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Health Impacts of Rural Flood and Community Coping Strategies in Northeast Thailand

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A B S T R A C T

Climate extremes, particularly unusual monsoonal flood events, cause prolonged inundation of rice field, and barriers to community connectivity and transportation. They also adversely affect community well-being and population health. The study sites were six rural villages with communities severely impacted by heavy floods, located in Khon Kaen province northeast Thailand. The data on population health impacts from floods was collected using structured questionnaires administered to 312 randomly sampled households. More insightful information on household health impacts and response to flooding was obtained by further interviewing key informants and from community consultation meetings. Floods have adverse impacts on household and community health. The effects were not just on direct physical and mental health during the onset, but also on community livelihood and environment, through a variety of pathways. The communication both within and outside community were crucial in helping family members prepare and deal with the flood impacts. Communities also recognized and observed that closely working with public health officers and community health volunteers could reduce health problems as well as prevent any emerging water-borne diseases. The extreme floods adversely affected community health, particularly emergence of water-washed and water-borne diseases. Household preparation to reduce environmental health risks; to improve access to flood information; to communicate closely with community leaders and government agencies; and to work effectively with public health officers and health volunteers were the key coping strategies.

Introduction

Climate extremes are the result of global warming; heavy precipitation events have frequently increased in many regions (IPCC, 2007) which, in particular, cause unusual monsoonal floods. Flooding has had a major impact on agriculture and fisheries in the Lower Mekong basin region including Thailand. Communities settled in flood-prone areas are most at risk, being threatened by prolonged inundation of

rice field, and blockages to community connectivity and transportation (MRC, 2009). Flood events have also adversely affected community well-being and population health (Alderman et al., 2012).

Thailand has been facing heavy flood inundation in every region. Within thirteen years between the years 2000-2013, more than 2,000 victims were killed, nearly 34 million people were affected by flood disasters and estimated damage amounted to nearly US $40.6 billion (CRED, 2014). Health impacts from floods increased water-related diseases, morbidity, mortality and socio-economic disruption, and put stress on health services, especially in rural flood areas (WHO, 2014). The capacity to cope with flood impacts is increasingly seen as an important short-term measure for households and communities. Community resistance and resilience are seen as key elements in coping with the ravages of these flood events (Adger, 2006). Coping mechanisms could take the form of actions to prevent the extension of flooding through physical measures, or actions to reduce the adverse impacts of flooding through such things as the relocation of belongings, livelihood diversification, or temporary resettlement (Few, 2003). Community health is linked to the effectiveness of the coping actions which effects on people mental health and possible water-related illness (Bich et al., 2011). There has been limited study of community health coping strategies at the rural community level in the flood plains of Thailand. Hence, this current study aims to assess population health impacts from flooding as well as to explore household coping strategies to minimize health risks in northeast Thailand.

Materials and Methods

The study sites were six rural villages with severely impacted communities from heavy floods. The villages were located in Muang Pia sub-district, Ban Phi district, Khon Kaen province, northeast Thailand; in lowland areas between the Chi River and Kaeng Lawa wetland. Some villages experienced inundation of their shelters and heavy flood flow into rice paddies. The data concerning population health impacts from floods was collected using a structured questionnaire of 312 household representatives randomly sampled from a total of 967 households. Questionnaire content concerned demographic data, householders' experience of flood impacts and households' strategies for coping with flood. The household survey has done by trained public health students. Each trained student took about 15-20 minutes to complete the survey interview. More insightful information on household health impacts and response to floods was further explored by interviewing key informants and community consultation meetings by researcher. Key informants interviews were conducted for total ten persons with six community leaders, a representative from local administration organization; Muang Pia Sub-District Administration Organization, a local health authority representative; Ban Lawa Sub-District Health Promotion Hospital, a representative from Ban Phai Hospital and a representative from Ban Phai District Public Health Office to gain qualitative information on community and the related organizations preparedness to flood and the duties of health authorities in response to health decline during and after floods. The interview took 30 minutes each. Interviews were recorded by voice recorder then transcribed to notes.

There were six consultation meetings with each community in which the leader, health volunteers and flooded victims were representatives. The meetings aimed to explore health impacts on each community

and how they cope to minimize the impacts. Meeting discussions took about 45-60 minutes. The results from the household surveys were analyzed in the STATA 10.0 software program to obtain percentage statistics along with qualitative data used for their explanation.

Results

Data collected by questionnaire show that 99.7% of households were affected by floods, with 75.3% experiencing hardship in their daily living. Households reported environmental health risks as a result of changed conditions with more abundance of poisonous animals and vector-borne diseases (69.5%). Some families were faced with suspended solids in the water supply caused by raw water supply having been influenced by floodwaters (36.5%).

