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ORIGINAL ARTICLE

Factors related to drowning preventive behavior among caregivers with children aged one to four in rural areas of Thailand.

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Abstract

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A cross-sectional descriptive study was conducted to investigate the factors related to preventive behavior among caregivers with children aged one to four, in rural Thailand. Two hundred eighty eight caregivers participated in this study during data collection in March, 2012. The chi-square test, Fisher's exact test and multiple logistic regression were used to identify the associations between the independent variables and the preventive behaviors of the caregivers regarding childhood drowning.

Approximately 60% of the caregivers practiced good preventive behavior regarding childhood drowning. The preventive behavior of the caregivers regarding drowning was found to have a significant association (p-value <0.05) with marital status, education, occupation, family income per month, level of knowledge, level of perceptions, the distance from caregivers' home to the river or the canal, the existence and quality of a barrier around the river, and the use of posters as a source of information.

In order to reduce childhood drowning, the government and the local administrative organizations should provide continuous childhood drowning information and education program for the caregivers at risk, such as single parents, those with a low level of education, the unemployed students, the low income group, and caregivers who live in a home within 10 meters of a river or canal in order to improve their knowledge and perceptions and increase good preventive behaviors about drowning.

Keywords: preventive behavior on drowning, caregiver with children aged one to four

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ปัจจัยที่สัมพันธ์กับพฤติกรรมป้องกันการจมน้ำของผู้ดูแลเด็กอายุ 1 ถึง 4 ปี ในชนบทประเทศไทย

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บทคัดย่อ

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การวิจัยแบบตัดขวางนี้ต้องการศึกษาปัจจัยที่สัมพันธ์กับพฤติกรรมป้องกันการจมน้ำของผู้ดูแลเด็กอายุ 1 ถึง 4 ปี ในชนบทประเทศไทย เก็บข้อมูลจากผู้ดูแลเด็กจำนวน 288 คนช่วงเดือนมีนาคม 2555 ใช้สถิติไคว์สแควร์ ฟิสเชอร์ เอคแซคเทส และการวิเคราะห์ถดถอยลอจิสติกพหุคูณ เพื่อหาความสัมพันธ์ระหว่างตัวแปรอิสระกับพฤติกรรมป้องกันการจมน้ำของผู้ดูแลเด็กอายุ 1 ถึง 4 ปี

ผลการศึกษาพบว่าผู้ดูแลเด็กร้อยละ 60 มีพฤติกรรมป้องกันการจมน้ำในระดับดี นอกจากนี้ยังพบว่าพฤติกรรมป้องกันการจมน้ำของผู้ดูแลเด็กมีความสัมพันธ์อย่างมีนัยสำคัญที่ระดับ 0.05 กับสถานภาพสมรส การศึกษา อาชีพ รายได้ของครอบครัวต่อเดือน ระดับความรู้ ระดับการรับรู้ ระยะทางจากบ้านผู้ดูแลเด็กไปยังแม่น้ำหรือลำคลอง การมีที่กั้นแม่น้ำหรือลำคลอง และการใช้โปสเตอร์เป็นแหล่งข้อมูลเกี่ยวกับการจมน้ำ

ดังนั้นเพื่อลดการจมน้ำของเด็กเล็ก รัฐบาลและองค์การบริหารส่วนท้องถิ่น ควรให้ข้อมูลข่าวสารและจัดโปรแกรมการศึกษาเกี่ยวกับการจมน้ำของเด็กเล็กให้กับผู้ดูแลเด็กกลุ่มเสี่ยงอย่างต่อเนื่อง ได้แก่ ผู้ปกครองคนเดียว กลุ่มที่มีระดับการศึกษาต่ำ กลุ่มที่ไม่มีงานทำ กลุ่มที่มีรายได้น้อย และผู้ดูแลเด็กที่อาศัยในบ้านที่อยู่ห่างจากแม่น้ำหรือลำคลองในระยะ 10 เมตร เพื่อเพิ่มความรู้และการรับรู้ที่นำไปสู่การพัฒนาพฤติกรรมป้องกันการจมน้ำที่ดีของผู้ดูแลเด็กต่อไป

