

## Drowning Risk Perceptions among Rural Guardians: A Community-Based Household Survey

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### Abstract

Drowning is one of the most common causes of death among young children in Thailand. Children in primary school in rural settings have a high rate of fatal drowning. Guardians' perceptions are important since children are normally in their care. Little is known about guardians' perceptions related to drowning which may be critical to preventing child-related drowning death. This study aims to describe drowning risk perceptions and identify barriers to developing a child's swimming skill. A cross sectional household survey was conducted in rural communities surrounding 12 school areas. A sample of 633 guardians of primary school children who had at least one child 6-12 years old or studying in grade 1-6 were interviewed in their household. The results revealed that less than one-fifth (18%) of children in the household could swim. Guardians reported that children should learn to swim at the age of seven. About one-quarter (23%) of guardians did not perceive drowning as leading cause of death among children. More than one-quarter (25.4%) perceived that their child is not at risk of drowning; and 40% unable to determine that drownings is a serious problem. There were statistical differences of perceptions of barriers between guardians who had a child that could swim and could not ( $P < 0.01$ ). The results highlight the need to promote drowning risk perceptions among rural guardians and consider changing their attitude to develop their child's swimming skills.

**Keywords:** Perceptions; Drowning risk; Swimming skill; Injury prevention; Thailand

### Introduction

Drowning is a leading cause of injury death among children aged less than 15 years worldwide. The majority of drowning deaths (97%) occur in Low and Middle Income Countries (LMIC). Drowning continues as a significant cause of childhood death in Asia [1-3]. Almost all drowning deaths occur in less developed and developing countries, including Thailand [4-10]. According to the Thai National Injury Survey in 2004, it was estimated that about 2,600 Thai children younger than 18 drown each year. Rural children between 1 and 17 years are almost 5 times more likely to drown than their urban counterparts. This is generally attributed to higher exposure in rural areas to aquatic environments and rural children's inclination towards higher risk-taking activity. Males are more than twice as likely as females to drown. Most drownings in Thailand occur in natural water bodies such as ponds, ditches, lakes, rivers or the sea which account for 76 percent of drowning. Rivers are the most cited places where children drown [10]. In a developed country, it is recommended to provide swimming lessons in children after age of four to prevent drowning [11].

Several methods have been recommended to prevent child drowning: increasing supervision, limiting exposure to bodies of water, equipping boats with flotation devices and providing swimming lessons [12-15]. Specific prevention strategies should be matched to appropriate age groups. Teaching swimming to increase survival skills in water is recommended for school aged children. Moran and Stanley reported the participation in formal swimming lessons was associated with a reduction in the risk of drowning [16].

In the search for risk factors of injuries, parental factors have long been identified as an important aspect for investigation since children are normally in the care of their parents. Many studies have been conducted in the area of parental factors and childhood injuries internationally, and these studies concentrated on parental perception, attitude, and supervisions [17-19]. However, the related issues of parental belief in the drowning risk, child's swimming skill

and barriers of swimming skill development remain poorly described. This study sought to examine drowning risk perceptions of guardians and determine the barriers of swimming skill development. The study would help to understand rural guardians' perception and determine the way to minimize barrier factors.

### Methods

#### Study area and recruitment

A cross-sectional household survey was carried out within Chiang Sean district of Chiang Rai province, Thailand. The district has an estimated total population of 51,949 inhabitants in 6 administrative areas. The surface area is 554 km<sup>2</sup>. Rural villages located in the district were selected as a target community due to the high mortality rate from drowning reported in the Thai National Injury Survey in 2004 [10]. Most of the villages are attached with natural water bodies such as rivers, ponds, lakes, dams, etc. As our target participants were guardians of the primary school children, therefore primary schools in those rural villages were used as a starting point in household survey. There were 20 schools with student grade 1-6 in 71 villages. There were 12 schools that accessible and feasible to conduct the community survey. Those 12 schools served people in 48 villages. The researcher collaborated with school teachers and community leaders to convey a verbal message to guardians about the impending community survey.

