that the population may exceed 7 million due to continued growth and urbanisation. The major ethnic groups in the state include the Ibibio, Annang, Oro, Eket, and Obolo, with the Ibibio being the largest group. The total area is 7081 square kilometres (2734 sq miles). The economy of Akwa Ibom State is dominated by the state's booming petroleum industry and agricultural farming (Figure 1).

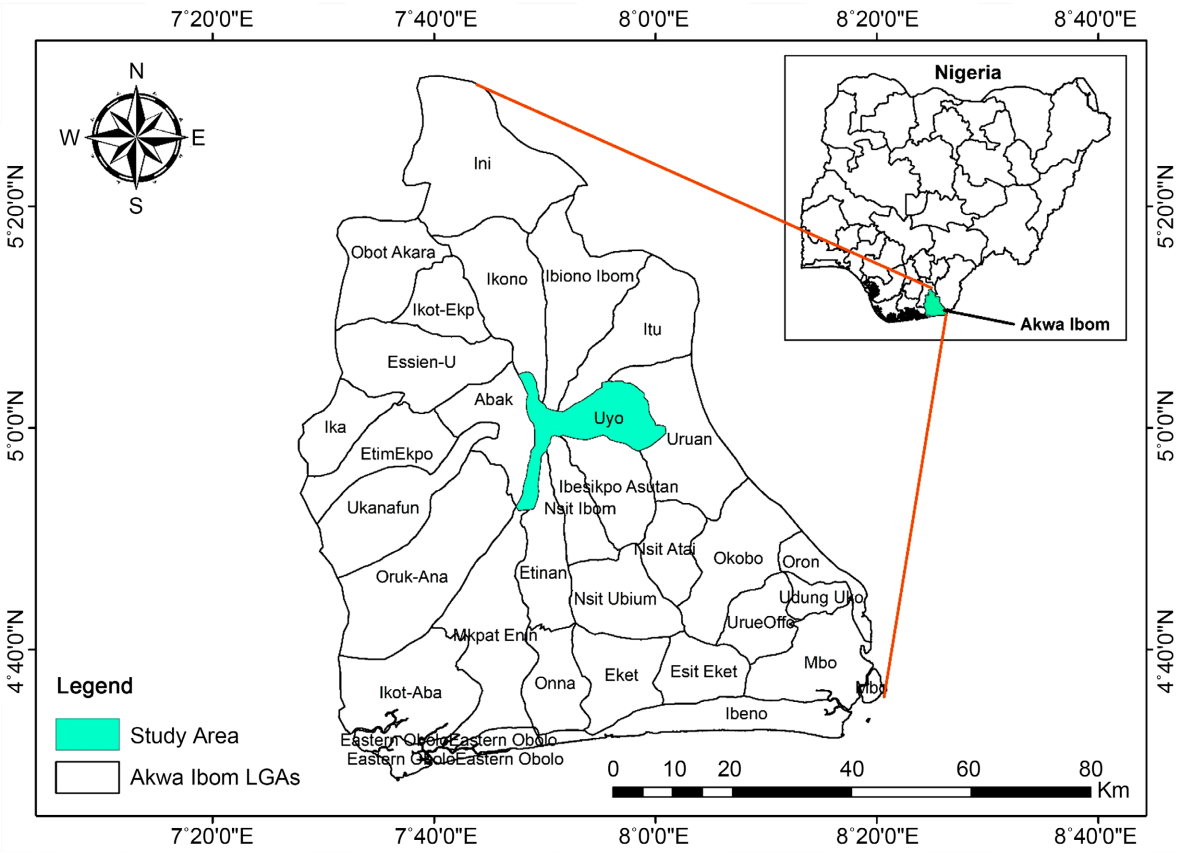

Figure 1. Map of Akwa Ibom State showing the 31 local government areas.

2.3. Population of the Study

The population of this study was grouped into two groups. The first group comprises healthcare workers in the sampled hospital. These provided research data on the emergency preparedness of the sampled hospital. The second group comprised patients who were victims of emergencies at the sampled hospital. These provided research data on the emergency response of the healthcare workers in the sampled hospital.

2.4. Sampling Technique

The purposive sampling technique was used to select the Uyo Teaching Hospital among the many other hospitals in the state because it has the highest likelihood of being involved in receiving emergency victims within the sampled state. The number of beds, the number of workers, and other factors can be compared with the WHO checklist [11].

