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Assessment of Safety Status and Response Capacity of Selected Primary Health Care Hospitals in Bangladesh

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Abstract

Aim: Hospital is an integral part of society. It can play vital role in saving lives during disasters. Bangladesh is a highly disaster-prone country in the world. It is urgent to know the safety status and response capacity of our healthcare facilities to ensure effective, necessary healthcare services during a disaster, safety and security of healthcare providers and patients. Our aim was to assess hospital safety status and response capacity of selected Upazila Health Complexes [primary healthcare hospital (PHH)].

Materials and Methods: The study was conducted at three PHH namely - Savar, Dhamrai and Saturia PHH. Sampling Technique: Purposive sampling technique was used. Healthcare providers and supporting staffs of the selected PHH and the PHH building were the study population of this study. The number of healthcare providers (physicians and nurses) in each PHH was 20. The total number of healthcare providers as study population was 60. The number of supporting staffs in each PHH was 73. The total number of supporting staff as study population was 219. PHH itself was a study population in this study and the total number of PHHs as study population was three. Estimated total number of study population was 282. Data were collected from 110 participants due to resource constraint. Of the 110 participants, 28 were physicians, 26 were nurses and 50 were other staffs. Three hospitals (PHH) were also included as the study population in this study.

Results: Among the three PHH, Savar and Dhamrai were classified as average resilient healthcare facilities on the impacts of the eventual disasters and Saturia PHH was classified as vulnerable healthcare facility on the impacts of the disasters.

Conclusion: Bangladesh has a large population compared to scarce healthcare resources. It is very pertinent to know the hospital safety status and response capacity of the healthcare facilities. Although it was a small-scale study, the results are alarming. This study will help policymakers decide priority-based resource allocations for the hospitals.

Keywords: Hospital safety, disaster, upazila health complex, primary care hospital, response capacity of hospitals

Introduction

Bangladesh is the largest bay island in the world. The country is highly vulnerable to disasters due to its geographical location, population density and climate change effects. Every year, it is ravaged by flood, cyclone, tornadoes, riverbank erosion, drought, road traffic accidents, etc. In the last three decades, the frequency of disaster has increased fivefold (1). Sixty-eight percent of the country is vulnerable to flood. Twenty percent (35.8 million) of the population is under risk for the effects of salinity. In the last three years, Bangladesh loses 10000 hectares per year due to riverbank erosion. Sixty-eight thousand people move each year due to riverbank erosion. Besides this, one of the critical issues is that Bangladesh lies in seismic zones. Bangladesh is under high threat of mega earthquakes due to its geographical location and historical background. All of these factors have raised Bangladesh to 5th place in world risk ranking in 2012 (2). As Bangladesh is highly disaster-prone country, the hospitals are also highly

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vulnerable to disasters. Hospitals are vital institutes that must continue activities during and immediately after disaster events. The health services during and shortly after a disaster are a matter of life and death for the mass population.

It is vital to know details about the capacity of our hospitals to withstand and continuation of services during disasters. In our country, hospital risks regarding structural, non-structural and functional aspects are still unknown. Therefore, it was a contemporary demand to conduct hospital risks assessment (HRA) in Bangladesh. This country has limited resources. By performing an evaluation of hospital risks, it will be possible to know about our hospital's safety status and ability to respond immediately after disaster events. The findings of this study will help policymakers decide primarily on resource allocation on a priority basis to withstand hospitals in disasters. It will save lives. According to the Pan American Health Organization (2015), building hospitals may request up to 70% of the Ministry of Health's budget of a country. For that reason, HRA is also a fundamental issue to ensure efficient use of available resources (3).

Bangladesh Healthcare System Structure

Bangladesh healthcare system is a pluralistic system. This system is broadly divided into three tiers: primary, secondary and tertiary healthcare facilities. Community clinics, union health and family welfare center, union sub-centers and primary healthcare hospitals (PHH) are primary care hospitals. District hospitals are secondary healthcare facilities. Medical college hospitals and specialized care institutes are considered tertiary care facilities (4).

