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Availability of Disaster Management Equipment and Level of Disaster Preparedness at Kenyatta National Hospital in Nairobi Kenya

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ABSTRACT

All over the world, disasters have wreaked havoc to developmental gains spanning many years in the history of many countries. For many ordinary people who live and work in many countries, Kenya included, disasters have made life to be very difficult for them. Social, economic and political posterity has been compromised with each emergency or disaster bedeviling society. The main objective of this study was to establish the availability of disaster management equipment and the level of preparedness of Kenyatta National Hospital in Nairobi County. This study adopted emergency management theory and descriptive research design was applied. The study applied the mixed method approach in which the study population for the quantitative data was the members of staff at Kenyatta National Hospital. Data was collected using semi structured questionnaires from respondents and an interview guide was used to collect information from the disaster management committee members. The target population of the study was 4646 and the study's sample size was 368. The study used proportional simple random sampling and the sample was distributed proportionately into the different cadres of workers in the hospital. The researcher conducted a pilot study using 10% of the respondents before the questionnaires were distributed for data collection. Validity of the instrument was assessed using content, construct and expert opinion. On the other hand, reliability of the instrument was assessed using Cronbach's alpha reliability test. The qualitative data was analyzed with the aid of SPSS version 23.0. Ethical issues were considered during the study. The study established that the disaster preparedness equipment at Kenyatta National Hospital were inadequate to handle the emergencies occurring forthwith. It is therefore recommended that the hospital and the government should put in place the necessary infrastructure that include protective equipment for use by the medical staff so that the hospital aligns itself to proper care and nursing practices and be able to handle casualties of disasters professionally.

KEYWORDS: Availability of disaster management equipment, Level of Preparedness, Kenyatta National Hospital

I. INTRODUCTION

A disaster is an occurrence that leads to more than 10 deaths, affects more than 100 people, or causes an appeal for assistance by those affected (Bravata et al., 2004). Disasters range from vehicle crashes to massive events such as the earthquake and terrorist attacks. Disasters are either natural, such as floods, earthquakes and disease outbreaks or they can be man-made, such as transportation incidents, terrorist bombings, and chemical or biological attacks. Each type of threat presents different challenges to hospitals, which are obligated to respond to. Given limited resources, however, hospitals must attempt to focus their resources on the most likely and potentially serious scenarios. According to the Institute of Medicine (2010), each region need to prioritize its response preparedness according to the likelihood of the different types of disaster it could face. Djalali et al. (2014) opined that hospitals prompt and efficient services can play a significant role in decreasing disaster mortality rate. Accordingly, hospitals should be well prepared and designed in such a way that they can effectively manage all kinds of medical related high-pressure crisis situations (Zaboli, et al, 2006). In China, Hospitals are among the healthcare centers whose prompt and efficient services has a significant role in decreasing disaster mortality rate. Disaster management equipment including decontamination showers and accessories, sanitation stations for accident cleanups, disaster survival kits, emergency communication systems, emergency lightsticks, emergency response PPE kits, portable water storage equipment and temporary emergency shelters are designed and built in such a way that they can effectively manage all kinds of high-pressure crisis situations (Shuang, et al 2014).

In Kenya, there has been need for adequate and reliable equipment, valuable institutional strategists to resolve weaknesses and reinforce strengths in hospital capacity to ensure efficient and effective service delivery during disasters (Simiyu et al., 2014). A comprehensive line of emergency equipment, according to WHO, include to the minimal the 10-Person Trauma First Aid Kit which is a compact and portable first-aid kit that is fully stocked to meet the emergency medical needs of up to 10 people, personal emergency response kits which provide support for one person in an outdoor survival situation for up to 24 hours and emergency thermal blankets which is waterproof and windproof material that protects and helps keep patients warm, dry, and clean. Effective disaster management requires appropriate medical equipment, facilities and available health work force. Policies and procedures that are based on an all-hazards risk assessment and emergency planning are also essential. According to WHO (2017), hospitals strategies should be aligned with appropriate risk assessment to ensure the continuation of care with emphasis on training and testing for all new and existing employees. At Kenyatta National Hospital, shortage of staff, increased demand for specialized health care, inadequate financial resources to meet these demands, training needs, lack of employee satisfaction, and poor working conditions are evident (Ochieng, 2015). A major driver of shortage of staff at KNH is the increase in the country's population with a greater number of patients seeking care, many emerging and more complex medical cases, and a new wave of retirements among trained nurses. There are also issues with medical staff recruitment and retention. The overall number of medical staff employed has increased but this doesn't meet the increased demand. In addition, staff shortages, as well as inadequate funding, has led to a reduction in services for a number of specialty. With too few doctors, there are reported gaps making the quality of care to deteriorate. Falloffs in medical staff pay has had a damaging impact on their morale which has contributed to a workforce crisis in KNH and has had a detrimental effect on its ability to recruit and retain doctors.