2.5. Sample Size Determination

Eligibility Criteria: Only healthcare workers who were available and working at the Accident and Emergency unit of the sampled hospital, and the patients/victims of emergencies or their relatives who were present and witnessed the incidents, met the criteria.

2.5.1. Healthcare Workers

The first group comprises healthcare workers in the hospital. The sample size was determined using the Taro Yamane formula [12] for a finite population. This formula is appropriate for populations below 10,000. From the hospitals' official records. N = Population size = 1988; n = Sample size; e = Precision factor.

From the literature, the precision value, e, was obtained as 0.0969; The sample size was thus obtained as 101. An attrition rate of 15.84% was added. Thus, the total number of questionnaires distributed was 117. The total number of correctly completed questionnaires was 109.

2.5.2. Emergency Patients

This is the second group, and it comprises emergency patients. The exact population of this group is unknown and varies daily. Consequently, the Cochran formula [13] for infinite populations was employed to estimate the sample size. In this formulation, Z is the standard normal deviation at the 95% confidence level (1.96), P is the prevalence factor representing the proportion of patients who were emergency victims, and T is the tolerance (margin of error) set at 5% (T = 0.05).

From the literature, the prevalence factor, P, was obtained as 0.9500. The sample size was 73, and the attrition rate was set at 15.07%. A total of 84 questionnaires were distributed, and 75 valid questionnaires were returned.

2.6. Nature or Type of Data

The study was based on primary and secondary data. Primary data were obtained using a well-structured questionnaire, basically to ascertain the response of the healthcare workers on their emergency preparedness, and also to ascertain the response of the emergency victims to the response of the healthcare workers during the emergencies. Secondary data comprised websites and articles from which other relevant information and data were obtained.

2.7. Method and Instrument of Data Collection

Data were collected using the survey method. Printed copies of the questionnaire

were administered to respondents on a one-on-one basis, with a time frame of a few minutes to fill out and return the completed questionnaire to the researcher or the research assistant. The questionnaire comprised closed-ended questions rated on a 5-point Likert scale, as well as questions on the socio-demographic profiles of the respondents. The data collection process lasted a period of three months.

The questionnaire was explained to the respondents before it was administered to them to elicit their honest responses. The questionnaire consisted of three parts: A, B, and C. Part A was given to the healthcare workers, Part B to the patients/victims, and Part C was the emergency checklist. The checklist was used to physically examine and ascertain the availability of important emergency preparedness systems required for proper emergency preparedness in hospitals, based on the WHO checklist [11].

2.8. Validity and Reliability of Study Instrument

The outcomes of the correctly completed questionnaires for the Healthcare workers (109) and the patients (75) were subjected to a validity test using Cronbach's alpha reliability test. A Cronbach's alpha coefficient of 0.70 was considered adequate for the research. Planning (0.706), Training (0.743), Logistics (0.643), Triage (0.489), Surge (0.410), Promptness (0.762), and Responsiveness (0.679). Five out of the 7 constructs scored a threshold value of 0.7 to the nearest one decimal place. This result is adequate for the validity test.

2.9. Method of Data Analysis

The study employed standard methods and statistical tools to analyse the data that were collected. The descriptive statistical methods (means, percentages, standard deviation), PCA (Principal Component Analysis), and Regression analysis were the methods that were used in the Data analysis. Descriptive statistics were used to cover objectives 1 and 2, while regression was used to cover objective 3, which involved the assessment of emergency preparedness on emergency response of the healthcare workers in the sampled hospital. PCA was used to evaluate the demographic variables affecting perception.

The general form of the multiple-linear regression model adopted for both Independent and dependent variables is given in Equation (1).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad (1)$$

where: Y = emergency response measure (dependent variable); X_1 = emergency training; X_2 = emergency planning; X_3 = emergency logistics availability; X_4 = emergency triage system; X_5 = emergency surge capacity; β_0 = intercept; β_1 - β_5 = regression slopes; and ε = error term. Y_1 denotes promptness, and Y_2 denotes responsiveness. The transformation of Equation (1) into a normal-equation equivalent yields a 6 × 6 matrix equation. In the metrics equation, every summation sign has a lower limit of (i = 1) and an upper limit of N = 75. The upper limit of 75 represents the number of respondents in the questionnaire. The input values of the 5 independent variables, as well as the two dependent variables, are evalu-

ated using each respondent's responses for the number of applicable questions, which are averaged. It may be recalled that 109 healthcare workers and 75 patient returns were usable. The smaller patient set determined the sample size, so 75 workers' records were used, and the extra 34 were excluded. The records were lined up in order only.