คำสำคัญ: พฤติกรรมป้องกันการจมน้ำ ผู้ดูแลเด็กอายุ 1 ถึง 4 ปี

Introduction

Drowning is a global killer. According to the WHO Global Burden of Disease estimates, 388,000 people died due to drowning worldwide in 2004.[1] Approximately 175,000 children and youth younger than 20 years old died due to drowning in the world. It is the second leading cause of accidental injury-related death among children aged zero to seventeen and the leading cause of injury-related death among children aged one to four.[2]

In Thailand, drowning is a crucial public health problem especially for children aged one to four. In this age group, around 40 per 100,000 children (40.4/ 100,000) die from drowning every year. This number is greater by far than that from other causes; it is more than three times the rate of pneumonia (12.3/ 100,000), the second leading cause of deaths. Drowning sis by far the top cause of deaths; and poses a risk for children, especially those aged one to four in Thailand.[3]

Furthermore, a remarkable difference in drowning rates is observed between rural and urban areas in all age groups of children under 18 years old in Thailand.[3] One of the reasons for this is that many natural water resources can be found in Thailand. The drowning rate of children aged one to four in rural Thailand is 53.4 per 100,000 children. This rate is more than three times higher than the drowning rate in urban areas. Drowning is the greatest cause of deaths among children, especially in rural areas of Thailand.[3]

Young children are dependent on the care they receive from other people. Those who take care of children need to understand the characteristics of development and also promote children's growth. John Bowlby, who is known as a pioneer of attachment theory, stated that having a warm relationship between a caregiver and a young child is very important if the child is to develop safely and healthily. If a child is not cared for properly by caregivers, this could cause problems in later years. The lack of responsible care might have a devastating effect on the child's health, growth, personality adjustment or cognitive capacity.[4]

All children need sensitive and responsive care from their caregivers to achieve healthy neurophysiological, physical and psychological development. Sensitive care means care such as being aware of the child and the child's acts and communicating with the child to discover their needs and wants. Responsive care means care with an appropriate response to the child's signals which exist or are likely to exist. As caregivers spend a long time with the child, they can improve the situation or encourage adjustment on the part of the child. It has been shown that there is a relation between children's positive health and development outcomes and sensitive and responsive child care. Conversely, a poor quality of caregiving threatens children's health, normal development and even their survival. Caregivers also play an important role in providing a good environment for children. The quality of the child's environment is dependent on caregivers. Therefore, appropriate care by caregivers is crucial for children.[4]

Drowning is preventable. It is possible to reduce the impact of drowning on public health, as shown by the history of drowning statistics in many high-income countries. It has been shown that childhood injuries including drowning have common forms. Appropriate care and modification of the environment surrounding children are crucial for prevention

of childhood drowning.[5] Many cost-effective, simple ways can make it possible to save thousands of lives. These prevention measures can affect children's development and quality of life. It is necessary to be clear which factors are related to drowning in order to make plans for prevention. It might also help in reducing the high incidence of drowning which threatens children's lives.

Young children under five years old need to be closely and properly supervised by caregivers for their safety. The American Academy of Pediatrics (AAP) recommends that children under the age of five years should never be left alone or in the care of another child while in water or near water sources. Their policy states that adults should supervise children from within an arm's length and refrain from distracting activities such as talking on the phone or concentrating on housework whenever children are in or around water.[6] However, many studies have shown that inappropriate child care by caregivers is associated with childhood injuries including drowning. According to a report from the Thai National Injury Survey, most caregivers were doing something else which made it difficult for them to concentrate on the child at the time of incidents.[3] Most of the previous research describes the patterns and causes of injuries and focuses on the main injury patterns among children, even though drowning can be prevented by caregivers. On the other hand, the Thai National Injury Survey reveals that many caregivers were engaged in distracting jobs or activities such as working outside at home (42%), household chores (31%), and gossiping (9%) when children aged one to four drowned. Nineteen percent of caregivers answered that they were sick at the time of the incidents.[3] These factors indicate that it would be possible to reduce child drowning risks by improving the care provided by caregivers.

Sing Buri Province is situated in the central region of Thailand. It is located in the Chao Phraya River plain, which is neither touristic nor urbanized. It might be possible to improve caregivers' awareness of children's risk of drowning. Therefore, this study will attempt to identify behaviors used to prevent drowning among caregivers with children aged one to four in rural areas of Sing Buri Province. The results of this study can help in the design of a program for preventing drowning in rural Thailand by finding associated behaviors and related factors for caregivers with children aged one to four.

