

Flood Preparedness Literacy and Behaviors in Community Dwelling Older Adults

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ABSTRACT

Objectives: The purpose of this study was to investigate the factors related to flood preparedness literacy and the relationship between flood preparedness literacy and behaviors.

Methods: A quantitative descriptive correlational study. The sample included 134 people residing in a central Thai province. Descriptive statistics, point-biserial correlation coefficient, and Spearman's rank correlation were used in the data analysis.

Results: The results revealed that the factors related to flood preparedness literacy with a statistical significance were marital status ($r_{pb} = 0.207$; $P < 0.01$), hearing ability ($r = 0.197$; $P < 0.05$), instrumental activities of daily living ($r = 0.226$; $P < 0.01$), and social support ($r = 0.388$; $P < 0.01$). Flood preparedness literacy was correlated with flood preparedness behaviors ($r = 0.281$; $P < 0.01$).

Conclusion: The factors related to flood preparedness literacy as mentioned above should be assessed to identify vulnerable groups for specific care provision. Furthermore, nurses should promote these factors to contribute to effective responses during flood disasters.

Key Words: community dwelling, flood preparedness behaviors, flood preparedness literacy, older adult

The disasters in Thailand have tended to increase in frequency and severity, particularly floods. According to the statistics, between 1995 and 2015, Thailand has had to endure flood disasters every year, and the severity has continued to rise.¹ Flood disasters affect both a person's physical and mental health.² The disaster literacy model is a model that has been applied to manage disaster,³ and was designed based on the concept of health literacy.⁴ This model explains the different factors that affect the ability to respond to disasters.³ The emphasis of the model is on vulnerable groups, particularly older adults that are more susceptible to harm than other groups because of their deteriorating physical health and sensitive mental condition.⁵

FLOOD PREPAREDNESS

According to the Sendai Framework for Disaster Risk Reduction 2015-2030, the aim of the framework is to prevent new risks while reducing existing risks, as well as ensuring preparedness for disasters and rehabilitation.⁶ Preparedness for floods is an activity that ensures that people are able to effectively handle public disasters and reduce the effects on themselves and society.¹ It is considered a proactive operation that can effectively respond to the possible effects of disasters. Nurses are public health officials that play an important role in preparing for the effectiveness response.⁷

OLDER ADULTS EXPERIENCING FLOODS

The occurrence of a disaster increases the risk of illness, injury, death, and the functional impairment of older adults.⁸ They are more likely to have greater risks when a disaster occurs because of decreased cognition, visual impairment, hearing impairment, reduced mobility, reduced ability to do activities of daily living, ineffective communication, dependence on medication and assistance tools, and economic factors.⁹ Especially, older adults with chronic illness may experience higher incidences of mortality after a flood.¹⁰ In addition, another factor is social support, which is correlated with the depressive symptoms that can follow.¹¹

DISASTER LITERACY

Different predisposing factors have an effect on the development of disaster literacy including basic disaster literacy, functional disaster literacy, communicative/interactive disaster literacy, and critical disaster literacy. All of these are interconnected, from inadequate to adequate disaster literacy, which enables individuals to appropriately respond to disasters.³ The variables in this study were selected based on a review of the literature. Personal factors included gender, age, marital status, educational level, occupation, and family income, while the perceptual factors included visual ability, hearing ability, and the ability to carry out daily living activities. The 2 other selected factors were

comorbidity and social support. They were investigated to see if they were related to the flood preparedness literacy of older adults.

METHODS

A quantitative, descriptive, correlational methodology was used to collect data between February and March, 2019.

Setting

Tambon Hua Weing, in Phra Nakhon Sri Ayuthaya Province in Thailand, has been affected by floods on a yearly basis because most of the area is in a plain.¹² Data were collected at the chronic disease clinic of Tambon Hua Weing Health Promoting Hospital, Thailand.