3. Results and Discussion

3.1. Perception of the Respondents on the Level of Emergency Preparedness in the Hospital

Table 1 represents the descriptive statistics of respondents' responses to the emergency preparedness constructs in the sampled hospital in Akwa Ibom State. The analysis used a 5-point Likert scale coded as: Strongly Agree = 5, Agree = 4, Disagree = 3, Strongly Disagree = 2, and Undecided = 1.

Table 1. Mean responses of healthcare workers on emergency preparedness.

Emergency Preparedness Constructs	Statistic	Value
Emergency Training	Mean	3.86
	Standard Deviation	0.90
	Skewness	−0.43
Emergency Planning	Mean	3.96
	Standard Deviation	0.93
	Skewness	−1.21
Emergency Logistic Availability	Mean	3.13
	Standard Deviation	0.61
	Skewness	−0.25
Emergency Triage System	Mean	3.13
	Standard Deviation	0.68
	Skewness	−0.45
Emergency Surge Capacity	Mean	3.43
	Standard Deviation	0.76
	Skewness	−0.27

Emergence Training: Showed a weighted mean score of 3.86, indicating that healthcare workers agreed their hospital effectively cross-trains providers in high-demand services like emergency, surgical, and intensive care units. They also agreed that the hospital provides adequate training and exercises in areas of potential increased clinical demand to ensure staff capacity and competency, and that these trainings align with current global and national standards. This result aligned with the work of [14], whose study emphasised that adequate training forms the foundation of effective emergency preparedness in healthcare facilities and is critical for maintaining competency among healthcare workers. Similarly, [15] demonstrated, at a hospital in Victoria, Australia, that an audiovisual presentation of the hospital disaster plan, followed by a simulated disaster exercise and

debriefing, significantly improved staff knowledge of emergency procedures and prompted a review and upgrade of departmental disaster plans.

Emergency Planning: The weighted mean score of 3.96 indicates strong agreement that the hospital has implemented a mass-casualty triage protocol based on the severity of illness/injury and hospital capacity, in accordance with international guidelines. Healthcare workers also strongly agreed that hospital management provides adequate security identification for vulnerable areas such as entry/exit points, food/water access points, and pharmaceutical stockpiles. Emergency drill activities are conducted by department heads and supervisors. [16] reported comparable findings across eleven Alexandria University hospitals, where assessing and then developing a hospital emergency preparedness plan using the WHO hospital emergency response checklist raised measured preparedness at the post-intervention evaluation.

Emergency Logistics Availability: The weighted mean (3.13) showed moderate agreement regarding the logistics aspects. It confirmed the existence of inventory systems and shortage alerts, adequate estimation of supply and consumption, and proper storage facilities. The scores suggest some areas could be improved, particularly in maintaining vendor agreements and ensuring the continuous provision of essential medications through stockpiles. The standard deviation was relatively low, at 0.61, indicating consistent views among healthcare workers. This concurred with [17], who argued that effective supply chain management processes are integral to healthcare disaster mitigation and planning, and that logistics resilience underpins an organisation's ability to sustain care during a crisis.

Emergency Triage System: The results showed a moderate weighted mean score of 3.13 for triage systems, indicating moderate agreement on the assignment of experienced triage officers and the appropriate positioning of triage areas in close proximity to essential personnel and medical supplies. Workers confirmed the existence of mass-casualty protocols and admission procedures during emergencies. This finding is particularly important, as [18] showed, from published data on twelve major mass-casualty bombings, a direct relationship between the rate of over-triage and the critical mortality rate among survivors, making the accuracy of triage a determinant of outcome.

Emergency Surge Capacity: The results also showed a moderate weighted mean score for surge capacity at 3.43, which suggests that the respondents or healthcare workers have a good agreement about their hospitals' adoption of suitable techniques for expanding hospital inpatient capacity, considering physical space and healthcare workers. They confirmed that their hospital maintains suitable contingency plans for inter-facility patient transfers when conventional transportation becomes unavailable and has means for identifying and addressing potential gaps in medical care provision, particularly for critical and emergent surgical care. Similarly, [19] observed that few surplus resources exist within current healthcare systems to absorb large numbers of casualties, so that surge plans must be scalable and

flexible, moving from facility-based "surge in place" measures to community-based, off-site care once facility resources are exceeded.

3.2. Perception of the Respondents on the Level of Emergency Response in the Hospital

The descriptive statistics of respondents' responses to the emergency response constructs in the sampled hospital in Akwa Ibom are presented in Table 2. The analysis used a 5-point Likert scale.