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Received May 21, 2012; Published December 31, 2012

**Citation:** Laosee O, Khiewyoo J, Somrongthong R (2013) Drowning Risk Perceptions among Rural Guardians: A Community-Based Household Survey. 2:581 doi:10.4172/scientificreports.581

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## Respondents

The respondents were guardians who live in 12 primary schools with at least one child studying in primary school or between 6 and 12 years of age. Guardians in this study are defined as a person who is the primary care taker of the child/children; they can be the father, mother or others. We estimated the sample size using the prevalence of swimming skill of primary school children. A prevalence estimate of 25% of children being able to swim from a previous study was used [10] and 0.035 acceptance error. A total of 633 guardians of primary school children provided data for this study. Research assistants who were undergraduate students and residents in target areas were recruited. They were trained to conduct data collection fieldwork in a one-day training session on the role of the interviewer before starting the community survey. Research assistants met the guardians in their household and applied face-to-face interview technique to collect data. To ensure consistent and accurate of data, research staff monitored and supervised field staff throughout the data collection period. Data collection was conduct during August to September 2009.

## Survey questionnaire

Introductory questions sought demographic information of the guardians and children in the household. Swimming skill in this study was defined as the physical skills necessary to transverse at least 25 meters of open water and remove oneself from water without assistance. The second part was applied the Health Belief Model to construct a set of questions [20]. This part was designed to gather the guardians' perceptions towards: 1) Children's susceptibility to drowning (e.g. drowning is a leading cause of death among children, every child is at risk of drowning, your child is at risk of drowning); 2) Severity of drowning (e.g. drowning is a serious problem, a child that drown must be admitted to the hospital, most drown victims will die ); and 3) Benefits of swimming skill (e.g. swimming is a life skill, swimming skill will decrease the risk of drowning, swimming skills are necessary in particular professional careers). The answers were based on a 5-likert scale (5= strongly agree, 3=don't know, 1=strongly disagree). The last part assessed the barriers to developing a child's swimming skill, for example, lack of swimming instructor, availability of clean water for children to learn to swim, lack of swimming lessons in school, unaffordable of the swimming fee, inconvenient to go to the swimming venue, and etc. The interviewers also asked if the respondent thought of any other barriers. The answers were "yes" or "no" based on guardians' perspectives.

The questionnaire was tested for reliability of the questions by 30 guardians in a non-study community on 11-12 May 2009. Through internal consistency test, the Cronbach's alpha was 0.72. After pretest, some words and the order of questions were adjusted following feedback from the respondents.

## Ethical consideration

The study was approved by the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University. Written informed consent was sought from each adult respondent.

## Data analysis

Data were independently entered by two data entry operators in EPI-Info version 6.04. The analysis was performed using Statistical Packages for the Social Sciences (SPSS, version 17.0). Descriptive statistics were calculated to describe characteristics of respondents, primary school children, and their perceptions in the survey. In the part on perceived of barriers to developing swimming skills, guardians

having at least one child who could swim were considered to have a child able to swim. The top five selected barriers were reported in this study. Comparisons of barriers of developing swimming skills for different guardians of child's swimming skills were made using Fisher's exact test, with a p-value <0.05 considered statistically significant.

## Results

The descriptive statistics revealed that three-quarters of the respondents were female; the median age was 44 years. About half (53%) had a primary school education and earn about 133 USD a month. One-third of guardians (35%) can swim and they thought that children should learn to swim at the age of 7 (Table 1). A total of 755 primary school children were found in the survey households. There is equal distribution among boys and girls in the households, about half (52%) are in Grade 4-6. Few children (5%) were studying in a school with a swimming pool. Among children in the household, less than one-fifth (18%) could swim. Children' demographics are displayed in table 2.