II. STATEMENT OF THE PROBLEM

According to Fatemeh, et.al (2018), the WHO guidelines, stipulates that hospitals should have improved capability and capacity to manage their role in emergency preparedness before a disaster strikes. The consequences of a disaster on health sector are so disastrous and may end up damaging the entire health facilities. Hospital failure to withstand this impact may lead to the collapse of health system, lack of basic health services, delay in treatment of trauma and injuries, collapse of emergency functions, and obstruction of ongoing public health services. Kenyatta National hospital has been faced by disasters in the past. One of the most notable ones is a fire in the hospital's cardiology department which led to the closure of the department. A statutory safety and health audit carried out at Kenvatta National Hospital in 2018 indicated that KNH does not have sufficient infrastructure to prepare for disasters. This threatens the health and well-being of health care workers and their ability to handle the influx of patients that could result from an escalation of a disaster. KNH funding which comes from the government has been decimated over the last decade, with the number of full-time positions declining. Despite bitter lessons from the recent past, KNH is far from ready to protect patients when disaster strikes their facilities. Equipment failures are apparent as well as the hospital old buildings whose ability to withstand a disaster is questionable, (KNH Annual Report (2018). With new construction and renovation projects, the hospital need to place its equipment in ready for a natural disaster hits and being a referral hospital there exists challenges in transferring evacuated patients from alternate facilities. Thus, compliance to disaster management policies with disaster mitigation strategies will help overcome the challenges facing Kenyatta National Hospital in disaster management.

Objective of the study: To assess the effect of availability of disaster management equipment on the level of preparedness at Kenyatta National Hospital in Nairobi Kenya.

Significance of the Study: Disaster preparedness will help KNH determine resource capacity and capability requirements and gaps based on risk, including any facilities, information, people, material, equipment and service needs necessary for the effective operation of the coordination centre during a disaster. For staff working at KNH (doctors, nurses and other health workers), they will understand relevant equipment.

Theoretical Review: The study anchored on emergency Management Theory. This theory reiterates that skills and tactics alone are not the only suitable requirements for a professional emergency management. It emphasis on understanding the nature of disaster and the reaction of people and organizations to the crisis. This theory stipulates that a hazard is most likely to produce a disaster when planning has been haphazardly done, policies have not been enforced, disaster management equipment are underdeveloped, preparedness measures have been neglected, and when there are challenges facing institutions and the special populations or other at risk groups (George et al., 2011). Such theoretical constructs are useful in understanding the nature of disasters and the difficulty of successful emergency management operations. Thus, Emergency Management Theory incorporate principles of disaster prevention, preparedness and improvisation. This study combined this theory with Incident

Management System which shows how unified command may take place among many organizations, while also illustrating how individuals in an agency may fall under planning, operations, logistics and finance which includes equipment. The theory therefore supported the variable availability of disaster management equipment of the study.