Promptness: The results showed a high weighted mean score of 3.74 for promptness. This indicates good agreement that medical personnel show a strong sense of urgency during emergencies, that hospital pharmaceutical centres and laboratories are consistently available, and that there is significant readiness of medical equipment and theatres for effective emergency response.

Responsiveness: The results showed a good level of responsiveness with a weighted mean score of 3.76. This indicates strong agreement that medical workers demonstrate urgency and professionalism during emergencies, work with clear plans and purpose, maintain receptiveness, and show awareness of requirements in different situations. These results underscore the clinical importance of promptness: in a population-based cohort of about 13.9 million emergency department visits in Ontario, Canada, [20] found that presenting during shifts with a longer mean length of stay was associated with significantly higher short-term mortality and hospital admission rates.

Table 2. Mean response of emergency response from patients.

Emergency Response Constructs	Statistic	Value
Promptness	Mean	3.74
	Standard Deviation	0.88
	Skewness	−0.85
Responsiveness	Mean	3.76
	Standard Deviation	0.95
	Skewness	−0.94

3.3. Relationship between Emergency Preparedness Constructs for the Hospital

In line with Pearson correlation, the following results were observed: a significant positive correlation was observed between the emergency triage system and emergency logistics ($r = 0.44$, $p < 0.05$), suggesting that hospitals with better logistics systems also maintained more effective triage systems. Emergency planning showed a positive correlation with surge (0.11) and weak negative correlations with both logistics (−0.01) and the triage system (−0.13), though these correlations were not statistically significant. Other relationships between preparedness constructs showed negligible correlations (see Table 3).

Table 3. Pearson correlation of emergency preparedness in UUTH.

Variables	ET	EP	EL	ETS	ESC
Emergency Training	**1.00**				
Emergency Planning	−0.10	**1.00**			
Emergency Logistic	−0.06	−0.01	**1.00**		
Emergency Triage System	0.06	−0.13	0.44	**1.00**	
Emergency Surge Capacity	0.14	0.11	0.05	0.00	**1.00**

Values in bold are different from 0 at the significance level alpha = 0.05.

3.4. Relationship between Emergency Response Constructs for the Hospital, UUTH

The Pearson correlation between emergency response measures for the hospital is shown in Table 4. Akwa Ibom (UUTH) demonstrated a weak positive but non-significant correlation between promptness and responsiveness ($r = 0.17$, $p > 0.05$). While this correlation suggests a slight tendency for higher promptness to be associated with better responsiveness, the relationship was not statistically significant.

Table 4. Pearson correlation of emergency response in UUTH.

Variables	Promptness	Responsiveness
Promptness	1.00	0.17
Responsiveness	0.17	1.00

Values in bold are different from 0 with a significance level alpha = 0.05.

3.5. Principal Component Analysis

Principal Component Analysis was used to understand the relationship between emergency preparedness constructs and demographic variables. The analyses showed that healthcare workers with 11 - 15 years of experience had a positive relationship (0.142) with logistics and triage, unlike those with 1 - 5 years, who showed a negative association (−0.058). Among work descriptions, Nurses showed a weak positive association (0.036), while Pharmacists showed a negative association (−0.113), suggesting that nurses were more likely to report better logistics and triage systems than pharmacists.

It was also found that healthcare workers showed a positive association with training (0.349), and Nurses showed a positive association (0.069) with training quality, whereas Pharmacists showed a negative association (−0.031). The Lab-Technicians also showed the strongest negative association (−0.121) with surge, while Doctors showed a weak positive association (0.073), suggesting that Laboratory technicians were more likely to report concerns about surge capacity than doctors. Further analysis showed that healthcare workers with more than 15 years of experience had a positive association (0.087) with planning, unlike those with 1 - 5 years of experience (−0.101).

Finally, it was found that gender showed relatively weak associations across all

components, with females showing slightly positive associations with logistics and training (0.031 and 0.056) while males showed corresponding negative associations (−0.031 and −0.056). This suggests that gender had minimal influence on perceptions of emergency preparedness measures.

3.6. The Assessment of Emergency Preparedness and the Response of the Healthcare Workers in the Sampled Hospital

In this study, the independent variable is emergency preparedness constructs. It is captured through emergency training, planning, Logistics availability, the triage system, and hospital surge capacity, while the dependent variable is emergency response measures, measured by promptness and responsiveness. Hence, two multiple regression models were developed: one for promptness and the other for responsiveness. Both models take the general form presented in Equation (1).

