

STATE OF DISASTER PREPAREDNESS AMONG MEMBERS OF STAFF AT KENYATTA NATIONAL HOSPITAL, NAIROBI COUNTY, KENYA

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Abstract

Objective: To find out the state of disaster preparedness among members of staff at Kenyatta National Hospital (KNH), Nairobi, Kenya.

Design: Sectional descriptive study.

Setting: Kenyatta National Hospital, Nairobi, Kenya.

Subjects: Three hundred sixty one respondents.

Results: The study established that terrorist attack (84%) is the leading potential threat followed by fire (81%). Most members of staff of KNH (66.7%) were aware of the existence of a disaster plan in the hospital. Majority (65.3%) of the respondents felt that evacuation plans are inadequate. The study found out that 58% of the respondents had no training on disaster management. Majority of the respondents indicated that there was no adequate infrastructure to manage disaster with 62.3 % indicating there was inadequate fire fighting equipments. There was no difference on disaster management knowledge among male and female ($P=0.631$; $\chi^2 = 9.570$) respondents. In contrast, a higher proportion (12%) with 50 years and above had excellent knowledge compared to those with between 31-40 years. The respondents' age was associated with knowledge on disaster management knowledge ($P<0.05$). In terms of training on disaster management, those trained had good knowledge (50.7%) as compared to 26.8% not trained and was statistically significant ($P<0.05$). Similarly, years worked in KNH played a role on knowledge on disaster management. There was a larger proportion (31.3%) of those who have worked between 10-15 years when compared to 49.5% who have worked between 15-20 years.

Conclusion

The KNH has the responsibility to ensure that all the members of the staff are familiar with the disaster preparedness contents and management plan. There was inadequate training in disaster preparedness by the member of staff and emergency drills were not held to evaluate the disaster response. There is no adequate infrastructure in the hospital to handle the emergencies as established by this study. The study has established that the hospital need to adequately look into the up-gradation of the infrastructure to enhance the efficiency of service delivery in times of disaster as well as performing emergency trainings and drills.

Introduction

Over the world, hospitals have suffered severe damage as a result of natural and anthropogenic disasters leading to partial or total collapse of the structures and interruption of the health services, urgently needed by the victims of the event. Health facilities can be affected by natural phenomena such as earthquakes, hurricanes, landslides, volcanic eruptions, and floods. They can also be damaged by anthropic events such as fires, gas leaks or explosions. (1). Disaster preparedness is the process of ensuring that an organization has complied with the preventive measures, including the insurance of timely and effective early warnings, temporary evacuation of people and property from the threatened locations, and readiness to contain the effects of a forecasted disastrous event to minimize loss of life, injury, and damage to property. (1).

Disaster mitigation is eliminating or reducing the threats as much as possible and appropriately. This includes, improved design of new health care facilities, retrofitting of old healthcare facilities, national policy and guidelines, Hospital disaster preparedness plan and drills, re-evaluating the plan and vulnerability analysis. The various measures have different implementation methods and costs. The simplest and most economical are nonstructural, administrative and organizational aspects; the most complex and costly are the structural measures. If an integrated hospital mitigation plan is carried out in stages, the use of resources can be spaced out over time, making it easier to keep the additional expenses within a reasonable margin of ongoing maintenance costs (2).

Disaster risk reduction has become important because of the frequency with which disasters occur and the impact they have had on development. Disasters cause diversion of funds and have affected efforts to achieve Millennium Development Goals, particularly the target of halving extreme poverty by the year 2015(3). This is why it is important to have Disaster Risk Reduction measures in place, to reduce the impact of disasters. The importance of reducing disaster risk is shown by the various efforts being made by different governments, the United Nations and other organizations. These efforts include the Yokohama strategy of 1994 and later the Hyogo Framework for Action (HFA) 2005-2015 aimed at building resilience of nations and communities to disasters with an expected outcome of a substantial reduction of disaster losses in lives and in the social, economic and environmental assets of communities and countries (3,4). Kenya is a signatory to the HFA; KNH being a national referral hospital must take lead in health sector emergency preparedness and planning.