Hospital Safety Index (HSI)

HSI is a rapid and inexpensive tool used in the evaluation of hospitals. It is developed by Pan American Health Organization disaster management experts. It is used to assess the safety of hospitals. It plays a vital role in emergency responses. HSI not only helps in safety status assessment, but also helps in the evaluation of the response capacity of the hospitals. A checklist helps to assess different items and safety ratings of a hospital. A scoring system assigns the relative importance of each item which gives a numeric value to the probability that a hospital can survive and continue to function in an emergency or disaster when calculated. It helps authorities to determine which hospitals need urgent actions to improve safety and functionality (5).

Objectives of the Study

General Objective: To assess hospital safety status and response capacity of selected Upazila healthcare complexes (sub-district hospitals).

Specific Objectives: i. To evaluate hospital risk assessment of structural components. **ii**. To assess hospital risk assessment of non-structural elements. **iii**. To determine HRA of functional components. **iv**. To evaluate hospital evacuation plan in case of emergency. **v**. To establish the hospital incident command system.

Materials and Methods

Study Place

The study was conducted at three Upazila Healthcare Complexes - Namely Savar, Dhamrai and Saturia PHH.

Sampling Technique

Purposive sampling technique used.

Sample Size

Healthcare providers and supporting staffs of the selected PHH and the PHH building were the study population of this study. The number of healthcare providers (physicians and nurses) in each PHH was 20 and the total number of healthcare providers as study population was 60. The number of supporting staffs in each PHH was 73 and the total number of supporting staff as study population was 219. PHH itself was a study population in this study and the total number of PHHs as study population was three. Estimated total number of study population was 282. Data were collected from 110 participants due to resource constraint. Of the 110 participants, 28 were physicians, 26 were nurses and 50 were other staffs. Three hospitals (PHH) were also included as the study population in this study.

Data Collection, Management, and Analysis

Data were collected using a mixed-type questionnaire, safe hospital checklist and document review. Researchers also conducted HRA by using "safe hospital checklist" (6). The data collection period was from the fourth week of August 2017 to the third week of September 2017. The safety assessment included three components covering structural, non-structural and functional capacity. To analyze the data, the safety status of each item was categorized into three levels: not safe, average safe and highly safe. The researchers assigned scores of 0, 1 and 2 to each category, respectively. Equal weight was given to all safety components and corresponding elements. A raw score was tallied by a simple sum of all the item scores. Finally, all scores were normalized on a 100-point scale. To ease interpretation, all scores were rounded to the nearest number. Hospitals were classified into three safety classes according to the normalized total scores as follows: low (<33.0), average (34.01-66.0) and high (>66.0).

Data Analysis: After collecting and clearing the data, analysis was done by using the Statistical Package of Social Science [(SPSS) IBM, Armonk, NY, United States of America] software version 22.

Ethical Approval

Ethical approval was obtained from the Institutional Review Board of National Institute of Preventive and Social Medicine (Memo No: NIPSOM/IRB/2017/231 Date: 08-23-2017).

Results

In this study Savar PHH was classified as "B" category health facility according to HSI. The average structural safety of Savar PHH was 50%, the average non-structural safety of Savar PHH was 36%, and functional safety of this PHH was 12%. Dhamrai PHH was classified as "B" category health facility according to HSI. The average structural safety of Dhamrai PHH was 51%, average non-structural safety of Dhamrai PHH was 38%, and average functional safety of this PHH was 12%. The results denoted that Savar and Dhamrai PHH have average resilience capacity following a disaster event. Saturia PHH was classified as "C" category health facility according to HSI. The average structural safety of Saturia PHH was 35%, average non-structural safety of Saturia PHH was 36%, and functional safety of this PHH was 0.0%. The safety indices of all PHHs are shown in Figure 1 (Table 1). This meant that Saturia PHH had a low resilience capacity following disasters and it was more vulnerable to disasters than others. In this study, the average structural safety score was 45%, average non-structural safety score was 37%, and the average functional safety score was 8%. The vulnerability indices of all PHHs are shown in Figure 2 (Table 2).