## Drowning risk perceptions and benefits of swimming skill

The majority of guardians report positive responses to drowning risk perception. However, about one-fifth of guardians (23%) did not know that drowning is a leading cause of death among children, and 40% could not determine that their child is at risk of drowning. In addition, more than one-quarter (26%) thought drowning is not

Number of respondents	633	
Gender, female	478	(75.5%)
Median age, year	44	(36, 52)
Age range (years)	18-74	
Mean persons in household	4.27	
Education level		
None	134	(21.2%)
Grades 1-6	340	(53.7%)
Grades 7-12 or beyond	159	(25.1%)
Marital status		
Married	565	(89.3%)
Single	19	(3.0%)
Widow/divorced	49	(7.7%)
Occupation		
Unemployed	95	(15.0%)
Farmer	213	(33.6%)
Worker	216	(34.1%)
Employee	16	(2.5%)
Self-employed	93	(14.7%)
Median monthly income, Baht	4000	(3000, 6000)
Swimming skill	223	(35.2%)
Median age of children that should learn to swim	7	(6, 10)

**Table 1:** Respondent demographic categorical data given by n (%), and continuous data by mean (inter-quartile range).

Number of children	755	
Gender, boy	357	(49.2%)
Median age	9	(8, 11)
Grades 4-6	380	(52.4%)
Attending school with swimming pool, yes	41	(5.7%)
Primary caretaker, mother	344	(47.4%)
Ever attend swimming lesson, yes	127	(17.5%)
Swimming skill, yes	132	(18.2%)
Experience of nonfatal drowning, yes	78	(10.8%)

**Table 2:** School children demographic categorical data given by n (%), and continuous data by median (inter-quartile range).

a serious problem. Regarding to the benefits of swimming skill, the majority of guardians perceived swimming skill to be beneficial skill for their children as swimming is a life skill, decreases drowning risk, and is necessary in particular professional careers (Table 3).

In terms of barriers to increase swimming skills, there were statistical difference between perceptions of guardians who have a child who could swim and those who could not. Guardians of an unable to swim child reported significantly higher proportion of barriers (Table 4).

### Discussion

In the guardians' view, a child should learn to swim at age seven. This revealed a misperception among guardians. The Thai Ministry of Public Health recommends that children should be able to swim at the age of five. Similarly, the American Academy of Pediatrics (AAP) has recommended swimming lessons for most children 4 years and older and some children at younger ages depending on exposure risk and developmental readiness [21,22]. In fact, young children have higher risk of drowning. Swimming and water safety skills were recommended to reduce drowning risk worldwide [5,15,23-25]. The results emphasized the need to deliver the core message of promoting swimming skills for children in younger ages among rural guardians.

The results revealed that two-third of guardians and four-fifth of their children cannot swim. This was consistent with a previous survey which indicated that only one-quarter Thai children after four years of age can swim [10]. In addition, the percentage of children who are able to swim is higher than those who attend school with swimming pool (18.2% versus 5.7%). This reflected the fact that some children have learnt to swim outside school curriculum. Children in rural area of Thailand are known for developing their swimming skills in natural water near their residence. Some of them were taught by their friends or tried by themselves, which contributed to high number of drowning reported in rural settings [10,26].

This cross sectional study reported drowning risk perception among rural guardians, and indicates that 13% of guardians did not perceive drowning as a leading cause of death among children. In fact, drowning is a leading cause of injury death among children aged less

than 15 years worldwide [27]. Drowning is one of the most common causes of death among young children in developing countries in Asia, including Thailand [5,7,10,28]. A 2006 Thai National Injury Survey (TNIS) estimated 2,600 young Thai children drown each year. In children aged 1–17 years, fatal drowning rates are 17.2 per 100,000, which makes drowning the leading cause of injury death in Thailand (higher than motor vehicle related deaths)[10]. Among school-aged children the mortality rate among those aged 5–9 years and 10–14 years were 15.5 per 100,000 and 9.0 per 100,000, respectively. Higher drowning rate was reported in those in rural areas [10,27].

Interestingly, this study revealed one-quarter of guardians did not realize that their child is at risk of drowning and one-fifth of them perceived drowning as not a serious problem. Parent's risk perceptions were examined in many research studies [17,19,29-33]. Our results confirmed previously reported low risk perceptions in those in developed and developing countries [19,30-31]. The explanation could be because majority of guardians in rural areas perceived drownings are accidents, and therefore could not be prevented. The results emphasize the crucial need to reinforce the messages that drowning is preventable. Their children have a risk of drowning and swimming lessons should therefore be started as soon as possible [6,23]. In addition, other preventive methods such as fencing, supervising, lifesaving, etc. should consider to be a crucial mechanism to prevent child drowning in the rural communities.