Hospitals and health centers are complex; they have high occupancy levels and play a critical role in disaster situations. For these reasons, special consideration must be given to disaster planning for these facilities. Assessing and reducing their vulnerability to natural hazards is indispensable. (30). Emergency preparedness in the health sector involves a logical process, with a series of activities ranging from formulation of policies, goals, written plans, continuous monitoring and evaluations, this is a dynamic process that requires constant improvements and fine tuning (4,5). It is, however, important to note that the policies and written plans do not guarantee disaster preparedness (6), but should be viewed as one of the elements of preparedness activities aimed at improving emergency response (7). The impact from inadequate disaster planning by healthcare facilities and government disproportionately affects those individuals who are the most vulnerable, such as children and the elderly (8). According to Khan (9) the following factors negatively impact the effectiveness of disaster response: poor coordination at the local level and the lack of an early warning system, very slow response times, limited number of trained and dedicated clinicians, lack of a systematic search and rescue system and equipment, and poor community empowerment and participation.

MATERIALS AND METHODS

The study was carried at Kenyatta National Hospital (KNH) in Nairobi. KNH is the biggest referral hospital in Kenya. The sample size was 361 out of total population of 4646 KNH staff and was randomly selected from each department of the hospital. Data was collected using self-administered questionnaire containing both closed and open-ended questions. The research adopted both quantitative and qualitative techniques using questionnaires, focus group discussions and in-depth individual discussions for key informants. Data was analyzed using descriptive statistics. The chi-square test of independence was used to test for association between dependent variable: Disaster preparedness and independent variables: age, training on Disaster management Preparedness, years of worked in KNH, and level of awareness. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 16.2 and Microsoft office excel.

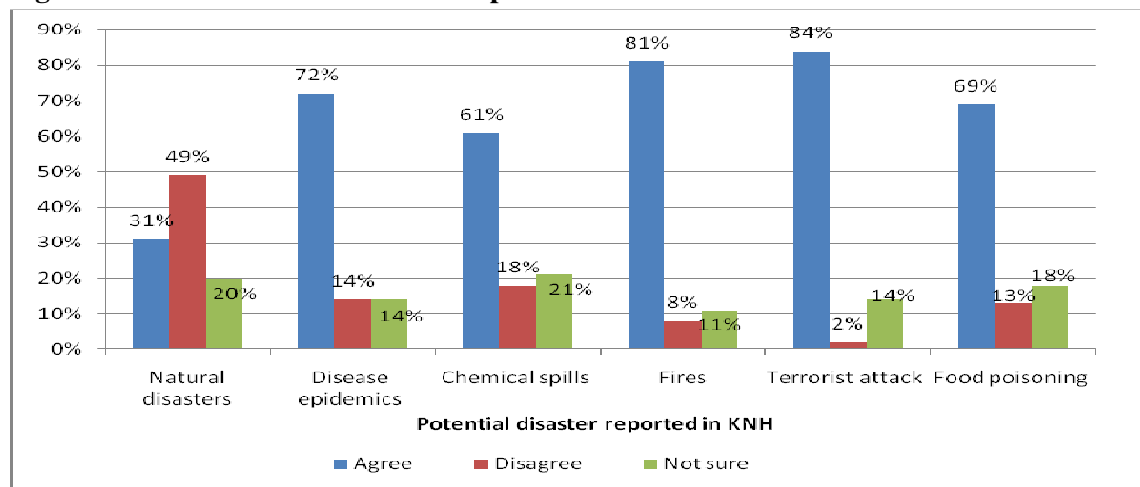
Results

Table 1 social demographic characteristic of the respondents

Characteristics		Number	%
Gender	Male	173	48
	Female	188	52
Age in Yrs	18-20	9	2.5
	20-30	61	16.8
	31-40	131	36.4
	41-50	111	30.7
	>50	49	13.6
Education	Primary	17	4.7
	Secondary	35	9.7
	Tertiary	309	85.6
Profession	Doctors	44	12.2
	Nurses	98	27.1
	Technologists	127	35.2
	Admin.	92	25.5
Job Group	K4-K1	22	5
	K5-K10	222	63
	K11-K17	117	32

