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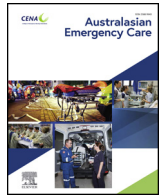
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## Research paper

# Flood disaster preparedness experiences of hospital personnel in Thailand: A qualitative study

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## ABSTRACT

**Background:** Nurses, as well as other health personnel and health systems, worldwide need to be adequately prepared for disasters because it is often difficult to predict where and when disasters strike. The 2011 Thailand flood disaster caused significant damage, including to hospitals. The purpose of this study was to investigate the experiences of hospital personnel regarding flood disaster preparedness in the central region of Thailand.

**Methods:** This qualitative study was conducted using content analysis. Purposive sampling was used to select the participants. Semi-structured interviews were conducted with 15 participants who were doctors, nurses, and persons involved in flood disaster preparedness. Content analysis was used for data analysis.

**Findings:** Two themes and ten subthemes were extracted with regard to flood disaster preparedness. The two themes were maintaining the function of care provision and struggle with preparedness. Personnel realized that preparation levels of their hospital were inadequate and identified the challenges in providing care during and after floods.

**Conclusions:** The finding identified several areas to improve the current state of preparedness of all hospitals that experienced service disruption due to flood disasters. This can help healthcare personnel, hospitals, and healthcare system to enhance flood disaster preparedness so that they can be better prepared.

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## Introduction

Flood disasters are the most common natural disaster worldwide, including Thailand, and pose significant community challenges when they occur [1]. In 2011, Thailand was hit by the great flood disasters and caused 1085 deaths, thereby affecting 4,103,322 residents [2] and costing approximately 45.7 billion USD [3]. The World Bank estimated that this disaster strike ranked the fourth most expensive disaster after the 1995 Kobe earthquake, the 2011 earthquake and tsunami in Japan, and the 2005 Hurricane Katrina in the USA [4]. Hospitals were also particularly hit hard by the floods, thus resulting in significant problems for health institutions, even for those with experience in managing and responding to disaster events. Five hundred sixty-one hospitals under the jurisdiction of the Ministry of Public Health (MOPH)

were damaged, and most of the affected hospitals were located in the central region of Thailand [5]. Ideally, during flood disasters, hospitals need to both maintain the provision of care to current patients and expand their facilities to meet the immediate health-care demands of flood disaster victims regardless of whether their facilities have been damaged or their ability to offer services has been disrupted. The 2011 Thailand flood disaster showed that the previous level of preparedness was insufficient [6]. Disaster preparedness has been accepted as a critical part of reducing the effect of disasters worldwide [7]. Therefore, after the 2011 Thailand flood disaster, hospitals in the central region of Thailand carried out a series of steps to improve their flood disaster preparedness. It is little known regarding experiences of health personnel in flood disaster preparedness for the hospitals. It is important to understand their experiences and opinions before going forward to prepare with great efforts. The literature review showed that there are only a few studies revealing that healthcare systems were poorly prepared for a flood disaster [8,9]. In Thailand, several studies were conducted following the 2011 flood disaster [10–12], reflecting on

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lessons learned and evidencing the limitations of disaster preparedness, especially regarding hospital settings, and only one study [13] was conducted on flood disaster preparedness for hospital settings in the central region of Thailand. This explanatory sequential mixed methods design study was conducted during 2015–2016 to investigate the flood disaster preparedness level and directions for improvement. The first study phase was conducted as a survey of 27 people responsible for hospitals' disaster preparedness in 24 hospitals after the 2011 flood disaster [14]. The current report is a sequential qualitative evaluation of this project. The purpose of this study was to investigate experiences of hospital personnel about flood disaster preparedness, with the intention to inform data to healthcare provider, hospitals, and healthcare system to improve on flood disaster preparedness for hospitals.

## Methods

### Sample and settings

Purposive sampling was used to recruit 15 participants from eight hospitals located in the central region of Thailand that received the highest and the lowest total scores on hospital flood disaster preparedness based on the previous survey results [14]. Participants were hospital directors, people responsible for hospital disaster preparedness (emergency physician, emergency nurse, community health nurse practitioner, and deputy hospital director of administration), or others who could provide additional information about preparedness issues (emergency nurse and butler in the hospital). On the basis of service disruption resulting from the 2011 Thailand flood disaster, hospitals were divided into three types: severe, moderate, and slight.