Population

The sample comprised 134 older adults who came to follow-up at the chronic disease clinic. Purposive sampling was also used to recruit the study sample based on the following inclusion criteria: (1) 60 y of age or older; (2) having lived in Tambon Hua Weing for more than 1 y; (3) a score on the abbreviated mental test equal to 8 points or higher; and (4) the ability to communicate in the Thai language.

Data Collection

The researcher and research assistants explained the research objectives and procedures. The interviews were conducted while the subjects were waiting for their appointment with their doctor, and the interviews lasted approximately 20 min. The study was approved by the Institutional Review Board, Faculty of Medicine Ramathibodi Hospital, Thailand.

Instrumentation

Part 1

A demographic characteristics questionnaire.

Part 2

The Charlson Comorbidity Index of Charlson et al. (2008).

Part 3

A questionnaire on the social support for flood preparedness. This questionnaire was adapted from the social support questionnaire of Schaefer, Coyne, and Lazarus (1981), which was translated into the Thai language by Hanucharurnkul (1988). The questionnaire was further adapted to suit the flood preparedness literacy of older adults. There were 18 response-choice items. Higher scores reflected a higher level of social support. The questionnaire was submitted to a panel of 5 experts to ensure its validity. The content validity index was equal to 0.91. The test-retest reliability was 0.91.

Part 4

The flood preparedness literacy questionnaire was developed by the researcher based on an extensive review of the literature. It is composed of 20 items. Higher scores reflect a higher level of flood preparedness literacy. The content validity index was 0.93, and the test-retest reliability was 0.89.

Part 5

The flood preparedness behaviors questionnaire was developed by the researcher based on a review of the literature. It is composed of 20 items that elicit data regarding the behaviors of older adults during the previous flood season. Higher scores reflect a higher level of flood preparedness behaviors. The content validity index was 0.98, and the test-retest reliability was 0.92.

Data Analysis

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to analyze the data regarding the demographic characteristics.

Point-biserial correlation was used to analyze the relationships among the personal factors of the gender, marital status, educational level, occupation, family income, and flood preparedness literacy and flood preparedness behaviors of the sample.

Spearman's Rho correlation coefficient was used to analyze the relationship among age, visual ability, hearing ability, ability to carry out daily living activities, comorbidity, social support, and flood preparedness literacy and flood preparedness behaviors.

Findings

Demographic Characteristics

Personal factors: More than two-thirds of the subjects, or 67.9%, were female, and almost half of them, or 48.5%, were between 60 and 69 y of age. Moreover, 60.4% were married, 84.4% had completed elementary education, and 65.7% were unemployed. As regards family income, nearly half of the subjects, or 45.5%, earned less than 5000 baht per mo, and approximately one-third, or 32.1%, had sufficient income with no savings. Finally, most of them, or 79.1%, had lived in Tambon Hua Weing for more than 40 y, as shown in [Table 1](#).

Perceptual factors: The subjects' mean score for visual ability was 3.93 points of the total score of 5 points (SD = 1.0), with a mean percentage of 78.6%. Their mean score for hearing ability was 2.76 points of the total score of 3 points (SD = 0.7), where the mean percentage was 92.0%. Finally, their mean score for the ability to do daily living activities was 7.28 of the total score of 8 points (SD = 1.5), and the mean percentage was 1.0%.

TABLE 1

| Demographic Characteristics of Participants: Personal Factors (<i>n</i> = 134) | |
|---|--------------|
| Personal factors | <i>n</i> (%) |
| Gender | |
| Male | 91 (67.9) |
| Female | 43 (32.1) |
| Age (year) | |
| 60 - 69 | 65 (48.5) |
| 70 - 79 | 57 (42.5) |
| ≥ 80 | 12 (9.0) |
| Marital status | |
| Single | 15 (11.2) |
| Married | 81 (60.4) |
| Divorced | 38 (28.4) |
| Educational level | |
| Uneducated | 3 (2.2) |
| Primary school | 113 (84.4) |
| Middle school | 12 (9.0) |
| High school and more than | 6 (4.4) |
| Occupation | |
| Unemployed | 88 (65.7) |
| Employee | 25 (18.7) |
| Agriculturist/Fisherman | 11 (8.2) |
| Merchant/Self-employed | 10 (7.4) |
| Family income (Thai baht per month) | |
| < 5,000 | 61 (45.5) |
| 5,001 - 10,000 | 39 (29.1) |
| 10,001 - 15,000 | 19 (14.2) |
| > 15,000 | 15 (11.2) |
| Sufficiency of income | |
| Sufficient with saving | 27 (20.1) |
| Sufficient without saving | 43 (32.1) |
| Insufficient without debt | 34 (25.4) |
| Insufficient with debt | 30 (22.4) |
| Duration of living in the area (year) | |
| 6 - 20 | 13 (9.7) |
| 21 - 40 | 15 (11.2) |
| > 40 | 106 (79.1) |