Despite having data using HSI, hospital staffs were interviewed by using a semi-structured questionnaire. One hundred and seven responses were collected from participants on different aspects of HRA. Seventy respondents (65.4%) stated that "Hospital Risk Assessment" was necessary for safety and security concern of health service providers and patients. Thirty respondents (28%) indicated that HRA was essential for effective service delivery during a disaster. Eighteen respondents (16.8%) stated that HRA was necessary for emergency preparedness.

Regarding the capacity of the Upazila health complexes to assess HRA, 41 respondents (38.3%) stated that PHH authority has medium capacity. Twenty-one respondents (19.6%) stated that authority had a low capacity. Thirty-eight respondents (35.5%) stated that they did not see any activity regarding HRA in the current work period. Two respondents (1.9%) stated that authority had a high level of HRA capacity. One respondent did not answer. One hundred respondents (93.5%) stated that "lack of manpower" was one of the barriers in HRA. Twenty-three respondents (21.5%) stated that "lack of logistics" was a significant barrier in HRA.

"Lack of financial resources" was identified by eight respondents (7.5%). Lack of training, lack of awareness and lack of maintenance were also identified as barriers by 15 (14%) respondents. Fifty-four respondents (50.5%) stated that "structural integrity" was a priority area in HRA. Sixty-four respondents (59.8%) stated "safety

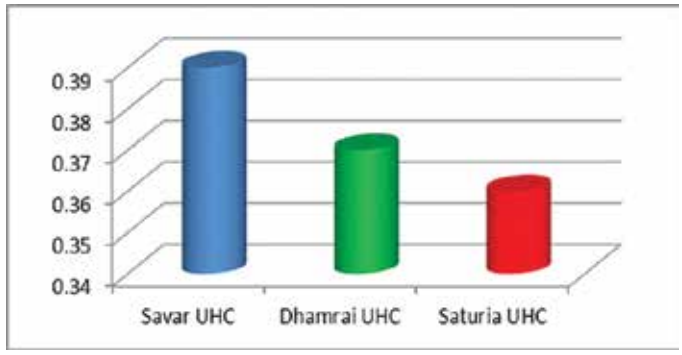

Figure 1. Safety indices of Savar, Dhamrai and Saturia primary healthcare hospital

Table 1. Safety indices of Savar, Dhamrai and Saturia primary healthcare hospitals

Savar PHH=0.39	Health facility status: "B" category
Dhamrai PHH=0.37	Health facility status: "B" category
Saturia PHH=0.36	Health facility status: "C" category

Note: Calculation done by using hospital safety index calculator (7)
PHH: Primary healthcare hospital

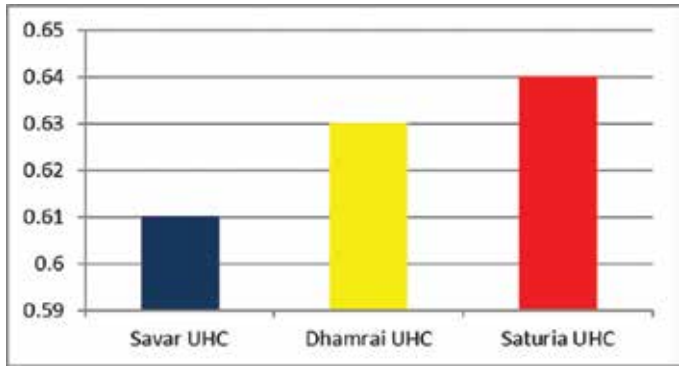

Figure 2. Vulnerability index of Savar, Dhamrai and Saturia primary healthcare hospital

Table 2. Vulnerability indices of Savar, Dhamrai and Saturia primary healthcare hospitals

Savar PHH Hospital	0.61
Dhamrai PHH	0.63
Saturia PHH	0.64

Note: Calculation done by using hospital safety index calculator (7)
PHH: Primary healthcare hospital

and security" as priority areas in HRA. Eighteen respondents (16.8%) stated "ensure logistics" as a priority area in HRA. Ninety-four respondents (87.9%) recommended "training" regarding HRA. Thirty respondents (28%) recommended "adequate supply of manpower", nine (8.4%) recommended "adequate financial resources", 11 (10.3%) recommended "ensure adequate logistics", two (1.9%) recommended "proper maintenance of PHH building", and seven (6.5%) recommended fire protection system, regular disaster management mock drill, rapid, flexible notification.