3.6.1. Multiple-Linear Regression Model for Assessing Emergency Preparedness Constructs against Promptness

The goodness of fit parameters for the model predicting promptness from emergency preparedness constructs are presented in Table 5. The model demonstrates excellent fit with an R^2 value of 0.977, indicating that emergency preparedness constructs explain 97.7% of the variability in promptness. The Durbin-Watson statistic of 1.002 suggests minimal autocorrelation in the residuals. The Analysis of Variance results presented in Table 6 confirm the statistical significance of the overall model ($p < 0.0001$). This indicates that emergency preparedness constructs collectively have high predictability of promptness.

The fitted multiple-linear regression model for promptness, obtained from the unstandardized coefficients in Table 7, is expressed in Equation (2).

$$Y_1 = -0.317 - 0.077X_1 + 0.390X_2 + 0.262X_3 + 0.603X_4 + 0.045X_5 \quad (2)$$

The unstandardized model parameters in Table 7 show that emergency planning and promptness ($p < 0.0001$) and triage system and promptness ($p < 0.001$) yielded positive significant results for promptness; While logistics and promptness ($p = 0.198$), surge capacity and promptness ($p = 0.664$), and emergency training and promptness ($p = 0.394$) yielded no significant results.

Table 5. Goodness of fit.

Observations	75.000
Sum of Weights	75.000
DF	69.000
R^2	0.977
Adjusted R^2	0.976
MSE	0.019
RMSE	0.137
DW	1.002

Table 6. Analysis of variance.

Source	DF	Sum of Squares	Mean Squares	F	Pr > F
Model	5	55.760	11.152	594.341	<0.0001
Error	69	1.295	0.019		
Corrected Total	74	57.055			

Computed against model Y = Mean(Y).

Table 7. Model parameters.

Source	Value	Standard Error	t	Pr > |t|	Lower Bound (95%)	Upper Bound (95%)
Intercept	−0.317	0.119	−2.666	0.010	−0.555	−0.080
ET	−0.077	0.090	−0.858	0.394	−0.257	0.102
EP	0.390	0.082	4.729	<0.0001	0.226	0.555
EL	0.262	0.201	1.300	0.198	−0.140	0.663
ETS	0.603	0.152	3.975	0.000	0.301	0.906
ESC	0.045	0.103	0.436	0.664	−0.160	0.250

Table 8. Standardised model parameters.

Source	Value	Standard Error	t	Pr > |t|	Lower Bound (95%)	Upper Bound (95%)
ET	−0.079	0.092	−0.858	0.394	−0.263	0.105
EP	0.410	0.087	4.729	<0.0001	0.237	0.582
EL	0.182	0.140	1.300	0.198	−0.097	0.461
ETS	0.446	0.112	3.975	0.000	0.222	0.669
ESC	0.040	0.091	0.436	0.664	−0.142	0.221

Standardised Model Parameters

The standardised coefficients in Table 8 provide insight into the relative importance of each predictor. The emergency triage system had the strongest association ($\beta = 0.446$), followed by emergency planning ($\beta = 0.410$). Emergency logistics showed a moderate but non-significant association ($\beta = 0.182$), while emergency training ($\beta = -0.079$) and surge capacity ($\beta = 0.040$) had minimal association. These results suggest that improvements in triage systems and emergency planning would have the greatest positive association with promptness.

3.6.2. Multiple-Linear Regression Model for Assessing Emergency Preparedness Factors against Responsiveness

For the responsiveness model, Table 9 shows excellent goodness of fit with an R^2 value of 0.975, indicating that emergency preparedness measures explain 97.5% of the variability in responsiveness. The Durbin-Watson statistic of 1.044 suggests minimal autocorrelation.

The ANOVA results in Table 10 confirm the model's statistical significance ($p < 0.0001$), indicating that emergency preparedness constructs collectively have high

predictability of responsiveness.

The fitted multiple-linear regression model for responsiveness, obtained from the unstandardized coefficients in Table 11, is expressed in Equation (3).

$$Y_2 = -0.665 - 0.040X_1 + 0.731X_2 + 0.934X_3 - 0.322X_4 - 0.073X_5 \quad (3)$$

The unstandardized coefficients in Table 11 show that planning and responsiveness ($p < 0.0001$) and logistics and responsiveness ($p < 0.001$) yielded a positive and significant result. Emergency training and responsiveness ($p = 0.692$), triage system and responsiveness ($p = 0.065$), and surge capacity ($p = 0.532$) yielded negative but non-significant results.