Source: KNH (2013) There were more female 188 (52%) than male respondents 173 (48%). The staff ages between 31-40 years were 131 (36.4%) and comprised of the majority followed by 41-50 years 111 (30.7%). Respondents between 18-20 years represented the least group 9 (2.5%). It was noted that 17 (4.7%) of the respondents had primary education or below with more than a third being technologists 127 (35.2%) and 44 (12.2%) were doctors. Nurses and administrative staff represented 98 (27.1%) and 92 (25.5%) of the respondents respectively. Majority of the respondents were in the job group K10-K5 accounting for 222 (63%) while the least number of the respondents were in the job group K4-K1 representing 22 (5%).

Figure 1 Potential disasters in the hospital



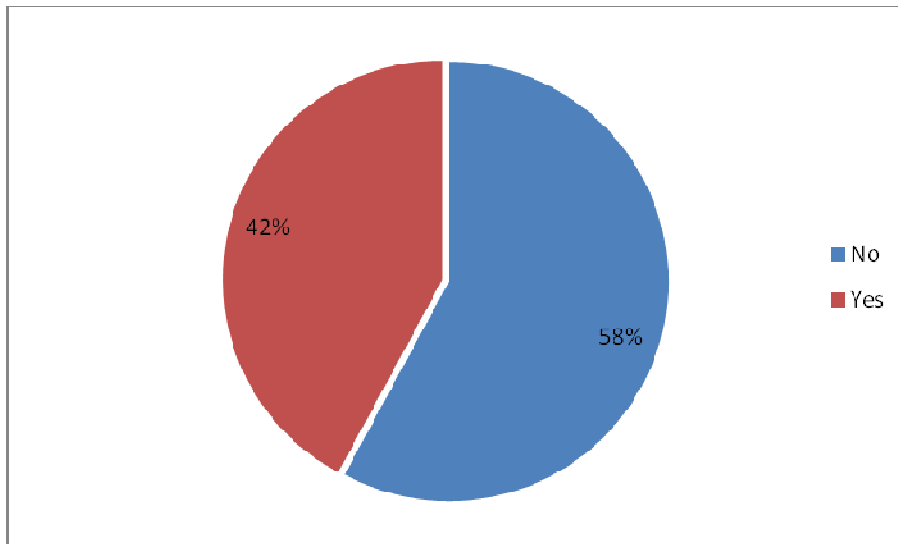
Many employees at KNH dismissed any likelihood of a natural disaster occurring at the hospital 175 (49%) as compared to 113 (31%) who agreed. A majority agreed to a likelihood of disease epidemics occurring 259 (72%), chemical spills 214 (61%), fires 291 (81%), terrorist attack 302 (84%) and food poisoning 247 (69%).

Table 2 Signs of Hospital’s preparedness for disasters

Awareness and Perception	Response		
	Agree	Not sure	Disagree
Presence of disaster management plan	241 (67%)	68 (19%)	52 (14%)
Existence of disaster management committee	279 (77%)	47 (13%)	35 (10%)
Familiarity with the contents of disaster management plan	146 (40%)	101 (29%)	114 (31%)
Disaster management training	171 (48%)	59 (16%)	131 (36%)
Adequate staffing	141 (39%)	77 (21%)	143 (40%)
Regular drills	142 (39%)	62 (17%)	157 (44%)
Availability of personal protective equipment	159 (44%)	64 (18%)	138 (38%)

The hospital had disaster management plan 66.7% (241), and existence of disaster management committee (77.3%, 279). Majority claimed they were not aware of the hospital having regular emergency drills (43.5%); there were also almost similar proportions that thought adequate staffing (39.1%) would improve disaster preparedness against 39.6% who thought otherwise. It was noted that a third of the respondents had no idea of the contents of disaster management Plan. Similarly, at least 13% were not sure of presence of disaster management plan, disaster committee, disaster management training and availability of protective gear and equipment in case of infectious disease outbreak (Table 3).