Empirical Literature Review: Timely availability of requisite equipment plays a vital role in disaster management in health facilities. In Southern Africa, Mete and Zabinsky (2015) vindicates the Monitoring Mapping and Analysis of Disaster Incidents in South Africa (MANDISA). This strategy is supported by a computerized database equipment that is lined to a Geographic Information System (GIS) for tracking disaster incidents including the loss incurred in small highly localized areas in the Cape Metropolitan area. The argument is that if small and localized disasters can be reduced, by the same action so can vulnerability to the large ones as well (Nomdo, 2012). According to Djalali et al. (2014), collapsed and damaged hospitals equipment compiled with triage, absence of command system and resource shortcomings have posted challenges in previous disasters management and one strategy to alleviate the challenges is to evaluate the various aspects of medical disaster management equipment and system. McEntire (2014) reported that for all hazard-types, life safety and property protection, emphasis is needed in assembling disaster equipment supplies kit which has among others (airway, breathing and circulation kits, bag valve mask, manual aspirator or suction unit, sphygmomanometer (blood pressure cuff), stethoscope, antiseptic wipes, band-aids, cotton balls, cotton swabs, iodine, bandages, reli-spray, ice pack, adhesive bandages (band-aids, sticking plasters), knuckles, moleskin for blister treatment and prevention, dressings (sterile, applied directly to the wound). Also included are personal protective equipment (PPE) and flashlight. Thus availing appropriate disaster mitigation equipment and establishing preventive maintenance schedules for all systems and equipment are essential.

III. CONCEPTUAL FRAMEWORK

A conceptual framework is a structure which the researcher believes can best explain the natural progression of the phenomenon to be studied (Camp, 2015). The conceptual framework was derived from the objective of the study which was; the dependent variable was level of preparedness of Kenyatta National Hospital while the independent variable was availability of disaster management equipment.



Independent variable *Source: Author (2020)*

Dependent variable

Research Methodology: This study applied descriptive survey research design. Descriptive study design was found to be appropriate since there were very few earlier all-inclusive studies to refer to or rely upon to understand the level of preparedness in disaster management. Since descriptive research largely utilizes small sample sizes and findings emanating from them are typically generalizable. This design was used to obtain information concerning the up to date status on level of preparedness in disaster management and described what existed with respect to variables and conditions stated.

Location of the study: The study was conducted in Kenyatta National Hospital in Nairobi County, Kenya. The Hospital was selected since it is the most ancient hospital in Kenya and it is a public hospital. It is also a teaching and referral hospital for the University of Nairobi College of Health Sciences and Ministry of Health. It is the largest referral hospital in East Africa located in a heavy populated region, west of Nairobi, the capital and biggest city of Kenya.

Target Population: This research targeted the entire staff at KNH distributed in various departments (KNH, 2017). The study excluded employees who were away on leave since they were not accessible during the period of study. Table 3.1 presents the target population for the quantitative study. The researcher further conducted an in-depth interview with the officers from the Disaster Management Committee, who held vital knowledge and experience in the line of disaster management and the KNH preparedness in disaster management to obtain qualitative data.

DEPARTMENT	NO.EMPLOYEE
Administration	263
Human Resource	75
Security and Safety Services	108
Catering Unit	177
Maintenance/Engineering	293
Corporate Affairs & Communication	78
Supply Chain Management	85
Planning	36
Finance	124
Medicine	576
Surgery	789
Reproductive Health	242
Pediatrics	326
Health Information	219
Accident & Emergency	152
Orthopedics	183
Laboratory Medicine	164
Farewell Home	19
Radiology & Medical Imaging	49
Radiotherapy/Cancer Treatment	50
Pharmacy, Therapeutic & SPU	65
Nutrition	39
Rehabilitative	97
Medical Social Work	33
Public Health	37
Prime Care Centre	360
Infection Prevention Control	7
TOTAL	4646

Table 3.1 Target Population

Sampling Procedures: Since it was possible to get a complete official list of all workers at Kenyatta National Hospital (sampling frame) and due to cost and accessibility challenges, this study selected a subset of workers using simple random sampling formula which stipulates that:

Where:

N = target (total) population of medical health workers

n = desired sample size

d= confidence interval (0.05 testing at 5% significant level)

n= 368

The sample size obtained was 368. To factor in for the non-response, this study inflated the sample size by 30%, yielding

Validity and Reliability of research instruments: Validity was classified into content validity, criterion-related validity and construct validity. Content validity was used to ascertain the extent to which the questionnaire provided adequate coverage on the level of preparedness at KNH. In this study the proportion of discrepancy due to the time measurement of a variable and the estimated uniformity of such measurements over time was measured through reliability.