### Data collection

Data were collected through semi-structured interviews by project investigator, and she was trained with interviewing techniques by taking a qualitative course. The interviews, which were approximately an hour long, were digitally recorded with the participants' permission. The interview guide contained broad questions focusing on effected experiences from flood disaster, responding experiences in the 2011 flood disaster, the current status of flood disaster preparedness, and the expectations and obstacles of preparedness. Interviews were continued until data saturation was achieved. Field notes were also taken as observations of participants and settings. After the interview, audio files were transcribed verbatim to check the accuracy of the information.

### Data analysis

The transcribed data were read and reread to focus on the description and meaning of the experiences of participants within the data. Content analysis was used according to Graneheim and Lundman's four techniques of coding, subcategory, category, and theme [15].

### Rigor and trustworthiness

A rigorous qualitative study was demonstrated through the criteria of credibility, transferability, dependability, and confirmability [16]. To achieve credibility, peer debriefing was used to validate analysis and findings. To ensure transferability, attempts were made to give clear and distinct descriptions of context, selection and characteristics of participants, data collection, and the process of analysis as well as a rich and vigorous presentation of the findings with appropriate quotations. To facilitate dependability, the researcher made reflexive notes throughout the process of

the study and the co-researchers served as auditors to examine processes and product. To enhance confirmability, the researchers verified their findings through member checking. Additionally, the findings were strengthened by a process of forward and backward translation from Thai to English and back to ensure that the transcripts were a true mirror of the participants' experiences [17].

### Ethical considerations

Ethical approval was obtained from the Research Ethics Committee, Faculty of Nursing, Chiang Mai University (215/2013), and the institutional review board of each targeted hospital, and written informed consent was obtained from each participant. Their rights, including confidentiality, were strictly preserved.

## Findings

In total, there were 15 informants: eight responsible for disaster preparedness for hospitals (56.67%), four directors of hospitals (26.67%), and three (20%) were others. There were five women (33.33%) and ten men (66.67%). Three participants were from hospitals experiencing severe service disruption during the flooding (20%), eight from hospitals experiencing moderate service disruption (53.33%), and four from hospitals experiencing slight service disruption (26.67%). For data analysis, the actual two themes that emerge from the data are as follows:

### Theme 1: maintaining functions for the provision of care

After the flooded hospitals had to perform their usual functions for the public, as well as deal with the disaster situation, five subthemes emerged from this theme regarding staff disaster preparation.

#### Enhancing ability of staff

Hospitals enhanced staff ability to care for patients associated with disaster to ensure that disaster victims would get proper care. Participants explained methods of enhancing the abilities of staff (staff included hospital staff and volunteers), such as classroom training and job training. For instance, participants said

*"We sent nurses to participate in psychosocial response because most disaster victims got stressed so we had to serve and we sent nurses from Health Promoting Hospitals to take the course." (C3)*

*"Nursing division rotated nursing staff to all departments. It was good that we could call for a replacement. All nursing staff knew job descriptions in each department so they knew (the operation of) every department" (C10)*

*"In our hospital, nurses experienced rotation to other wards, except for chief wards" (C8)*

#### Increasing number of staff

Hospitals could not battle a great sudden healthcare demand with the routine number of staff. Participants described measures for increasing amount of staff in advance for staff surge capacity by staffing in hospital and healthcare network. They described

*"We plan to let emergency nurses work in their ward and mobilize other nurses who were available from other departments to join the medical mobile unit."(C9)*

*"We could ask for support from healthcare network in our area through Provincial Public Health Office" (C6)*

### Managing supply and equipment from resources

Supply refers to food, water, and pharmaceuticals, which are the basic requirements in daily life for patients, their relatives, and staff. However, medical equipment is also essential to support staff competency in emergency response. Participants explained that their hospital prepared the supply and equipment by managing internal and external resources.