Figure 2. Training on disaster management



Majority 209 (58%) of the respondents has never had any training on disaster management, while 152 (42%) had been trained, with 12 (7.9%) have been trained to a certificate level with the remaining 140 (92.1%) having undergone a one week in-house course on disaster management and preparedness (Figure 2).

Figure 3. Level of knowledge on disaster management

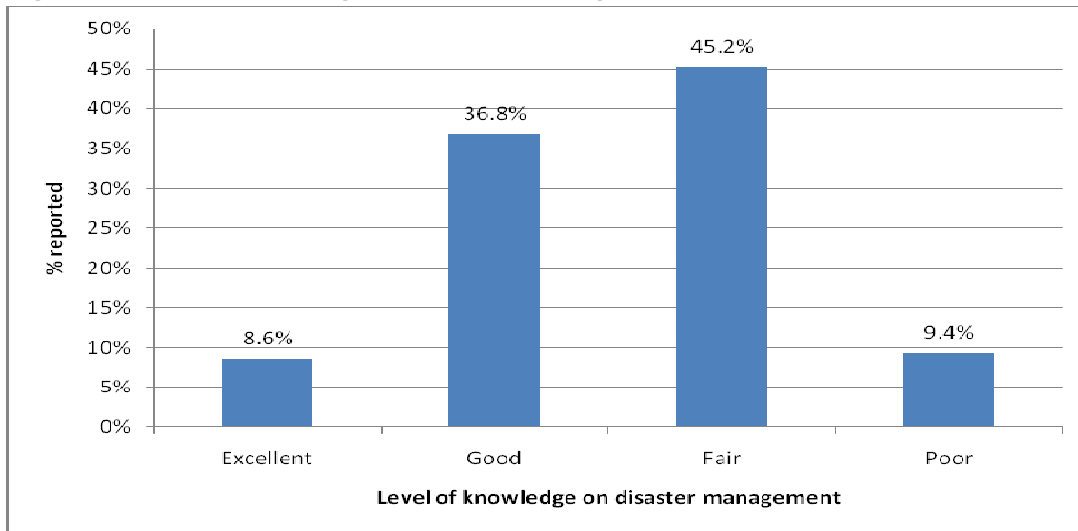


Figure 3 shows that majority of the respondents 163(45.2 %,) had a fair knowledge on disaster management. Only 31 (8.6%) had excellent knowledge on disaster management.

Table 3 Factors contributing to knowledge on disaster management

Variable	Knowledge on disaster management				Significant	
	Excellent	Good	Fair	Poor		
Gender	Male	16(9.2%)	70(40.5%)	76(43.9%)	11(6.4%)	$\chi^2=9.570$ df = 3 P=0.631
	Female	15(8.0%)	63(33.5%)	87(46.3%)	23(12.2%)	
Age (years)	Below 30	6(9.2%)	26(40%)	28(43.1%)	5(7.7%)	$\chi^2=13.202$ df= 9 P=0.002
	31-40	7(5.3%)	44(33.4%)	63(47.7%)	18(13.6%)	
	41-50	11(9.6%)	42(32.1%)	56(49.1%)	5(4.4%)	
	Above 50	6(12.0%)	19(38.0%)	16(32.0%)	9(18.0%)	
Trained on DMP	Yes	19(12.5%)	77 (50.7%)	49 (32.2%)	7 (4.6%)	$\chi^2=34.738$ df = 3 P=0.001
	No	12 (5.8%)	56 (26.8%)	114 (54.5%)	27 (12.9%)	
Years worked in KNH	<5	8(8.6%)	35(37.6%)	44(47.3%)	6(6.5%)	$\chi^2=13.202$ df = 12 P=0.007
	5-10	5(11.9%)	15(35.7%)	17(40.5%)	5(11.9%)	
	10-15	8(10%)	25(31.3%)	37(46.3%)	9(11.3%)	
	15-20	9(10.8%)	41(49.5%)	27(32.5%)	6(7.2%)	
	>20	6(9.5%)	20(31.7%)	27(42.9%)	10(15.9%)	

Note: DMP – Disaster Management Preparedness.