The aim of the study was to describe the preventive behavior for drowning, socio-demographic factors, knowledge about drowning, perceptions of drowning among caregivers with children aged one to four, cues to action and environmental risks for drowning in rural areas of Sing Buri Province. Furthermore, the study sought to identify the relationship between these factors and preventive behavior on drowning.

Methods

A cross sectional descriptive study was carried out March 9-21, 2012. The data collection was conducted in Sing Buri Province. The study population comprised caregivers who were currently giving care to a child/children under five years old. The inclusion criteria for selection included: 1). the respondents were currently taking care of a child or children aged one to four; 2) the respondents were currently living in a rural area of Sing Buri Province; and 3). the respondents were willing to participate in the research.

There are six districts in Sing Buri Province. Two districts were selected since the Chao Phraya River runs through the rural areas of these districts, namely, Inburi and Promburi Districts. Next, all 10 sub-districts were selected from Inburi District and all seven sub-districts were selected from Promburi District. Simple random sampling was used to select primary caregivers with children aged one to four years. The minimum estimated sample size was 266, with 10% added to compensate for withdrawal of participants from this study. Therefore, the minimum estimated sample was 292. The composition of the sample group was proportionate to the number of children aged one to four in the two districts. Thus, 224 caregivers were selected from Inburi District, and 68 caregivers were selected from Promburi District. There were four caregivers who didn't complete the questionnaires. Finally, it was possible to collect data from 288 questionnaires completed for this study. Interviews were conducted at caregiver's homes, elementary schools, a nursery school, and in the community center. Interviews took about 20 minutes on average.

A structured questionnaire comprising six parts:

Part 1. Socio-demographic factors: This part included six restricted choice questions and three open-ended questions concerning age, sex, marital status, education, occupation, type of caregiver, type of family, number of children in family, and family income per month.

Part 2. Knowledge about drowning: This part included 11 restricted choice questions concerning caregivers' understanding about drowning among children aged one to four, including the definition, causes, risk factors, preventive measures, consequences of drowning and how to save a child in an emergency. Based on Bloom's criteria, correct answers by the respondent were classified into three levels: good, moderate and poor.

Part 3. Perceptions of drowning: This part included 20 restricted choice questions concerning perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. A Likert scale was used to determine the perceptions of caregivers toward child drowning. The perceptions were classified into three levels by using the mean as the cut-off point.

Part 4. Environmental risks for drowning: This part included 16 restricted choice questions concerning types of water source near caregivers' homes. This part was composed of questions about types of water sources and access to water sources, including the distance to the water sources from the house. It was also possible for the interviewer to observe the accuracy of this type of risks.

Part 5. Cues to action: This part included 16 restricted choice questions concerning the mass media and advice from other people.

Part 6. Preventive behavior on drowning: This part included 16 restricted choice questions concerning caregiver's actual practices in preventing drowning among children aged one to four. Three kinds of answers were possible: "Usually", "Sometimes", or "Never". Positive questions were scored as follows: "Usually" was given 3 points, "Sometimes" 2 points and "Never" 1 point. The median score was used as the cut-off point to categorize preventive behaviors into two levels: good and poor behaviors.

The questions in the questionnaire were drawn from a review of the relevant literature and from opinions expressed by experts on the topic. The questionnaire

was revised by experts. After the revision process, the questionnaire was translated into Thai.

Pre-testing of the questionnaire was done in Nakorn Pathom Province. The KR-20 result for the knowledge part was 0.35 after the first administration of the questionnaire. Cronbach's Alpha for the perception part of the questionnaire was 0.70. A second pre-test was conducted after revising the questionnaire. The KR-20 for the knowledge part of the second pre-test was 0.53. The questionnaire was then improved before data collection.

Each respondent was interviewed face-to-face by interviewers. The interviewers were Thai health workers from the public health office and health centers of Sing Buri Province. The researcher explained the objectives and methodology of the study, the questionnaire and ethical matters to the interviewers during a one-day training session to ensure that caregivers would be correctly interviewed for this study. The interviewers used a structured questionnaire and interviewed respondents in Thai. The purpose of the study was explained to all respondents; they were also informed of their right to refuse or withdraw anytime. They were told that they could return the questionnaire unanswered if they felt reluctant to respond to the questions. Participation of respondents was on a voluntary basis and their answers were anonymous.