min = 6, max = 84, mean = 58.5, SD = 20.4.

Health data of the subjects: Most of the subjects, or 86.6%, had a chronic illness, and 35.1% had 2 comorbidities. The most common comorbidity was hypertension, making up 68.7% of the total, followed by hyperlipidemia at 50%, as shown in Table 2. When assessing the subject's comorbidity, it could be seen that 43.3% had a comorbidity score of 1 point. Almost all of them, or 97.9%, explained that the flood made it more difficult for them to meet doctor's appointments.

Social Support, Flood Preparedness Literacy, and Flood Preparedness Behaviors

Social support in preparing for a flood: The findings showed that the mean score for social support in preparing for floods on the part of the family of older adults was 14.0 points (SD = 5.0) and the mean percentage was 58.3%. The mean score for social support in terms of preparing for floods from persons close to the older adults was 8.7 points (SD = 5.6) and the mean

TABLE 2

| Demographic Characteristics of Participants: Health Data (<i>n</i> = 134) | |
|--|--------------|
| Health data | <i>n</i> (%) |
| Presence of comorbidity | |
| No | 18 (13.4) |
| 1 | 31 (23.1) |
| 2 | 47 (35.1) |
| 3 and more than | 38 (28.4) |
| Comorbid conditions | |
| Hypertension | 92 (68.7) |
| Dyslipidemia | 67 (50.0) |
| Diabetes | 36 (26.9) |
| Heart disease | 15 (11.2) |
| Asthma | 4 (3.0) |
| Thyroid | 4 (3.0) |
| Cerebrovascular disease | 4 (3.0) |
| Joint pain | 11 (8.21) |

percentage was 36.1%. Finally, the mean score for social support in preparing for floods by the health-care staff of older adults was 10.8 points (SD = 6.1) and the mean percentage was 45.0%. Of the full score of 72 points, the maximum score for the overall social support of older adults was 64, with a minimum score of 1 point, a mean score of 33.4 points (SD = 13.7), and the mean percentage was 46.4%.

Flood preparedness literacy: The mean percentage for the access to information aspect was 65.6%. The mean percentage for the perception and understanding aspect was 67.8%. The mean percentage for the communication aspect was 69.2%, and the mean percentage for the perception and understanding aspect was 67.8%. The mean percentage for the decision-making aspect was 74.7%, and the mean percentage for the contextual and situational analysis aspect was 66.7%. The full score for flood preparedness literacy was 60 points, the mean score was 41.4 points (SD = 7.4), and the mean percentage was 69.0%. When the criteria of Bloom (1968) were used to divide the scores into 2 levels, it could be seen that the overall mean score for flood preparedness literacy was at an adequate level, with 82.8% of the subjects having adequate flood preparedness literacy.