Household waste during floods could not be disposed of in the usual way by the sub-district local administration organization, due to roads being inundated (33.0%). Villagers reported that during the flooding period, families experienced critical health problems with: skin infection due to exposure to water contact (48.1%); common cold (20.2%), conjunctivitis (12.8%), etc., as shown in table 1. Family members also became more stressed, and greatly worried about losses (72.1%).

Table.1 Household impacts from community flooding

Health impacts items	**Number (Percentage) n=312**
Area Flooded	311(99.7%)
- Farm only	200(64.1%)
- House only	15(4.8%)
- Both farm&house	96(30.8%)
- None	1(0.3%)
Physical Impacts	
- Skin infection	150(48.1%)
- Common Cold	63(20.2%)
- Conjunctivitis	40(12.8%)
- Muscle pain	20(6.4%)
- Diarrhea	15(4.8%)
- Leptospirosis	4(1.3%)
Metal Impacts	
- Stress and Worried of loss	225(72.1%)
Environmental Health Impacts	
- Poisonous animals and vector-borne increased	217(69.5%)
- Lack of clean water supply	114(36.5%)
- Improper waste disposal	103(33.0%)
- Lack of toilet	86(27.6%)
- Not enough food	74(23.7%)
- Lack of clean drinking water	48(15.4%)

Table.2 Household coping strategies to flood

Coping strategies	**Number (Percentage) n=312**
Communicating with the community leaders on flood conditions	293(93.9%)
Arranging and keeping essential medicine	276(85.6%)
Piling soil on the ground floor	246(78.9%)
Provide nets for insect protection	239(76.6%)
Storing food and water in advance	236(75.6%)
Storing cooking gas/woods	208(66.7%)
Money Saving	208(66.7%)
Belongings relocated to high places	176(56.4%)
Clear and extended water drainage system	173(55.5%)
Provide plastic bag for waste	162(51.9%)
Boat provision	120(38.5%)
Prepared essential equipment ready for evacuation	116(37.2%)
Seeking spare place for children and elder	89(28.5%)
Clearing lavatory tank before flood	66(21.2%)

Most villagers were coping with the floods by: regularly and closely communicating with the community leaders on flood conditions (93.9%) to help them prepare. Village leaders communicated by community broadcast speakers every day concerning flood conditions from the upper Chi River and with others news includes suggestions for family preparedness. Leaders always placed emphasis on communicating during the dangerous 5-7 days before flooding to encourage people to get ready. For shelter preparation, 78.9% of households piled soil on the ground floor to elevate their houses, some of them shifting their house floor and moving the electric plugs to higher positions. As floodwater out-flows became easier and faster, 55.5% cleared and extended the water drainage system in their areas, while 21.2% of respondents cleared their lavatory tank before flood events. About half of respondents stated that the relocation of belongings to high places was necessary to decrease asset damage while 66.7% of households saved money to deal with risk of damage to their house or assets and for the next round of cropping. For living purposes, 75.6% of families stored instant and canned foods along with rain water and/or buying bottled water, before flood events. Some households stored cooking gas/wood (66.7%) because it is hard to get this during disasters.

Coping measures relating to family health preparedness included arranging and keeping essential medicine for family use (85.6%), especially by households that have children and/or elderly members. These groups also sought spare places for those vulnerable household members in cases of severe inundation to their houses (28.5%). Many households provided nets for insect protection (76.6%) because floodwater leads to abundance mosquito; most of them

prepared sleeping nets with some installing screening nets at the window and doors. During flood periods, household waste is difficult to remove from flooded communities; so plastic bags were provided for waste storage and other purposes (51.9%). Some communities experienced barriers to connectivity and transportation, boats being the only vehicle for transport during floods. There were 38.5%, of household who had boat provisions with 37.2% making prior preparations of essential equipment ready for evacuation in the case of sudden and severe conditions. The household coping strategies to flood are summarized in table 2.

During the consultation meetings, the heads of communities reported that flood had affected the social, economic and health conditions of people in the communities, particularly of those who are poor (Joerin et al., 2012). The poor did not have enough money to manage the physical action of adding soil to raise the ground level of their house or to buy a boat; leading to hardship in living and greater risk of water-washed diseases from often having to wade into the floodwaters (Tempark et al., 2013; Ngaosuwankul et al., 2013). The meetings also stated that the greatest impact was from loss of rice production as investments had to be made before flooding in order to ensure at least short-term cultivation even if it meant experiencing a reduction in overall production; because households require rice for family consumption and sale for the rest. When the rice fields fail due to flooding, this means a lack of food security; households must then buy rice for everyday meals. This meant reductions in their household income, along with the mental stress suffered from the losses to those families.