The study results in table 4 indicate factors contributing to knowledge on disaster management in KNH. There was no difference on disaster management knowledge among male and female ($P=0.631$; $\chi^2 = 9.570$) respondents. In contrast, a higher proportion (12%) with 50 years and above had excellent knowledge compared to those with between 31-40 years. The respondents' age was associated with knowledge on disaster management knowledge ($P<0.05$). In terms of training on disaster management, those trained had good knowledge (50.7%) as compared to 26.8% not trained and was statistically significant ($P<0.05$). Similarly, years worked in KNH played a role on knowledge on disaster management. There was a larger proportion (31.3%) of those who have worked between 10-15 years when compared to 49.5% who have worked between 15-20 years.

Table 4 Disaster preparedness

Factors of disaster preparedness	Disagree	Agree
Insufficient infrastructure	87 (24.1%)	274 (75.9%)
Poor coordination in times of disaster	137 (38.0%)	224 (62.0%)
Limited trained staff	129 (35.7%)	232 (64.3%)
Lack of emergency training and drills	91 (25.2%)	270 (74.8%)

Table 4 shows that 75.9% of the respondents agreed there were insufficient infrastructures, 62% agreed there was poor coordination in times of disasters.

Table 5 Association between disaster preparedness and level of awareness

Disaster preparedness	Level of awareness and perception			Significance
	Not aware	Aware	Total	
Not prepared	20 (5.5%)	110 (30.5%)	130 (36.0%)	$\chi^2 = 8.477$ df = 1
Prepared	14 (3.9%)	217 (60.1%)	231 (64.0%)	
Total	34 (9.4%)	327 (90.6%)	361 (100%)	p = 0.004

Table 5 indicates there is an association between disaster preparedness and level of awareness, $p=0.004$. The null hypothesis that Disaster preparedness among members of staff in KNH is not associated with level of awareness and perception is disapproved.

Table 6 Measures put in place in KNH to prepare for disaster

Preparedness	Agree	Not sure	Disagree
Disaster Committee	201(55.7%)	63(17.5%)	97(26.8%)
Policy on Disaster Management	234(64.8%)	44(12.2%)	83(23%)
Firefighting equipment	113(31.3%)	23(6.4%)	225(62.3%)
Evacuation plans	76(21.1%)	49(13.6%)	236(65.3%)
Early warning systems	101(28%)	49(13.6%)	211(58.4%)
Adequate Assembly points	83(23%)	44(12.2%)	234(64.8%)
Fire exits	114(31.6%)	49(13.6%)	198(54.8%)
Training on Disaster management	213(59%)	56(15.5%)	92(25.5%)

Table 6 shows that there exists a policy on disaster management 234 (64.8%). Majority of the respondents indicated that there was no adequate fire fighting equipment 225 (62.3%); evacuation plans 236 (65.3%); early warning system 211 (58.4%); adequate assembly points 234 (64.8%); fire exits 198 (54.8%).