Flood preparedness behaviors: The scores for flood preparedness behaviors were divided into 5 aspects. The mean percentage for the following-up news on floods and devising a plan to evacuate aspect was 50.0%. The mean percentage for the environmental arrangement and prevention of damage to property aspect was 85.0%. The mean percentage for the preparation of consumer products and necessary tools and equipment during floods aspect was 76.0%, while the mean percentage for the preparation of first-aid and treatments aspect was 77.7%. Finally, the mean percentage for the preparation of knowledge about floods and flood management aspect was 20.0%, and the mean percentage for flood

TABLE 3

Correlation Coefficients Among Personal Factors, Perceptual Factors, Social Support, Comorbidity, and Flood Preparedness Literacy

| Variables | Correlation coefficient (r) |
|---------------------------------------|-----------------------------|
| Personal factors | |
| Gender | -0.114 (rpb) |
| Age | -0.088 |
| Marital status | 0.207* (rpb) |
| Educational level | 0.149 (rpb) |
| Occupation | 0.007 (rpb) |
| Family income | 0.087 (rpb) |
| Perceptual factors | |
| Visual ability | 0.029 |
| Hearing ability | 0.197* |
| Ability to do daily living activities | 0.226** |
| Comorbidity | -0.084 |
| Social support | 0.388** |

*P < 0.05.

** P < 0.01.

Abbreviation: r_{pb} = point-biserial correlation.

preparedness behaviors was 72.0%. When the criteria of Bloom (1968) were used to divide the scores into 3 levels, it could be seen that the overall mean score for flood preparedness behaviors was at a moderate level.

Relationships Among Personal Factors, Perceptual Factors, Social Support, Comorbidity, and Flood Preparedness Literacy

The analysis revealed that the factors that were related to the flood preparedness literacy of older adults were marital status (r_{pb} = 0.207; P < 0.05), hearing ability (r = 0.197; P < 0.05), ability to carry out daily living activities (r = 0.226; P < 0.01), and social support (r = 0.388; P < 0.01), as shown in Table 3.

Relationship Between Flood Preparedness Literacy and Flood Preparedness Behaviors

Spearman's rank correlation coefficient was used to analyze the relationship between flood preparedness literacy and flood preparedness behaviors. It was found that flood preparedness literacy was related to the flood preparedness behaviors of older adults (r = 0.281; P < 0.01).

DISCUSSION

Flood Preparedness Literacy of Older Adults and the Factors Related to Flood Preparedness Literacy

In this study, most of the subjects, or 82.8%, possessed adequate flood preparedness literacy regarding each aspect and overall flood preparedness literacy. The aspect with the highest mean was the decision-making aspect, at 74.7%. This was perhaps because Tambon Hua Weing has suffered flood disasters on a yearly basis and most of the subjects, or 79.1%, had lived in this

area for a very long time. They gained more experience in dealing with flood disasters every year, which occurred in the same pattern. All of them intended to stay at home rather than evacuating themselves, so they had to maximize their own ability to defend themselves against floods. Additionally, this area could access help and resources from many authorities during the time of a flood, and this could promote flood preparedness literacy among the subjects in this study.

The factors related to the flood preparedness literacy of older adults with a statistical significance were marital status, social support, hearing ability, and the ability to carry out daily living activities, which can be explained as follows. Older adults that are living with their spouse will support each other in preparing for floods. Previous studies yielded similar findings.^{13,14} However, the finding of this study was different from some studies that reported that marital status was not seen to be related to health literacy.^{15,16} This may be due to the different context of the study, which is an urban community.¹⁵ Additionally, most of the subjects lived in an extended family, so they were able to receive support from their family members.¹⁵ With regard to social support, the communities in Tambon Hua Weing, Sena District, Phra Nakhon Sri Ayutthaya Province are rural communities where community dwellers take care of and help one another just as in other rural communities.¹⁷ This is similar to the findings reported in previous studies.^{14,18}

Hearing ability was found to be related to flood preparedness literacy. It could be explained that clarity and voice quality during communication had an effect on the communication about disaster management.⁹ In this study, almost all of the subjects followed news on the flood through hearing; they listened to weather forecasts and flood warning announcements. If they had hearing loss, this could have affected their flood preparedness and evacuation. However, no studies were found related to hearing perception or disaster preparedness in the literature review.