The researcher sought ethical approval from the faculty at the university. After the approval, the researcher sought a letter from the University which helped in obtaining the research permit from National Commission for Science, Technology and Innovation (NACOSTI). Thereafter the Ministry of Health office of the Director General gave an approval letter to administer questionnaires to health workers in the public county hospitals for this research. All the approvals, NACOSTI, Ministry of Health and the University were presented to the respective hospitals by the research assistants to obtain the final authority to reach out to the staff of KNH.

IV. RESEARCH FINDINGS AND DISCUSSIONS

Rate of Response: Out of the 468 questionnaires administered, 369 questionnaires were returned. This translated to 79% response rate. In Table 4.1, the response rate for this study was 79% which was quite high and was therefore considered to provide adequate information that could respond to the concerns of this study. According to Babbie (2012), response rate of 50% is adequate for analysis. The high response rate was credited to the fact that the researcher ensured that there was a face to face interaction with the respondents of which clarification was done where required.

Table 4.1: Response Rate				
Response	Number	Percentage		
Responded	369	79		
Not Responded	99	21		
Total	468	100		
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Source: (Survey Data, 2019)

Demographic characteristics: The study examined different characteristics of the participants. This included their gender, the department assigned, the number of working years, their highest formal education completed and their experience to the type of disasters that had previously occurred at KNH.

Gender of KNH Staff: The study sought to establish the gender of staff at Kenyatta National Hospital. Gender has been found to moderate on the way workers experience and respond to disaster. UNDP (2016) observe that, women, and men have distinct vulnerabilities, and this shapes the way they experience and respond to disaster. It was therefore important to establish the gender of the staff at KNH. The results are shown in Table 4.2.

Table 4. 2: Distribution of KNH Staff by Gender			
Gender	Frequency	Percent	
Male	175	47	
Female	194	53	
Total	369	100	
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Source: (Survey Data, 2019)

Based on the study findings, it was established that 53% of respondents were females while 47% were males as illustrated in Table 4.2. This indicates that majority of the workers in Kenya health sector are women as compared to men. The study findings are consistent with Asha (2017) study on Human Resource for Health in 10 OECD countries where women made up to between 62-85% of health work force.

Table 4. 3: Department Working in		
Department	Frequency	Percentage
Administration	82	22
Human Resource	17	5
Security and Safety Services	46	12
Corporate Affairs & Communication	53	14
Finance	23	6
Health Information	62	17
Accident & Emergency	15	4
Public Health	45	12
Others	26	7
Total	369	100

Source: (Survey Data, 2019)

From Table 4.3, it was established that 22% of the respondents were from administration department, 17% of respondents were from health information department, 14% from corporate affairs and communication

department, 12% from security and safety services and public health departments, 7% from other departments, 6% from finance department, 5% from human resource departments while 4% were from accident and emergency departments. This was partly in line with WHO (2011) hospital emergency response checklist which emphasizes that when organizing a hospital incident command group, it is imperative to consider representatives from other departments in addition to the medical staff.

Number of Working Years: The study sought to understand how long the staffs had been working at KNH. According to Roman and Raya (2017), individuals with longer working tenure have distinct experience obtained from the amount of time spent in a particular job. At the same time, learning from the past prepare for the future impact on disaster preparedness.



Figure 4.1: Distribution of KNH Staff by Number of Working Years Source: (Survey Data, 2019)

From the study findings, it was found that 45% of the respondents had been working at KNH for a period of between 10 and 15 years showing a wealthy working experience, 27% had been working for above 15 years showing a vast work experience, 19% have been working for between 5 and 10 years while 9% have been working for at most 5 years as indicated in Figure 4.1. The study results are an indication that most respondents had worked in the hospital for quite some times thus they had knowledge on the hospital operations, infrastructure.

KNH Staff Highest Formal Education Qualification: The study sought to establish the highest level of academic qualification attained by those working at KNH. According to Raja and Wirapon (2012), formal education can promote disaster preparedness because education enhances individual cognitive and learning skills as well as access to information. It is also an indication that one is ready and willing to learn new ideas and knowledge.