The standardised coefficients in Table 12 revealed that emergency planning had the strongest positive association ($\beta = 0.707$), followed closely by logistics ($\beta = 0.598$). The emergency triage system showed a moderate negative effect ($\beta = -0.219$), while emergency training ($\beta = -0.038$) and surge capacity ($\beta = -0.059$) had minimal association. These results suggest that improvements in emergency planning and logistics would most effectively enhance response quality. It is worth noting that the wider literature places greater weight on training: in a systematic review of seventeen studies of nurses' preparedness for disaster response, [21] reported that previous disaster-response experience and disaster-related training were the factors most consistently associated with preparedness, while nurses remained insufficiently prepared overall. The differences in the results may be due to the locational effect. As this same study, carried out in a Federal Medical Centre in a different location in Southern Nigeria by [22], showed, the planning, training, and triage system had a significant positive association with responsiveness. At the same time, logistics and surge did not yield significant results in terms of responsiveness.

Table 9. Goodness of fit.

Observations	75.000
Sum of Weights	75.000
DF	69.000
R^2	0.975
Adjusted R^2	0.974
MSE	0.024
RMSE	0.155
DW	1.044

Table 10. Analysis of variance.

Source	DF	Sum of Squares	Mean Squares	F	Pr > F
Model	5	65.654	13.131	548.562	<0.0001
Error	69	1.652	0.024		
Corrected Total	74	67.306			

Computed against model Y = Mean(Y).

Table 11. Model parameters.

Source	Value	Standard Error	T	Pr > |t|	Lower Bound (95%)	Upper Bound (95%)
Intercept	−0.665	0.134	−4.943	<0.0001	−0.933	−0.396
ET	−0.040	0.102	−0.397	0.692	−0.243	0.163
EP	0.731	0.093	7.845	<0.0001	0.545	0.917
EL	0.934	0.227	4.112	0.000	0.481	1.387
ETS	−0.322	0.171	−1.876	0.065	−0.664	0.020
ESC	−0.073	0.116	−0.628	0.532	−0.304	0.158

Table 12. Standardised model parameters.

Source	Value	Standard Error	T	Pr > |t|	Lower Bound (95%)	Upper Bound (95%)
ET	−0.038	0.096	−0.397	0.692	−0.229	0.153
EP	0.707	0.090	7.845	<0.0001	0.527	0.886
EL	0.598	0.145	4.112	0.000	0.308	0.888
ETS	−0.219	0.117	−1.876	0.065	−0.451	0.014
ESC	−0.059	0.094	−0.628	0.532	−0.248	0.129

4. Conclusions

Based on the results of this study, the following conclusions were drawn:

i) There is a substantial and moderate level of emergency preparedness in the sampled Teaching Hospital Uyo, in terms of training, planning, logistics availability, triage system, and surge capability.

ii) The hospital also revealed a moderate level of emergency response (promptness and responsiveness).

iii) Principal component analysis revealed that emergency preparedness measures were influenced by demographic factors, particularly years of experience and professional role. Experienced healthcare workers aged 11 - 15 years showed strong positive associations with all emergency preparedness constructs, except for planning, for which healthcare workers with more than 15 years of experience showed stronger associations.

iv) For the assessment of emergency preparedness on emergency response, it was concluded that training, surge capacity, and logistics availability yielded no significant results on promptness, whereas planning and triage yielded significant results on promptness. Regarding responsiveness, planning and logistics yielded positive and significant results, while training, triage, and surge showed no significant results.

5. Recommendations

Based on the findings of this study, the following recommendations are made:

i) The hospital management and government should improve the emergency preparedness of the hospital, particularly in areas of logistics availability, surge capacity, and training, in line with standard hospital emergency preparedness guidelines, to enhance their association with promptness and responsiveness.

ii) The management of the hospital should improve the surge capacity and logistics availability of the hospital by providing about 25% more beds and space, which are required during emergency response. More healthcare workers are to be employed to handle a substantial surge during the emergency response.

iii) When healthcare workers are employed, attention should be paid to hiring those with good experience of at least 11 years and above.

iv) Healthcare workers should be properly and suitably motivated at all times through suitable remuneration and promotion to enhance their response, not only during normal services but also during external emergencies.

Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Author Contributions

Deborah I. Omelogu is a PhD candidate for whom this manuscript is part of her research work. She wrote the first draft of the manuscript. Professor Ify L. Nwaogazie guided the data analysis and documentation and proofread the drafts. Professor John N. Ugbebor guided the data collection and also proofread the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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