The trial test and data collection were done after obtaining approval from the Mahidol University Institutional Review Board (MU-IRB) regarding ethics in human research. The data were analyzed by using MINITAB. The chi-square test and Fisher's exact test were used to identify the relationship between the preventive behavior of the caregivers and the independent variables. Multiple logistic regression analysis was used to evaluate the magnitude and significance of chosen independent variables.

Results

Most of the caregivers (85.1%) were married. Approximately one-half (51.4%) were mothers, followed by grandparents, relatives, fathers, older siblings and other. Nearly one-half of caregivers (48.3%) had two children. Nearly 40% of the caregivers (39.9%) had a monthly income of 5,000 to 9,999 baht (Table 1).

Most of the respondents (91.0%) received information about child safety and drowning from television. Over one-half of the caregivers (51.4%) received advice from personnel in the public health office and health centers. Furthermore, nearly one-half of the caregivers (44.4%) received information from health volunteers and family members. Family members were also a main adviser or key person for providing information.

Of the total number of caregivers, 170 (59.0%) had good preventive behavior on drowning. (Table 3)

The results of the chi-square test for association between the independent variables and the preventive behavior of the caregivers regarding drowning are shown in Table 4. This study found that marital status, education, family income per month, level of knowledge and perception, the use of posters as a source of information, the distance from caregivers' home to the river or canal, and the existence and quality of a barrier around the river were all significantly associated with preventive behaviors of the caregivers regarding drowning.

A significant association was found between knowledge and perceptions of the caregivers regarding drowning and preventive behavior (p-value <0.05). The caregivers who had good knowledge or perceptions about drowning had the highest proportion of good preventive behavior, whereas those who had poor knowledge or perceptions had the highest proportion of poor preventive behavior. The caregivers who lived near a river with few barriers were most likely to have a high level of preventive behavior.

The significant factors identified by the chi-square test were further tested by multiple logistic regressions to determine which factors had the most significant association for the preventive behaviors of the caregivers, as shown in Table 5. Since the p-value for the association between occupation of the caregivers and the preventive behavior regarding drowning was just 0.050, it was included as a significant factor. The results confirm a significant association by multiple logistic regressions (p-value = 0.034). After adjusting for other factors, caregivers who had high and moderate levels of perceptions were 2.17 times more likely to have proper preventive behaviors compared with those who had low perception levels. Caregivers who had good and moderate knowledge levels about drowning were 1.93 times more likely to have proper preventive behaviors compared with those having poor knowledge. A barrier around the river and the distance from the canal were significantly associated with preventive behavior on drowning (p-value <0.05). Caregivers who lived near a river without a barrier were 2.65 times more likely to have proper behavior than those who lived near a river with a barrier. With regard to the distance to the river and the canal, the preventive behavior of caregivers who lived less than 10 meters or more than 100 meters from a river or canal were prone to have worse preventive behavior compared with those who lived between 11 and 100 meters from a river or canal. Therefore, the distance from the house to the canal was classified into two groups: one included those living less than ten meters or more than 100 meters from a canal; the other was caregivers who lived between 11 and 100 meters from a canal, as shown in Table 6.

Table 1 Frequency and percentage of caregivers by socio-demographic characteristics

Socio-demographic characteristics	Frequency (n = 288)	Percentage
Age (years)		
15-24	37	12.9
25-44	151	52.4
45-64	93	32.3
>64	7	2.4
Mean = 39.10, SD = 13.08, Min = 16, Max = 72		
Marital status		
Married	245	85.1
Widowed/ Divorced/ Separated/ Never married	43	14.9
Education		
Lower than secondary school	13	4.5
Secondary school	87	30.2
High school	97	33.7
Vocational school	33	11.5
Bachelor's degree and above	58	20.1
Type of caregiver		
Mother	148	51.4
Father	15	5.2
Grandparent	102	35.4
Relative	20	6.9
Older sibling/Other	3	1.0
Occupation		
Farmer	46	16.0
Private sector employee	36	12.5
Government employee	37	12.9
Laborer	28	9.7
Housewife	77	26.7
Unemployed	21	7.3
Vendor	35	12.2
Student	2	0.7
Other	6	2.1
Family income per month		
<5,000 baht	55	19.1
5,000-9,999 baht	115	39.9
10,000-19,999 baht	53	18.4
≥20,000 baht	65	22.6
Median = 8,000, QD = 5,375, Min = 1,000, Max = 70,000		