KNH Staff Highest Formal Education Qualification:



Figure 4.2: Distribution of KNH Staff by Their Level of Education Source: (Survey Data, 2019)

Based on the study results obtained, it was established that, majority 51% of the respondents had undergraduate degree as their highest level of education qualification which was an indicator of more understanding on the available disaster preparedness measures at KNH, 39% had post-graduate education level which also shows they had more understanding of the available disaster preparedness measures at KNH while 10% of respondents had certificate/diploma as their highest education level as illustrated by Figure 4.2. The study results conform with the national health work requirements which requires those working at referral hospitals in Kenya to possess at least an undergraduate degree.

Disaster Occurrence at KNH: The knowledge that the hospital had once suffered a disaster should have served as a warning on the importance of preparedness. Previous experience enhances better management in future occurrence. The study sought to establish whether the respondents had witnessed any disaster event in and around KNH since they were employed. It had been noted that prior experience in previous disaster was associated with better disaster preparedness.



Figure 4.3: Disaster Occurrence at KNH Source: (Survey Data, 2019)

Results as presented in Figure 4.3, above shows that 89% of respondents had not witnessed any disaster at KNH since they were employed while 11% of respondents indicated that they had witnessed disastrous events at KNH. The study clearly shows that, the majority of staff are still young and energetic since they were employed not too

long ago, and if this workforce is well utilized then disaster prepared unit can be said to be moderately prepared. Disasters are rare occurrences especially with effective preventive measures. Therefore, it is not surprising that majority have not experienced any disaster at KNH.

Level of Disaster Preparedness at KNH: In this study respondents were requested to rate the level of disaster preparedness at KNH as high, moderate or low. To rate the level of as high, moderate or low preparedness, the respondents were presented with (WHO, 2011 Standards) levels of preparedness of which in the lowest level, there are no extra supplies or preparations other than what has always been there. In this level an institution is not prepared at all, thus making every emergency a disaster. In the second level we have a few more equipment and a few other hospital supplies and personnel. This means that we can deal with a disaster but not satisfactorily. In the third and highest level, institutions are well prepared, with a 72-hour kit, they have also a year's stock and other necessities needed to get them through the worst disaster. The results from the study are shown in the figure below.



Level of Disaster Preparedness at KNH



As can be seen in the figure 4.3 23 % rate the level of preparedness as high, 67 % rated KNH as moderate in the level of preparedness while 10 % rated the level of preparedness as low. In the first level which has 10%, the institution is not prepared at all for any disaster. While in the second level, which is the moderate with 67% one is able to handle disasters but not sufficiently. In the third level, which is 23%, the institutions are self-sufficient, meaning they have the sufficient supplies, equipment and staff to handle any type of disaster. This is supported by Hyogo Framework for Action (2015). Therefore, the fact that 67 % of the participant's view KNH to be at a moderate level may be suggestive of the need of continuous development. It is important to acknowledge that the hospital resources for disaster preparedness are expensive and therefore the moderate level of is encouraging.

Disaster Management Equipment at KNH: On the components entailed in the KNH disaster preparedness plan, the study found out that these included disaster communication channels, disaster response units, handling of the disaster to avoid casualties and follow-up plan to determine the root cause of the disaster. Based on these results, it is clear that the level of disaster preparedness at KNH is on average adequate to deal with hazardous event that might occur and which might affect delivery of services at the institution. To further probe the level of preparedness the study sought to find out the main disaster management equipment at Kenyatta National Hospital. The respondents' ratings are tabulated in the table below.

Availability of Disaster Management Equipment...

Aspects of disaster management equipment	No extent	Little extent	Moderate extent	Great extent	very great extent
Importance of Equipment:	2.5	23.1	37	21.8	15.5
Equipment of alarm systems (fire alarms, fire					
extinguishers, fire brigade)					
Lifesaving equipment (ventilators in Theatre,	9.8	13.0	30.7	28.8	17.7
PPEs) Expensive					
Recovery equipment (Recovery beds and cardiac	12	16.1	30.1	24.1	17.7
monitor)					
Assembly emergency points	21.8	23.8	30.4	12.7	11.3

Source: (Survey Data, 2019)