Discussion

As "HSI" is a readily applicable, simple tool to assess hospital preparedness, many countries are using this tool in large scale. In Moldova, all government hospitals have been evaluated using HSI. Of the 61 public hospitals being assessed, 24.6% (n=15) hospitals were classified as group A hospitals – indicative of these hospitals has relative high degree of resilience to the impact of eventual disasters. 41 hospitals (67.2%) were classified as group B - indicative of an average degree of resilience to the effects of consequent disasters. Five hospitals (8.2%) were classified as group C hospitals. That denotes that these hospitals are vulnerable to the impacts of the disasters (8,9).

HSI of 421 Iranian hospitals was assessed in 2015. Eighty-two hospitals (19.4%) were classified as not safe hospitals. Considering resilience to the impacts of disasters, 339 hospitals (80.6%) were ranked as average secure hospital. There was no hospital in the high safety category (10,11). In Bangladesh, Asian Disaster Preparedness Center conducted HRA recently. The study was a city-based study. The researchers of the study reported HRA draft results. Results of HRA showed that among 16 hospitals, six scored "B" and ten scored "C" in terms of the overall safety index calculated for the structural, nonstructural and functional components of the hospitals by 151 HSI indicators (12).

In this study, two PHHs, namely Savar and Dhamrai PHH, were classified as "category B" health facility considering their resilience to the impacts of disasters. This denotes that these two hospitals are basic safety facilities considering resilience to inevitable disasters. The remaining one, namely Saturia PHH, was classified as "category C" health facility considering its resilience to the impacts of disasters. This denotes that Saturia PHH is vulnerable to eventual impacts of disasters. In our current study, average structural safety score was 45%, average non-structural safety score was 37% and the average functional safety score was 8%. In Iranian research, the average safety score of functional capacity was 41.0%, the average safety score of the non- structural component was 47.0% and the average safety score of structural safety was 42.0%.

The method for "adapting HSI" to Iranian context was performed by a multidisciplinary group of experts from disaster management, medical sciences, architecture, and engineering field. The adaptation process also included translation into the Farsi language, field-testing, face and content validation, and developing an analysis plan (10,11). In this study, the methods for adapting the "HSI" were performed by disaster management expert. The adaptation process also included field-testing, content validation, and developing an analysis plan.

According to the FHSI guideline in the Islamic Republic of Iran, hospital disaster committees are responsible for assessment coordination, data collection, and data entry in the "Ministry of Health and Medical Education" Portal System. The assessment team have three to five members including physicians, nurses, technicians or engineers from the hospital maintenance office. Self-assessment was the primary approach for data collection (10,11). In the current study, there was only one "Hospital Disaster Management Committee" in Savar PHH and data were collected from that committee. In our other two hospitals, there was no "Hospital Disaster Management Committee". In this case, our researchers assessed the HSI by using a safe hospital checklist. In the Iranian research, researchers analyzed the FHSI data that were available on the "Ministry of Health and Medical Education" portal system and that hospital was affiliated to the Ministry of Health and Medical Education (10,11). In this study, all study hospitals were affiliated with "Ministry of Health and Family Welfare". But there was no data regarding HRA in "Ministry of Health and Family Welfare" portal system.

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Ethics

Ethics Committee Approval: Ethical approval had been taken from the Institutional Review Board of National Institute of Preventive and Social Medicine (Memo no: NIPSOM/IRB/2017/231 Date: 08-23-2017).

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Surgical and Medical Practices: M.E.M., B.K.R., M.Z.I., M.H., Concept: M.E.M., B.K.R., Design: M.E.M., B.K.R., M.Z.I., M.H., Data Collection or Processing: M.E.M., B.K.R., M.Z.I., M.H.,

Analysis or Interpretation: M.E.M., B.K.R., Z.I., M.H., Literature Search: M.E.M., B.K.R., M.H., Writing: M.E.M., B.K.R., M.H.