Table 2 Frequency and percentage of caregivers by cues to action about child safety and drowning

Cues to action	Frequency	Percentage
Media*		
TV	262	91.0
Newspapers	166	57.6
Radio	145	50.4
Posters	39	13.5
Brochures	76	26.4
Books/Magazines	12	4.2
Handouts	32	11.1
Internet	84	29.2
Advice from Other People*		
Family members	140	48.6
Friends	44	15.3
Relatives	100	34.7
Neighbors	103	35.8
Health personnel	148	51.4
Health volunteers	128	44.4

*multiple answers

Table 3 Distribution of caregivers by level of preventive behavior on drowning

Level of preventive behavior by caregivers regarding drowning	Frequency (n = 288)*	Percentage
Good	170	59.0
Poor	118	41.0
Median = 28, QD = 2, Min = 10, Max = 30		

*Score: Good (≥ 28), Poor (< 28)

Table 4 Associations between independent variables and preventive behavior for drowning

Factors	Level of preventive behavior on drowning				x^2 (df)	p-value
	Good		Poor			
	n	%	n	%		
Marital status of caregivers						
Married	151	61.6	94	38.4	4.604	0.032*
Unmarried	19	44.2	24	55.8	(1)	
Education of caregivers						
Lower than secondary school	4	30.8	9	69.2	17.550	0.002**
Secondary school	56	64.4	31	35.6	(4)	
High school	46	47.4	51	52.6		
Vocational school	20	60.6	13	39.4		
Bachelor's degree and above	44	75.9	14	24.1		
Occupation of caregivers						
Farmer	28	60.9	18	39.1	12.600	0.050*
Private sector employee	22	61.1	14	38.9	(6)	
Government employee	27	73.0	10	27.0		
Laborer	14	50.0	14	50.0		
Housewife	42	54.6	35	45.5		
Vendor/Other	29	70.7	12	29.3		
Student/Unemployed	8	34.8	15	65.2		
Family income per month of caregivers						
<5,000 baht	24	43.6	31	56.4	8.663	0.034*
5,000-9,999 baht	71	61.7	44	38.3	(3)	
10,000-19,999 baht	30	56.6	23	43.4		
>20,000 baht	45	69.2	20	30.8		
The distance from home to the river (n = 126)						
1-10 m	15	35.7	27	64.3	11.204	0.011*
11-50 m	19	67.9	9	32.2	(3)	
51-100 m	11	78.6	3	21.4		
>100 m	22	52.4	20	47.6		

Table 4 Associations between independent variables and preventive behavior for drowning (cont.)

Factors	Level of preventive behavior on drowning				x^2 (df)	p-value
	Good		Poor			
	n	%	n	%		
A barrier around the river (n = 126)						
Yes	14	63.6	8	36.4	16.796	<0.001***
Yes, but inadequate	14	100.0	0	0.00	(2)	
No	39	43.3	51	56.7		
The distance from home to the canal (n = 157)						
1-10 m	28	59.6	19	40.4	12.080	0.007**
11-50 m	30	71.4	12	28.6	(3)	
51-100 m	12	80.0	3	20.1		
>100 m	22	41.5	31	58.5		
The use of health posters						
Yes	30	76.9	9	23.1	5.973	0.015*
No	140	56.2	109	43.8	(1)	

***p-value <0.05, **p-value < 0.01, ***p-value <0.001**

Table 5 Associations between level of knowledge and perceptions of caregivers toward drowning and preventive behavior for drowning

Factors	Level of preventive behavior on drowning				χ^2 (df)	p-value
	Good		Poor			
	n	%	n	%		
Level of knowledge						
Good	59	64.1	33	35.9	8.199	0.017*
Moderate	81	63.3	47	36.7	(2)	
Poor	30	44.1	38	55.9		
Level of perception						
High	38	76.0	12	24.0	11.933	0.003**
Moderate	114	58.8	80	41.2	(2)	
Low	18	40.9	26	59.1		