*“In early rainy season, we held meetings with committee members to talk about how to respond to flood situation and let each committee member list needed supply and equipment including reasons and evidence support.” (C8)*

*“Our hospital had a plan for reserving blood, supply supply, and medical equipment. We set a high estimation of supply and medical equipment that we had to store for at least two weeks.” (C6)*

*“We had our own medication for flooding situation and prepared it and coordinated with the Provincial Public Health Office to support more pharmaceuticals related to flooding.” (C7)*

*“Our hospital director made an agreement with other hospital directors nearby so we could ask and get it (supply and equipment) and buy it back for them later” (C1)*

### Keep hospital safety from floods

The 2011 Thailand flood disaster posed different harms to hospital structures, such as broken facilities, a risk of for inundation, and inundation of properties and facilities. Participants revealed that their hospitals focused on constructing flood barrier, modifying interior structure, lifting electric power/water system up, and setting up the back-up system. For instance, participants said

*“We constructed new flood barrier with rock in the west part of the hospital. We constructed a ridge as flood barrier in the east of the hospital.” (C1)*

*“We believe that we can stand on to provide care without the first floor. If water inundates, let it be. We will move up and downsize the hospital, mobilize resources and leave the first floor. We will work from the second floor upward” (C13)*

*“Three generators were lift up and taken on the second floor. This means that if there is flood like the 2011 flood disaster, we will be safe.” (C13)*

*“We set up water system back up by ourselves (groundwater system). However, we used both resources. This means that if we have some problems with groundwater system, we will use water from the Provincial Water Work Authority” (C7)*

### Providing services for various clients

Participants explained that their hospitals prepared health services for different kinds of clients during flood disaster. They classified clients into four categories: persons who can access healthcare at hospital, persons who cannot access healthcare at hospital, persons who have better conditions but cannot go home, and persons who have conditions beyond hospital capability at that time. The participants said

*“We have two plans: First, we can provide health services as usual if water does not overflow the first floor and infrastructure does not collapse. Second, if water overflows the hospital but buildings are safe, we can operate only outpatient department and emergency department. Our policy is to deliver health services in emergency department and outpatient department that are open 24 hours.” (C8)*

*“We surveyed where patients lying on the bed are. We did mapping to identify target patients and marked them with a flag. When we need to visit them by boat, we will follow the flag.” (C4)*

*“The building for Buddhist monks (a place in hospital where ill monks are admitted) is usually available. We can move patients with better condition but cannot go home to rest there and assign helpers to take care of them after treatments have been done for them.” (C5)*

*“We have to send patients with conditions beyond hospital capability to other hospitals which are in our health network because this is our agreement.” (C4)*

### Theme 2: struggling with preparedness

The participants reflected various aspects, which occurred during the preparation for flood disasters and caused them to struggle, and this theme included five subcategories as follows:

#### Difficulty formal external coordination

Formal coordination is needed to ensure that support from all parties will be in place if a disaster occurs. All kinds of hospitals experiencing service disruption disregarded formal external coordination such as mutual aid agreements and memorandums of understanding (MOU) because staff were worried to carry on activities based upon formal external coordination. The local incident command system could effectively handle the situation and personal relationship could greatly assist coordination between the hospital and organizations. The participants elaborated

*“The details of the MOU should include the quantities of supplies and equipment that we will need. Each party in the MOU must have people in charge of the response. This should not be ignored. If suppliers fail to abide by the contract when an emergency situation occurs, they must be held responsible.” (C13)*

*“Relationships are important for hospitals or administrators as me. Once a crisis situation occurs, I will ask for support to fulfill our immediate needs. Close personal relationships can help us a lot.” (IDC15)*

*“We live in the same province and know each other. We have a meeting once a month. If emergency situations occur, we can call our networks and ask for supporting without official letters.” (C8)*

#### Conflict in internal coordination

Internal coordination is a system which puts order into the work method among different groups in a hospital to work together continuously and smoothly, thereby reducing overlap or conflict related to purposes and hospital policies. Participants from hospitals that experienced moderate and slight disruption to health services explained issues related to internal coordination, including “colleagues did not see the importance of disaster preparedness” and “persons responsible for disaster preparedness were reluctant about the scope of practices.” They described

*“Some hospital staff who did not take part in disaster preparedness said that the boat which we bought was useless. They compared the boat with operation instruments that were used frequently.” (C6)*