Discussion

The study findings indicated that most of the members of staff at the Kenyatta National hospital are aged between 30-40 years thereby indicating that the staff members are young and energetic to deal with cases of emergencies resulting from disasters. The study findings indicate that most of the members of staff at the Kenyatta National Hospital have worked for quite long time in the facility and therefore are well versed with the operations of the facility and the preparedness for disasters. These findings went in line with the findings of another which conclude that, hospital staffs need to be prepared for an unusual increase in workload which calls for hospital disaster preparedness (7). The study findings indicate that most of the members of staff have attained tertiary education. This shows that the members of staff at Kenyatta National Hospital have the requisite education to be trained on such important issues like the disaster management. Understanding a dimension of preparedness was found to be associated with work experience. This concurs with a research carried out in the Caribbean on vulnerability of hospitals to disasters, which shows that there is an association between preparedness and work experience (1). A number of researches also show this association (10,11,12). Work experience within the risk environment leads to Prediction of responses. Prediction is part of mitigation. The study reveals that the tertiary staff is fairly prepared for the management and preparedness of disaster at the hospital. Also, the study found out that there exists a relationship between the level of education attained by the staff, the age of the staff, work experience in years and the knowledge on disaster management. These findings are reinforced by another which indicated that investments in improving administration and strengthening the resource-base of public institutions will have a general positive impact on the effectiveness of preparedness arrangements, emergency responses and the quality of longer-term recovery planning (13). Training programmes in general, and especially those with a management or technical focus, can be expected to improve the implementation of mitigation and response measures. The study further established that there was no relationship found between the gender and the knowledge on disaster management.

Findings of the study indicate that KNH staff, have perception that natural disasters are less likely to occur. This is likely to affect effective disaster preparedness. Hospitals are unsafe environments as cross infections between patients and even staff could occur. Polypathological and nosocomial infections are real threats in hospitals. This is explained by the high number of respondents (71.8%) who indicated disease epidemics as a potential threat. This agrees with a study carried out in the Carribeans after Hurricane Katrina and the flooding of New Orleans and other areas of the Gulf Coast (10). Chemical spill was considered a potential threat by 60.7% of the respondents. This is in agrrement to an safety and audit report carried out at KNH (23). Fire was also indicated as a potential threat with 80.6% of the respondents perceiving fire as a potential threat. This is in agreement to a Statutory Safety and Health Audit carried out at Kenyatta National Hospital in August 2012 indicated that KNH does not have sufficient fire fighting equipments (14). The possibility of a terrorist attack was very high (83.7%). Food poisoning was consired a portential threat by 68.4% of the respondents.

The study revealed that members of the hospital staff, aware of a disaster management plan were 66.7% (241), and that there was a disaster management committee in place. Majority indicated they were not aware of the hospital having regular emergency drills (43.5%). A third of the respondents had no idea of the contents of disaster management Plan. This factors are likely to affect disaster mitigation. This is in

agreement to a study done by Coppola that found out that emergency communicators must make effort to correct perceptions through communication, and in turn, influence behavior that more appropriately addresses individuals, communities, and entire countries hazard profiles (Nelson, 2007). Majority (58%) of the respondents has never had any training on disaster management. This is contrary to the Occupational Safety and Health Act (OSHA) 2007, and Legal Notice No. 31: The Factories and Other Places of Work (Safety and Health Committee) Rules, 2004 which advocates for training on safety in work places. This is contrary to KNH policy of conducting several internal occupational safety, health and environmental training for its staff, which include the following among others (14). Gender was found not to have any influence on perception of disaster preparedness whilst age was found to have an influence with those aged above 50 having a good awareness and perception on disaster preparedness. This could be due to work experience which was found to influence awareness and perception. This concurs with a research carried out in the Caribbean on vulnerability of hospitals to disasters, which shows that there is an association between awareness and perception and work experience (1).