***p-value <0.05, **p-value <0.01**

Table 6 Adjusted odds ratio from multiple logistic regression for drowning preventive behavior by the caregivers by selected factors

Factors	Preventive behavior on drowning[R]			
	Adj. Odds ratios	95% CI for OR		p-value
		Lower	Upper	
Occupation				
Farmer/Private sector employee	1.86	1.05	3.30	0.034*
Government employee/Laborer				
Vendor/Other				
Housewife/Student/Unemployed	1.00			
Level of knowledge				
Good/Moderate	1.93	1.04	3.56	0.036*
Poor	1.00			
Level of Perception				
High/Moderate	2.17	1.05	4.49	0.036*
Low	1.00			
The use of posters				
Yes	2.62	1.10	6.21	0.029*
No	1.00			
A barrier around the river				
Yes/Yes, but inadequate	2.65	1.05	6.69	0.039*
No	1.00			
The distance from house to the canal				
1-10 m/ >100 m	1.00			
11-100 m	2.50	1.23	5.10	0.012*

***p-value <0.05**

Reference group (R): poor level of preventive behavior

Discussion

The results show that married caregivers had a higher percentage of good preventive behavior than the unmarried. This result supports the findings of Bishai et al.[7], who found that children with parents who had never married were at a higher risk of injury than those with a mother who stayed married throughout the child's life. Weitoft et al.[8] found that children who grew up in a single-parent family experienced increased health risks, including risk for injuries. This might be because married caregivers might receive more support from their families and it makes them concentrate on taking care of the children. It may make them better able to use good preventive behavior. On the other hand, single parents might not be able to fully concentrate on child care since they have many roles, such as breadwinner, housewife, and caregiver for children at home, as reported by Weitoft et al.[8]

The results show that more highly educated caregivers were more likely to behave well in preventing children from drowning. This result supports the findings of Vries et al.[9], who showed that more highly educated people scored better regarding health behaviors than people with lower levels of education. The research of Bishai et al.[7] also showed that the highest level of maternal education was significantly associated with lower rates of child injury. Bishai et al. also showed that the highest level of maternal education was significantly associated with lower rates of child injury. Iqbal et al.[10] found that more than two-thirds of mothers who lost a child by drowning did not have any formal education.

With regard to occupation, the group with the lowest proportion of good preventive behavior (34.8%) comprised students and the unemployed; it did not include housewives. This result is similar to the findings of a previous study conducted by Atak et al.[11], showing that working mothers were more likely to be associated with risks for injury to their child or children compared with nonworking mothers.

Atak et al. also found that the perceptions of childhood risks of injury by mothers who had a job was higher than that the perceptions of mothers who did not (p-value = 0.002). This study reveals that the perceptions of the caregivers were significantly associated with preventive behavior regarding drowning. The higher the level of perception the caregivers had, the higher the proportion of good preventive behavior they exhibited.

The results reveal that the highest income group had the highest percentage of good preventive behavior, whereas the lowest income group had the lowest percentage. This result is similar to the findings of Laursen et al.[12] and Sevketoğlu et al.[13] They reported that a child from a high-income family was less likely suffer childhood home injuries and that caregivers from such families could better protect children from accidents. This might be because higher income families can afford to purchase equipment or devices to prevent children from drowning. Another reason the highest income group had the highest proportion of good preventive behavior was probably that caregivers could afford to be better educated. This suggestion is supported by a report by WHO.[2] It concludes that poverty is one risk factor for drowning in children and poverty is associated with a lack of educational opportunity. There is reliable evidence that the level of education of caregivers or the head of family affects childhood drowning. In this study, the level of education of caregivers was also significantly

correlated with preventive behavior regarding drowning.

The group of respondents with a good level of knowledge had the highest level of good preventive behavior on drowning (64.1%) and the group with a poor level of knowledge had the highest level of poor preventive behavior (55.9%). This is similar to the findings of Thein et al.[14], who found that the mothers who had correct knowledge protected their children from injury. They also found that mothers who had good knowledge levels had high educational levels. In this study, a significant relationship was also found between caregivers' educational level and preventive behavior on drowning. This result may suggest that knowledge of the caregivers was a determinant factor and had an effect on preventive behavior on drowning. This supports the results of Crosby et al.[15], who reported that knowledge makes it possible to understand how to perform a behavior.