Stress and worry begins about the last week of September every year, the time when the upper river is most prone to flooding and when inundated waters flow into the main river. Mental anguish rose to its highest when waters flowed straight through their farm areas and when rice paddies sunk under the waters (Udomratn, 2008). Leaders of flooded house communities mentioned the hardship to daily living caused by the blockage of the communities' lines of connectivity and transportation. Household electricity failed as a result of cable poles being pulled down into the floodwaters. There was a lack of toilets because they were covered by flood waters; only neighbor's toilets located on higher ground were useable. Frequent wading in flood water put their health at risk. Skin irritation and infection often occurred as the common diseases of these communities during flood time (Vachiramon et al., 2008).

The community representatives reported on the following important coping strategies. Communications with irrigation organizations and with other upper river communities were necessary ways to get prior warning of floods. Village leaders were the important keys to communication within community; this could help family members prepare and deal with the flood impacts. They were satisfied to the government flood compensation policy for farm and house damaged, which help them having some money for the next crop investment and shelter repairing.

Results from interviewed of local administration organization had shown that there are sub-district disaster prevention and mitigation department available in the institution which responsible for providing and managing the annual budget for the community disaster relieved. They also acted in many ways to support flooded communities such as in: training about flood warning systems given to community volunteers; in donation of food, water and essentials for living through the floods; and

in provision of yearly budgets for flood protection (buying sand bags, ropes, boat engine fuel for transporting, etc.). The interviewed of local health authorities indicated that all of them were worked together as a network by integrated coping measures from floods to disease control along with health promotion works. Ban Lawa Sub-District Health Promotion Hospital was the main health institute that responsible closely to community health during flood as to prompt community health volunteer capacity for the impacts and storing adequate essential medicine before flood. They also set the temporary health emergency center to supply for community health needs in the hardness time. Ban Phai Hospital and Ban Phai District Public health office were the effective supportive to community local health service center as sharing human resource, support of medicine and water dis-infection substance (chlorine), emergency patients transferring, including of environmental health problem seeking during and after flood. Community leaders also recognized and observed that communities who worked closely with the public health officers and community health volunteers could reduce health problems (Blashki et al., 2007) because they were better prepared and they distributed essential medicine in the communities, with home visiting and health care consultation during flood. Community health volunteers were those who lived in the flooded villages; they well understood the needs and health problems in their areas. Health and hygiene education concerning emerging water-borne diseases promoted early on in the disaster period helped to reduce the health burden of the communities (Ligon, 2006).

Discussion

Floods have a significant impact on household and community health. Their effects are not just on direct physical and mental health during the onset, but also on community livelihood and environment, through a variety of pathways. These lead to community health vulnerability, which consists of increased exposure to hazards in general and to sensitivity of the communities' adaptive capacity to deal with their impacts (WHO, 2003).

This study found that the vulnerable group within flooded communities consisted of those households who had children, chronic disease patients and/or disabled persons, as this group needed particular health care support and medicines during floods. During the initial flood stage, communities communicated well among their members and became united to deal with the impacts of the floods. This finding complies with the study of Chang (Chang, 2010) who observed that community cohesion increased when flooding occurs; people devote more attention to their community and are willing to participate in community activities for protection against loss.

The adoption of coping strategies by households varies, determined by many factors such as household income, education, flood characteristics, occupation and distance from riverbank (Chang, 2010). Communities learn from past experience of the impacts of floods, which enhances their capacity to select the best ways for risk reduction and for strengthening health. They were aware of risks caused by floods and have a basic understanding of how to react at household level before, during and after floods. External assistance from agriculture offices, local administrative organizations, sub-district health promotion hospitals and related agencies give strong support to the affected communities, with provision to compensate and revive agricultural, livelihood, and health related activities. These actions follow the national policy in various sectors.

Governments should continue to provide long-term effective adaptive measures for community sustainability, especially in the public health sector related to community health (Hess et al., 2012). More studies of community health impacts coping strategies to flood even other weather extremes in the different parts of Thailand could benefit the national health policy maker on how the needed measures could be fit to the variety of community contexts (Haines et al., 2006; Huang et al., 2011). Long term public health adaptation to climate change impacts will be a new challenge for the nexus health sector which tends to increase the extreme disasters in wide regions especially to identify the vulnerable group of the disasters (McMichael et al., 2006). In this case, flood preparedness and emergency management should integrated in all relevant sectors of sub-district and community development plan, early warning system based on community networks working in the upper river basin, community human capital capacity building, strengthened primary health care including health surveillance, public health awareness advocacy and flood evacuation practice are of value in disaster prevention planning and for implementing appropriate relief measures as well as for evaluation of community effectiveness (SEARO, 2006).

Conclusion

Extreme floods adversely affect community health particularly relating to emergence of water-washed and water-borne diseases. Household preparation to reduce environmental health risks, access to flood information with close communication with community leaders and government agencies, and well organized working with public health officers and health volunteers were key coping strategies.

Ethical considerations

Ethical issues concerning this study have been completely assessed and approved by The Office of The Khon Kaen University Ethics Committee in human research, Khon Kaen University, Thailand.

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