*“Why it is not the responsibility of the Department of Disaster Prevention and Mitigation. Why do we have to deal with this job? Our major concern is to respond to health impacts. What is the responsibility of hospital?” (C6)*

### Unstable cooperation with local administration organization

Local administration organization is an organization that allows representation of public to take part to respond in their public welfare. Hospitals need non-healthcare volunteers for staff surge capacity during disaster, but cooperation with this organization is not stable. One of our participants provided qualitative information that his hospital delayed training non-healthcare volunteers because their policies (local administration organization) were unclear. The participant described the situation as follows:

*“The local administration organization in my province did not work consistently. The volunteers were trained with rescue techniques, but they did not maintain their skills. I observed for a while and decided that if they do not demonstrate that they can adequately manage and organize their responsibilities, we will not offer any courses to the volunteers.” (C13)*

### Unfamiliarity with staff databases

Database system is a system that accumulates staff information related to staff qualifications for decision-making about assigning the right man in the right job and keeping track of progress. Participants from hospitals experiencing severe and moderate service disruption explained that they used traditional staff database and could easily call trained staff for working during disaster. For instance, participants said

*“Senior staff of the emergency department was responsible for recording history of training courses for their staff in her book.” (C13)*

*“Our hospital is not a large hospital. There are four or five persons who are professional in psychiatric. Once the emergency associated with mental health occurs, we can call them, then it may not necessary for our hospital to deliver the personal database.” (C4)*

### Small chance of flood disaster occurrence

Hospitals did not appreciate the value or usefulness of flood disaster exercise. Participants from hospitals in all categories of service disruption thought that the probability of flood disaster is less when compared to fire or traffic accident. They described as follows:

*“It’s just talking about what we will do when flood comes. Right now, I think that it (flood disaster) is uncommon; fire is more likely to happen.” (C15)*

*“We usually conduct exercise for traffic accident because there are more common and more injured cases. For flood disaster, there are few injured cases.” (C6)*

*“Flood in our area is not flash flood, but it is inundation flood, so we just do tabletop exercise. . . who is responsible for what and do their duties” (C4)*

## Discussion

The views of hospital personnel regarding flood disaster preparedness were assessed and described in this study. The result indicated that hospitals attempted to maintain function for the provision of care by enhancing the ability of staff. Hospitals had to enhance staff ability related to care victims who associated themselves with flood to ensure that they will obtain proper care. Participants explained methods of enhancing abilities of staff in their hospitals, such as classroom training and job training. Other previous studies also reported findings similar to those of the present study [18]. They found that hospitals had higher

preparedness in training staff. Through training, employees had the opportunity to interact; communicate; and share ideas, experience, and knowledge with other skilled employees. This would also increase their self-confidence level and inspiration to work [19]. In the period of disasters, hospitals could not meet immediate needs of an influx of patients following a large-scale incident or disaster with routine number of staff; hospitals needed more staff [20]. The current study revealed that hospitals increased the number of staff responsible for disasters by mobilizing staff from other departments of the hospital and their healthcare network hospitals. This finding was supported by other studies [18,21], which indicated that there were methods of having sufficient numbers and types of personnel to provide the expected ordinary healthcare needs at mass gathering sites. One of the recognized categories in maintaining function for the provision of care was managing supply and equipment from resources. The results of this study can be confirmed by the report of the hospitals that reflected the adequate preparation of pharmaceutical supply and equipment in hospitals throughout Los Angeles County [22].

During disasters, hospitals must remain safe, accessible, and be functioning at the maximum capacity to save the life of victims [23]. On the basis of the findings in the present study, hospitals were safe from flood, both structurally and non-structurally, by constructing flood barrier, modifying the interior structure, lifting electric power and water system, and setting up the backup system. However, the findings of the present study was inconsistent with those of some studies [9,24], which indicated that there were problems with establishing basic utilities such as electricity back-up and there was inadequate reduction in construction danger, and poor hospital building status was found in Iran. Even though basic utilities were not reported to lead to any public health problem, this should be highlighted in the planning process for supporting health services [25].

