SHORT COMMUNICATION

Epidemiological profile of water-related disasters in Japan: A focus on the environmental impact of rainstorms and floods on humans in 2013 and the role played by public health nurses

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Abstract
Aim: In Japan, the ravaging magnitude of storms and floods have recently been taking place. The scope and impact of rainstorm and flood disasters occurring in Japan in 2013, and the role played by public health nurses (PHN), is presented.

Methods: A documentary study was conducted using a descriptive approach for a 1-year period (2013).

Results: In total, 22 published articles and reports were considered for the literature review. Rainstorm, mudslide and flood disasters caused 61 deaths, and 350 cases of injury were reported; and more than 580,000 people were ordered to evacuate. Rainstorm and the subsequent mudslide and flood destroyed 3,972 houses, and 27,080 other residences were flooded; they also destroyed tons of crops in farm lands, costing approximately 2 billion Yen. The role of PHNs consisted mainly of the monitoring of evacuees, caring for those with chronic conditions, and providing health consultation and mental health support to the evacuees as well as the community members. PHNs also conducted health surveys and implemented health promotion activities.

Conclusion: This study showed that the impact of rainstorm and flood disasters was considerable in terms of human and environmental impacts. It also highlighted the main activities undertaken by PHNs in affected areas, suggesting that the contribution of nurses as members of disaster relief teams is of utmost importance.

Key words: disaster, epidemiology, flood, Japan, rainstorm

INTRODUCTION

Floods are the leading cause of natural disaster-related deaths worldwide, being responsible for 6.8 million deaths in the last century. Asia remains the most affected region by flood in the world, accounting for approximately 50% of flood-related fatalities in the last quarter of the 20th century (Noji, 2000; Jonkman & Kelman, 2005). Global climate change is increasing the frequency of extreme precipitation, causing rainstorms and flooding (Zhang, Zhang, Jiang, Liu, & Tong, 2014).

During the last three decades, the impact of flood disasters on humans was enormous. On a global scale, approximately 2,822 million people were affected by flood between 1980 and 2009, including 540,000 who have been killed and 362,000 others who have been injured (Doocy, Daniels, Murray, & Kirsch, 2013). According to the Inter-governmental Panel for Climate Change (IPCC), increases in temperature, intensity of precipitation and rainfall intensity and variability are extremely likely to result from global climate change (GCC) (Christenson, Elliot, Banerjee, Hamrick, & Batram, 2014). This suggests that without proper countermeasures that prevent or reduce GCC, there will be more natural disasters, including flood disasters.

In 2010, flood disasters have made approximately 189 million victims worldwide. And there was an average annual frequency of 192 flood disasters in the last decade.
(Guha-Sapir, Vos, Below, & Ponsere, 2010). Recently, in their report on global flood risk under climate change, Hirabayashi et al. (2013) established a relationship between warmer climate and the risk of flood.

In Japan, a country that is still striving to recover from the quadruple disaster (earthquake, tsunami, fire and explosion at nuclear power plants) following the massive 9.0 magnitude earthquake that struck the east coast of the country in 2011 (Christodoulou et al., 2011), devastating magnitudes of flood disasters have recently been taking place in different areas of the country (Ikeda, Yoshitani, & Terakawa, 2005), with increasing impact in terms of disaster-related evacuation, human security, ecological and economic issues, and as well as health risks.

Public health nurses (PHNs) have been playing an important role in the aftermath of disasters by implementing activities oriented towards disaster mitigation and risk reduction throughout all phases of disaster (Hasegawa, 2004; Mikoshiba, asuda, Shimazawa, Sakamoto, & Zukawa, 2006; Nishigami & Kawahara, 2014). The present work investigated the epidemiology of rainstorm and flood disasters, the scope of their human and environmental impacts, as well as the role played by PHNs in affected areas in Japan in the year 2013.

METHODS

Study design
A documentary study was conducted using a descriptive approach for the period between January and December 2013. It consisted of a preliminary study that preceded international collaborative fieldwork and research projects on water-related disaster preparedness and risk reduction in eastern Asia.

Literature search
Figure 1 illustrates the flow chart of the literature search conducted for the review. The following terms were used separately and in combination (both in English and Japanese) in the search process: heavy rain (gou), water-related disaster (suigai), mudslide disaster (dosha saigai), nursing (kango) and Japan (Nippon). Published papers...
and reports on rainstorms and floods with obvious human and environmental impacts occurring in Japan in the year 2013, as well as the information on activities undertaken by PHNs, were collected. They were retrieved from searches of the following databases: Medline, Embase, Japan Medical Abstracts Society, and J-Stage. In addition, reports from governmental institutions were also included in the review process, as shown in Fig. 1.

RESULTS

Trend and impact of rainstorms and floods and their human and environmental impacts in Japan in 2013

If natural disasters such as flood and rainstorm are getting more and more frequent and severe on a global scale due to climate change (Leaning & Guha-Sapit, 2013), the trend in Japan shows increases in both the number of torrential rainfall (over 50 mm/h) occurrences and the cost of flood damages since the beginning of the last decade. A Japanese Governmental report (2014) found an increase of 69% in the amount of torrential rainfall (average of 160 mm in 1976–1986 vs. 233 mm in 1998–2008); in contrast, the value of general assets damage due to flood has almost doubled; approximately 2 billion Yen (US$20 million) in 1989–1993 and 3.8 billion Yen (US$35 million) in 2004–2008 (Government report, 2014).