The study findings reveal that there is presence of disaster management plan at the KNH thereby confirming, that the hospital complies with world body to recommendations which indicate that Disaster Risk Reduction measures should be in place to reduce the impact of disasters (2, 15)). However, the study findings have indicated that some of the staff members of Kenyatta National Hospital are not familiar with the contents of the disaster management plan and therefore this compromises the preparedness of the hospital to the disasters that may rock it. The study finding has established that there exists a disaster management committee though most of the employees of Kenyatta National hospital are not members of that committee. This goes against the findings another study indicated in his study that bringing up members to make policies that ensure the setting up of goals, assignment of responsibilities for achieving these goals to various organizations and sectors, helps in the decision making process and enhances ways on which such plans are to be achieved (10). Investments in improving administration and strengthening the resource-base of public institutions will have a general positive impact on the effectiveness of preparedness arrangements, emergency responses and the quality of longer-term recovery planning (11). The study has established that the employees with longer work experience at the Kenyatta National hospital are more prepared to tackle disasters than those who have a smaller work experience. This explains that work experience is directly related to the disaster preparedness. The experienced employees are better prepared to tackle disasters and improve the efficiency in the management of disasters. Warfield also adds that, training programmes in general, and especially those with a management or technical focus, can be expected to improve the implementation of mitigation and response measures. The study has also revealed that there is insufficient infrastructure at the Kenyatta National hospital to handle emergencies. The study has indicated that there is insufficient fire fighting equipment. Evacuation plans were also found to be inadequate. There was no early warning system in place. Assembly points and fire exits were also inadequate. This agrees with a Statutory Safety and Health Audit carried out at Kenyatta National Hospital in August 2012. During the audit, it was noted that both the fire Hose Reels and Hydrant system were out of order and no alternative was in place (14).

Conclusion

The study has established that Kenyatta National Hospitals have a disaster committee and plan in place but not many of the members of staff are members and therefore compromises disaster preparedness and mitigation. The hospital therefore has the responsibility to ensure that all the members of the staff are familiar with the disaster preparedness contents and management plan. There is inadequate training in disaster preparedness by the member of staff and emergency drills were not held to evaluate the disaster

response. There is no adequate infrastructure in the hospital to handle the emergencies as established by this study. The study has established that the hospital need to adequately look into the up-gradation of the infrastructure to enhance the efficiency of service delivery in times of disaster as well as performing emergency trainings and drills. Disaster preparedness helps in curbing the high cases of emergencies resulting from disasters that occur in the country. The quality of disaster preparedness thus facilitates the delivery of healthcare services.

References

1. PAHO. *Guidelines for Assessing Disaster Preparedness in the Health Sector*. 1st Ed. New York. WHO; 1995.
2. UNISDR. Hospitals and Health Facilities Management. International Strategy for Disaster Reduction; 2008:11-17.
3. UNDP. *Government of India- United Nations Development Programme (GOI/UNDP). Guidelines for Hospital Emergency Preparedness Planning*. 1st ed. India. UNDP; 2004.
4. United Nations. *General Assembly Resolution 57/256. International Strategy for Disaster Reduction*. 1st ed. Geneva. UN; 2003.
5. Allen K. Community-based disaster preparedness and climate adaptation: local capacity building in the Philippines Disasters. 2006; 3. Vol. 30 No. 1:81-101.
6. Morrow B. Identifying and mapping vulnerability, Disasters.2007; 1-18.
7. American Public Health Association. Global Public Health Community Responses to Devastation in Haiti, The Nation's Health. *American Public Health Association*.2010; 32: 45.
8. Bremer R. Policy development in disaster preparedness and management: lessons learned from the January 2001 earthquake in Gujarat, India, *Prehospital and Disaster Medicine*, 2003; 18:370–382.
9. Khan M. Disaster preparedness for sustainable development in Bangladesh, *Disaster Prevention and Management*.2008: 662-671.
10. Drabeck ET. Predicting Disaster Response Effectiveness. *International Journal of Mass Emergencies and Disasters* .2005:49-72.
11. Ginter MP. Effective Response to Large-Scale Disaster: The need for Higher Reliability Preparedness Networks. *International Journal of Mass Emergency and Disasters*. 2006:331-349.
12. Peek L. Transforming the Field of Disaster Research through the Next generation. *International Journal of Mass Emergencies and Disasters*.2006; 371-389.
13. Coppola DP. *Introduction to International Disaster Management*. 1st Ed. Burlington. Butterworth Heinemann, 2006.
14. Kenyatta National Hospital. *Statutory Safety & Health Audit*. 1st ed. Kenya. Kenyatta National Hospital printing unit; 2012.
15. ISDR-CRED. *Disasters-in-numbers from International Disaster Database*. <http://www.unisdr.org/eng/media-room/facts-sheets/2007> (accessed June 6, 2013).