Apart from keeping hospitals safe from flood, preparedness in care services for various clients was also crucial because disasters can diminish the physical health of survivors with injuries, intensify chronic diseases, and decrease access to health care services [26]. The finding of this study indicated that hospitals prepared health services for different kinds of clients during flood disaster. In contrast to the study findings, Abaya and colleagues [8] reported that they had inadequate health services and limited health professionals in the Gambella Hospitals, Ethiopia. The research explained that they lacked flood-specific policy, little risk assessment, and weak institutional capacity.

The delay in preparedness of flood disaster was also identified, as hospitals challenge for struggling during preparedness. On the basis of the findings in the present study, a participant reflected that his hospital had difficulty formal external coordination, which led to struggle in preparation because staff were afraid to carry on activities based upon formal external coordination. The provincial/district incident command system could effectively handle the situation, and personal relationships could greatly assist coordination between the hospital and organizations. The results of this study were similar to those of previous reports [22,27] that showed inadequate coordination in several jurisdictions, especially in cases of mutual aid agreements/memorandums of understanding with other hospitals. Formal coordination is needed to ensure that support from all parties will be in place if a disaster occurs. To have a sustainable system, hospitals should design agreements with other organizations on the basis of their specific needs and circumstances, thus recognizing the strengths and limitations of all parties involved. Moreover, the result revealed that hospitals reduced cooperation with local administration organizations. Hospitals delayed instituting improvements because local administration organizations did not have clearly defined functions. The results of this study were consistent with those of previous research

[9], which revealed that hospitals had inadequate preparation designed to make sure that staff were qualified to respond to a flood disaster. Organizational culture and biases remain significant barriers to greater involvement of volunteers in disasters, thus causing hospitals to reduce available resources and staff to become exhausted while trying to manage alone [28]. Based on this finding, it is essential to develop proactive cooperation with the local administration organization.

The results revealed that hospitals were unfamiliar with setting up staff databases; they had no system for recording staff qualifications and skills and were not able to accurately record or update information about staff qualifications and skills. The results of the present study were consistent with those of prior research [9], which indicated inadequate preparation designed to make sure that staff were qualified to respond to a flood disaster. When responding to disasters, it is imperative to have accurate staff data on qualifications and skills to ensure a timely and specific medical response [29]. For this reason, hospitals need to develop an information technology system to organize and maintain up-to-date staff capabilities databases for decision-making.

Hospitals in this study lowered the priority of flood disaster drills and exercises and selected a limited kind of disaster to conduct exercise (e.g., fire, traffic accident). The findings of the present study were similar to those of previous research [30], which revealed that a very small percentage of hospitals conducted biannual drills or exercises. If hospitals refuse to conduct these exercises, they may struggle with meeting their goals when disasters occur. Thus, hospitals need to assess challenges and opportunities to identify their causes and needs and enable the development of professional exercises and reduce the inappropriate allocation of resources [29].

### Limitation

This study has several limitations. As such, the results of this research cannot provide a comprehensive view of preparedness and need in different kinds of service disruption hospitals after flood disaster for the best match with their context. Further research should provide a deep understanding on these areas separately. Second, the experiences of hospitals' staff who involved in disaster preparedness were highlighted. It is important to know about the perception of preparedness among hospitals' staff who were not the key person in disaster preparedness and whether different kinds of staff might still influence hospital preparedness. Future research should broaden coverage for a better understanding of various kinds of hospital personnel.

### Conclusion

This study revealed a better and deeper understanding of the experiences of flood disaster preparedness among hospital personnel in Thailand. Many challenges were highlighted, thus reflecting a barrier inhibiting the hospital flood disaster preparedness. By adopting effective strategies for hospitals, such as design agreements with other organizations according to their individual needs and circumstances, hospitals should establish proactive cooperation with local administration organizations and maintain good relationships with local organizations to access necessary resources in the case of disaster, develop an information technology system to organize and maintain up-to-date staff qualification for decision-making, and assess challenges and opportunities to identify whether their causes and needs are necessary. This study offered valuable information in developing policies and implementation of strategies for improving hospital flood disaster preparedness in Thailand.

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### Provenance and conflict of interest

None declared. This paper was not commissioned.

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