Considering the investigation of perceptions regarding drowning among caregivers, among those who had high levels of perception, over three-fourths (76.0%) had good preventive behaviors. The findings of this study support the results of Morrongiello et al.[16], who found that mothers' perceptions of the risk of injury was increasing, and they supervised children closely and left their children alone less frequently. Dal Santo et al.[17] also revealed that maternal perceptions of the risk of hazard were significantly correlated with maternal preventive behavior on injury for preschool children.

With regard to the distance to the river, the caregivers who lived within 10 meters had the lowest proportion of good preventive behavior (35.7%). More than two-thirds of caregivers who lived 11-100 meters from the river had higher good preventive behavior. This may be because caregivers who lived within 10 meters of the river were used to being close to the river and they weren't conscious enough of the existence of the river. The results regarding the distance to the canal were similar and the implied reason may be the same. All 14 caregivers who had good preventive behavior answered that they lived near a river with an inadequate barrier. This implies that insufficient or inadequate barriers near the river made the caregivers more aware of the need for the prevention of childhood drowning.

In this research, more than 90% of caregivers (91.0%) got information from TV. This percentage is nearly 95.70%, which is the proportion of people 15 years of age and over in the central region, excluding the Bangkok metropolitan area in 2008[18] who habitually watched TV. In Thailand, TV is the most frequently used medium and caregivers might be informed by TV since they have many opportunities to watch it. This result is similar to the findings of Hong et al.[19] who found that caregivers' main sources of information for prevention of childhood home injuries were television or radio (87.8%) in South Korea.

Posters were read by 13.54% of caregivers as a source of information regarding child safety and drowning. Those who read posters were 2.62 times more likely to use good preventive behavior than those who didn't read posters. This result implies that caregivers with a high level of education can use posters as a source of information by interpreting short messages from posters and acquiring the knowledge needed to use good preventive behavior regarding drowning. In this research, educational level and knowledge of

caregivers were associated with preventive behavior. This inference supports the findings of Koelen et al.[20], who wrote that posters should included the elements of a clear message, visual appeal, and menatal stimulation, which make a person consider the content of the message. They wrote that it is possible for all social groups to gain knowledge from mass media information. People with high educational levels take more notice of printed media compared with people with low educational levels. Furthermore, people with high educational levels are prone to take more notice of news and information programs compared with less well-educated people according to the findings of Koelen et al. This means that good posters might be effective especially for people who are sensitive and able to understand and interpret the messages even though probably such materials are probably not appropriate for everyone. Our findings also support those of Crosby et al.[15], who wrote that knowledge makes it possible to understand how to use the behaviors illustrated in print.

Nearly one-half of caregivers (48.61%) obtain advice from family members. This result is similar to the findings of Hong[19], who showed that 43.9% of caregivers get information regarding the prevention of childhood injuries from their family.

This study shows that more than one-half of caregivers received advice from health personnel and 44.4% of caregivers received advice from health volunteers. The main sources of information for caregivers in rural areas of Sing Buri Province were health personnel in the public health office and health centers and health volunteers. This might because the health workers were close to the caregivers and health workers had succeeded in building a trusting relationship with the population. Therefore, many caregivers might trust them and listen to their advice.

Recommendations

1. Single parents, the group with low educational levels, the unemployed, students, the low income group and caregivers who live in a home within 10 meter of a river or canal had a low percentage of good preventive behavior. Therefore, the organizations involved should provide an easy to understand program about childhood drowning for caregivers, in order to improve awareness and reduce their economic burden so that they can be involved in designing good preventive behavior for childhood drowning.

2. Knowledge about drowning is one of the most important factors affecting the preventive behavior of the caregivers in rural Thailand. Therefore, Thai local administration organizations should join with the upper levels of administration in the province, such as educational institutions, to make correct information widely available for caregivers.

3. A combined qualitative and quantitative study would be worth while for detecting the elements related to preventive measures against childhood drowning among caregivers in order to understand how their individual situations more precisely to reflect preventive behavior. Such a study should concentrate on the observation of caregiver practices regarding prevention of childhood drowning since this study did not directly observe the caregivers' preventive practices.

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