The rainstorm and the subsequent mudslide and flood were the deadliest natural disasters in Japan in 2013, causing 61 deaths and 350 cases of injury. The Tokyo area, Tohoku region and Shikoku region, especially the Kochi prefecture (Kochi government report, 2013; National Research Institute for Earth Science and Disaster Prevention report, 2013) were among the most affected areas. Within the country’s territory, there were more than 580,000 people ordered to evacuate and stay in temporary shelters (mostly gymnasiums). In addition, rainstorm and flood had a huge environmental impact, with 3,972 houses completely destroyed and approximately 27,080 other residences flooded within the year 2013, as shown in Table 1.

On 14 October 2013, a night time rain storm damaged the Izu Oshima Island located in the southern part of Tokyo area; the fact that the local government did not issue an evacuation order in time meant that residents had to stay in their homes. The subsequent flood and mudslides left approximately 39 people dead and 108
injured, according to the governmental report (2014); and a preliminary report issued by the Japan Meteorological Agency suggested that the storm was the most powerful one in 10 years, and the amount of rain surpassed records in the area (International charter, 2013).

In addition to the impact of flood disasters on humans (six deaths and 125 cases of injury) that occurred on 13 September 2013 in Iwate prefecture and Kyoto, these two areas have suffered the greatest ecological impact, destroying 1,650 houses and more than 10,000 others being inundated. Moreover, tons of crops and farms were ravaged by water currents. Taken together, ecological damages and the loss in terms of damaged infrastructure and businesses were obviously huge.

Role of public health nurses in rainstorm and flood disaster-affected areas

The occurrence of a disaster impacts not only physical but also mental and psychosocial states of affected groups and individuals. It may worsen pre-existing health conditions (e.g. chronic diseases) and create new health events. As a consequence, support from healthcare professionals is needed. In Japan, local public health nurses play the role of front runners when a disaster occurs. In water disaster-affected areas, PHNs’ activities consisted mainly of providing mental health support to affected people, conducting health surveys and consultations. They provided relief aids according to the needs of evacuees and other community members, cared for people with chronic illnesses, and implemented preventive care activities in evacuation centers through the promotion of hygiene and sanitation (Narahashi, Yoshikawa, & Uda, 2013; Okazaki & Yamazaki, 2013; Hanazumi, 2014; Shiroki, Urahashi, & Saito, 2014).

DISCUSSION

The present report showed that the environmental impacts of water-related disasters on humans in Japan during the year 2013 were huge and costly. Despite the efforts made by governmental agencies and other local disaster agencies in terms of preparedness and implementation of disaster countermeasures, there is a need to have continuous awareness efforts and design new preparedness approaches.

Reinforcing preparedness to reduce the impact of rainstorm and flood disasters on humans

As for most South-East Asian countries, Japan is a country prone to varying types of climate conditions including flooding and storm hazards, owing to meteorological (typhoon, cyclone, etc.) and geographical (precipitous terrains, steep rivers) conditions; and one-half of the population is believed to be concentrated in areas that would be inundated by rainstorms and floods (Government report, 2014). Although there are efforts to counter climate-related disasters - thanks to modern meteorological technology that allows the issuing of warnings for preparedness in municipalities - there is still more to do to efficiently prevent the impact of flood disaster on humans.

Factors such as climate change, deforestation, subsidence of soil, obstacles on river beds, urbanization and high concentration of populations are known to increase the risk of rainstorm and flood disasters (Fig. 3). Depending on the case, it would be desirable to have preventative measures applied. Removing obstacles on river beds that impede flooding, regulation and control of urbanization, reforestation, avoiding construction near
water space or on terrain at risk (near mountains that have a landslide risk) might contribute to reducing the risk of rainstorm and flood disasters (Fig. 3). In addition to the above-mentioned measures that are mainly oriented towards ecological and environmental sustainability, there is a need to improve awareness among populations. If hygiene constitutes an important measure to reduce the impact of disaster on humans in temporary shelters - as it helps to avoid the occurrence of a possible secondary disaster in later phases - efficient prevention and mitigation of the direct and immediate impact of water-related disasters (rainstorm and flood) on humans may be improved thanks to key safety measures applicable at individual and community levels; Shelter (residence, evacuation or temporary shelter) strengthening and proper localization to allow safety against water current, avoidance of landslide adverse effects or provision of safe and easily accessible evacuation shelter; a Timely evacuation when a warning from weather broadcasting agencies (radio, T.V.) is issued or in case of a personal feeling of danger; Others (family members, neighbors, etc.) should be warned of possible danger that might be caused by rainstorm or flood; and Promptness of the decision to evacuate for the family and neighbors to reach a safe shelter on time.

Individual compliance to the ‘STOP’ safety measures (acronym derived from the safety measures described above), and organization of periodical water-related disaster drills to increase awareness among inhabitants, might contribute to improving preparedness and reducing the impact of such disasters to humans.

CONFLICTS OF INTEREST
None declared.

ACKNOWLEDGMENTS
The authors thank Dr. Estuar E. Maria Regina Justina for proofreading this manuscript.

REFERENCES


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