It was established that on the scale of 1 to 5 where 1 indicates no extent (zero rating) and 5 indicates the highest rating, on average; life-saving equipment which includes ventilators in theatres and first aid kits was rated very high by 17.7% of the respondents and great extent by 28.8% of the respondents. Equipment of alarm system was also rated very high with 15.5% of the respondents reporting to a very great extent and 21.8% to a great extent. The alarm system in the hospital helps hospital teams to alert and communicate with each other quickly and effectively in an emergency, (ANT Telecom 2021). Hospitals need to be prepared for any emergency that might come through their doors. That's why having medical equipment on-hand at all times are so crucial to providing complete care. Likewise, 17.7% of the respondents reported that recovery equipment determined the level of preparedness to a great extent while 24.1% to a great extent. In order to provide comprehensive treatment for patients, there is a standard set of equipment that all hospitals should have ready. Majority of the respondents (30.4%) rated moderately Assembly emergency points as appropriate equipment for determining level of preparedness.

Other equipment found available was emergency response PPE kits. From these results, we can conclude that majority of the respondents (slightly above 30%) reported that the extent to which various aspects of disaster management equipment determined the level of disaster preparedness at KNH was moderate. This list of medical equipment as listed above can often be refurbished as well as new ones can allow hospitals to manage disaster effectively. For example, ventilators, PPEs etc. Keeping these at hand is critical to the operational success of a hospital and the health care provided within it, (Future Health Concept, 2020). This implied that the employees at KNH were aware of the characteristics of disaster management equipment even though their responses on the extent varied.

Effect on Level of Disaster Management Equipment at KNH: The respondents were also requested to rate the extent to which factors related to funding and acquisition of equipment affect the availability of disaster management equipment at KNH.

Factors affecting the level of disaster management equipment	No extent	Little extent	Moderate extent	Great extent	very great extent
Special internal arrangements for the acquisition and disbursement of funds	5.5	18	32	26.9	17.4
Policies and agreements for the use of other's equipment and services	8.2	10.2	19.0	31.0	31.6
Emergency funding strategies	12	26.9	43.4	12	5.7
Availability of disaster management equipment	38.0	28.5	12.3	10.8	10.4
Occurrence of various disasters at the hospital and the country in general	12.5	16.2	35.5	22.4	13.4
Source: (Survey Data, 2019)					

Table 4.5: Level of Disaster Management Equipment at KNH

Table 4.5 above shows that majority of respondents 44.3% indicated that special internal arrangements for acquisition disbursement of funds were done at KNH to a great and very great extent, while 23.5% indicated that there was little or no special internal arrangements for acquisition and disbursement of funds were done at KNH.

This is important for planning purposes, transparency and policy making. And 32% had a moderate response on the same. 62.6% also indicated that policies and agreements for the use of others equipment and services was in place at KNH to a great and very great extend while 18% showed that policies and agreements for the use of other equipment and services was in place at KNH to a little or no extent., and 19% had a moderate response of the same. Policies provide guidance, consistency, accountability, efficiency, and clarity on how an institution operates, (CMHC, 2018). On emergency funding strategies, results showed that 21.2% responded to greater and very greater extent, 38.9% responded with little and no little extent while majority 43.4% had a moderate response. The availability of disaster management equipment report revealed that 21.2% rated this to a great and very greater extent. Majority 66.5% rated this aspect with little and no extent, while 12.3% rated it moderate. Finally, on the aspect of occurrence of various disasters at the hospital and the country in general, respondents 35.8% reported that there was a great and very great extent and 35.5% rated this aspect with moderate extent. We can also conclude that availability of disaster management equipment and section and the and section of the same aspect with moderate extent. We can also conclude that availability of disaster management equipment needed more attention for improvement at KNH.

V. CONCLUSIONS

From these results, we can conclude that various aspects of disaster management equipment determined the level of disaster preparedness at KNH.

Recommendation: Concerning availability of disaster management equipment, the study recommends that KNH and the government should put in place the necessary infrastructure that include protective equipment's for the nurses and the medical staffs to receive, care and nurse the casualties of disasters with ease and professionally. Lack of equipment or insufficient equipment's compromises the service delivery to the casualties that may result to further injuries to the victims.

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