The ability to carry out advanced daily living activities was one of the factors related to flood preparedness literacy in this study. Older adults that lack the ability to take care of themselves might be less prepared for flood disaster.⁹ In fact, the ability to do advanced daily living activities is necessary for individuals to further develop their literacy. This finding is consistent with previous reports.^{19–21}

These factors were not related to flood preparedness literacy: gender, age, educational level, occupation, family income, visual ability, and comorbidity. Most of the subjects in this study were female with the mean age of 70.54 y, and most of them (84.3%) had completed an elementary education. A plausible explanation is that both the male and female subjects in this study had been living in Tambon Hua Weing for many years, and all of them had experienced flood disasters before. Thus, the flood preparedness literacy was not

different between the females and males. This is consistent with a study of disaster preparedness among elders in Hong Kong,²² where it was found that age and educational level were not correlated with flood preparedness literacy. The subjects in this study learned how to adapt their lifestyles during the flood disaster on a yearly basis rather than learning about it in school. Such findings lend support to the findings of previous studies, where it was indicated that education level was not related to health literacy or disaster preparedness.^{13,15,22}

The context of Tambon Hua Weing is similar to that of other rural communities, that is, the people that live in the same neighborhood tend to have similar ways of living.¹⁷ Therefore, whether they are employed or not, older adults are able to similarly access information about flood preparedness. Furthermore, they receive support from local government agencies that enable them to prepare for flood disasters. This is similar to the results of previous studies in Thailand, which indicated that occupation was not related to health literacy or disaster preparedness.^{13,18} Likewise, family income was not seen to be related to flood preparedness literacy. This is not consistent with previous studies, which found that household income was related to health literacy and flood preparedness.^{18,23} It can be explained that older adults in this study received materials, boats, barriers, and financial support from several agencies so they were able to prepare for floods without their own financial support.

Visual ability has been found to be related to health literacy.^{24–26} However, it was not related to visual ability or flood preparedness literacy in this study. Older adults with visual impairment might have some barriers in terms of obtaining information, including news on the disaster and warning for evacuation; however, they could receive news and information by listening to the radio, television, and public announcements in the community. Accordingly, they might be less affected by a visual impairment in terms of their preparedness literacy. Finally, it was found that comorbidity was not related to flood preparedness literacy. This is consistent with a study that reported that the number of underlying diseases was not related to health literacy.²⁷ In this study, it was possible that the older adults with or without a comorbidity might also be prone to experiencing a large affect from a flood so they prepare themselves to minimize the risks. Therefore, flood preparedness literacy was not seen to be different, whether the person had a low or high comorbidity.

Flood Preparedness Behaviors of Older Adults and Their Relationship With Flood Preparedness Literacy

The findings showed that the subjects' behavior regarding follow-up news on floods and planning for evacuation was at a low level (50%). It is possible that the subjects were able to adjust themselves to living with floods by using lesson in the past. One explanation why the subjects' mean score for knowledge about floods and flood management was lowest

(20.0%) was that the subjects were older adults and their ability to learn was limited due to their age.²⁸

It was found that the older adults' flood preparedness literacy was related to flood preparedness behaviors with a statistical significance ($r = 0.281$; $P < 0.01$), which was in compliance with the disaster literacy model that was adapted from the concept of health literacy, proposing health literacy as an outcome of health promotion that can change the determinants of health.⁴ Accordingly, the disaster literacy model includes 4 levels of literacy by which people are increasingly enabled to exert greater control and have personal responsibility, along with increased awareness of the factors that shape their efforts to respond to disasters effectively.³ Flood preparedness literacy in older adults should be assessed and promoted so as to enhance their disaster preparedness behavior and lessen the impacts from flood disasters.

CONCLUSIONS

The findings from this study add to an understanding of the factors related to flood preparedness literacy, as mentioned above. These factors should be assessed to identify vulnerable groups for specific care provision. Community nurses should assess these factors and organize training to ensure that public health volunteers are able to assess such factors to more effectively approach community-dwelling older adults that have obstacles in preparing for flood disasters. In addition, community nurses should coordinate with related agencies and organizations in local areas to organize training to disseminate knowledge on flood preparedness to older adults using media that are interesting and that suit the hearing ability of older adults that have hearing impairments.

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