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References

1. Directorate General of Health Services. 2010. Guidelines for Hospital Contingency Plan. Available at https://www.slideshare.net/nationalguidelines/guidelines-for-hospital-contingency-plan [Accessed February 27, 2017]
2. Directorate General of Health Services. 2010. Disaster Management: Bangladesh Perspective. Available at https://www.ifrc.org/PageFiles/212320/Forecast%20Based%20Financing/Bangladesh%20Government%20Presentation.pdf [Accessed: February 28, 2017]
3. Applied Technology Council. 2011. Reducing the Risks of Nonstructural Earthquake Damage – A Practical Guide. 201 Redwood Shores Parkway, Suite 240, Redwood City, California 94065, USA. Available at http://www.curee.org/organization/office/docs/2011_FEMA_E-74_Nonstructural.pdf [Accessed March 8, 2018]
4. Directorate General of Health Services, 2012. Healthcare Network of Bangladesh: From Policy Planners to Domiciliary Workers. Ministry of Health and Family of Welfare, Dhaka, Bangladesh. Available at https://www.k4health.org/sites/default/files/hb2012_ch2_healthcare-network-bd.pdf [December 27, 2018]
5. World Health Organization and Pan American Health Organization. Hospital Safety Index Guide For Evaluators. Safe Hospitals Initiative. 2nd Edition. WHO Press, Switzerland. 2015. Available at https://www.who.int/hac/techguidance/hospital_safety_index_evaluators.pdf?ua=1 [Accessed December 27, 2018]
6. Pan American Health Organization, and World Health Organization. Medium and Small Hospitals Safety Index. Hospital Safety Index. Series: Hospitals Safe from Disasters, No 4. Emergency Preparedness and Disaster Relief Coordination. Washington D.C: PAHO/WHO. 2015. Available at https://www.paho.org/disasters/index.php?option=com_docman&view=download&category_slug=books&alias=2389-medium-and-small-hospitals-safety-index-2015&Itemid=1179&lang=en [Accessed December 27, 2018]
7. Pan American Health Organization, and World Health Organization. Guide for Evaluators. Hospital Safety Index. Series Hospitals Safe from Disasters, N° 1. Hospitals Safe from Disasters. Pan American Health Organization, Washington DC, 2008. Available at https://www.paho.org/disasters%20%20/index.php?option=com_docman&view=download&category_slug=hospital-safety-index&alias=329-safe-hospitals-evaluators-guide-english&Itemid=1179&lang=en [Accessed December 27, 2018]
8. Pisla M, Domente S, Chetraru L, Ostaficiuc R. Republic of Moldova Hospital Safety Assessment Report. National Center for Disaster Medicine. Chisinau, 2010. Available at http://aids.md/aids/files/1016/Report%20final%20ENG.doc [Accessed December 27, 2018]
9. Rajaei-Ghafouri R, Mirzahosseini S, Pouraghaei M. Are our hospitals safe against disasters? An evaluation of hospital safety index in Tabriz, Iran. J Anal Res Clin Med. 2018;6:139-44.
10. Ardalan A, Kandi Keleh M, Saberinia A, Khorasani-Zavareh D, Khankeh H, Miadfar J, et al. 2015 Estimation of Hospitals Safety from Disasters in I.R.Iran: The Results from the Assessment of 421 Hospitals. PLoS One. 2016;11:e0161542.
11. Ardalan A, Kandi M, Talebian MT, Khankeh H, Masoumi G, Mohammadi R, et al. Hospitals safety from disasters in I.R.iran: the results from assessment of 224 hospitals. PLoS Curr. 2014;6.
12. ADPC's News. ADPC presents Hospital Risk Assessment results during high-level meeting in Bangladesh. 2017. Available at http://www.adpc.net/igo/contents/media/media-news.asp?pid=1195&topic=#sthash.morEiZ0I.dpbs [Accessed 7 June 2017]