Previous study indicated that the absence of public health interventions, lack of research on intervention effectiveness and cost-effectiveness, and a paucity of national drowning prevention programs are the main barriers to reduce drowning in low and middle income countries [5]. This present study is unique as it is the first study reported drowning risk perceptions among guardians which investigated barriers to developing child's swimming skills in rural areas where most fatal drowning occurs. The study reported statistically differences in perceptions of barriers between guardians who have a child able and unable to swim. Availability of infrastructure has been reported as affect the life chance or chance to be able to swim, or participate of water activities [34]. Guardians of unable to swim children may have to put more effort to overcome those barriers and rethink that swimming

	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Mean	(S.D.)
Drowning is a leading cause of death among children	6	(0.9)	81	(12.8)	65	(10.3)	377	(59.6)	104	(16.4)	3.8	(0.9)
Every child is at risk of drowning	3	(0.5)	65	(10.3)	77	(12.2)	408	(64.5)	80	(12.6)	3.8	(0.8)
Your child is at risk of drowning	9	(1.4)	152	(24.0)	94	(14.8)	334	(52.8)	44	(7.0)	3.4	(1.1)
Drowning is a serious problem	38	(6.0)	86	(13.6)	39	(6.2)	345	(54.5)	125	(19.7)	3.7	(1.1)
A child that drown must be admitted to the hospital	5	(0.8)	61	(9.6)	123	(19.4)	390	(61.6)	54	(8.5)	3.7	(0.8)
Most drown victims will die	15	(2.4)	64	(10.1)	109	(17.2)	366	(57.8)	79	(12.5)	3.7	(0.9)
Swimming is a life skill	1	(0.2)	2	(0.3)	18	(2.8)	417	(65.9)	195	(30.8)	4.2	(0.5)
Swimming skill will decrease drowning risk	1	(0.2)	3	(0.5)	12	(1.9)	459	(72.5)	158	(25.0)	4.2	(0.5)
Swimming skill are necessary in particular professional career	1	(0.2)	7	(1.1)	26	(4.1)	321	(50.7)	278	(43.9)	4.4	(0.6)

Table 3: Number and percentage of drowning risk perceptions among guardians.

Type of barriers	Child swimming skill		p value*
	No (n=514)	Yes (n=119)	
Lack of swimming instructor	403(78.4)	76(63.9)	0.001
Lack of clean water to swim	398(77.4)	79(66.4)	0.009
Lack of swimming lessons in school	371(72.2)	71(59.7)	0.006
Unaffordable of swimming course	149(29.0)	40(37.6)	0.188
Inconvenient to go to the swimming venue	137(26.7)	34(28.6)	0.375

\* by fisher's exact test

Table 4: Number and percentage of barriers by child's swimming skill.



skills of their children is their responsibility. If they could change their attitude of responsibility into response to the best of their ability, that could be beneficial for their children.

This study involved guardians in particular rural communities, therefore, the resulting in a lack of generalizability. Urban guardians or those from other countries might have different perceptions. We recognize that face to face interviews could influence the results if our interviewer met guardians as a group.

## Conclusion

This study highlights inadequate drowning risk perceptions among rural guardians in Thailand. In addition, guardians perceived an older age to start learning to swim. They neither perceive drowning as a risk nor a serious problem. The lack of swimming instructors, clean water, and swimming lessons in schools were reported as barriers to developing a child's swimming skill. The findings of the study could develop core messages to promote increased risk perceptions among rural guardians, and consider changing their attitude to develop their child's swimming skill as their responsibility. The findings of the study could be useful to develop existing infrastructures to enhance childhood drowning intervention programs in rural communities of Thailand as well as in similar settings of other developing countries and thereby reduce child mortality as a result.

## Funding

Thailand Research Fund through the Royal Golden Jubilee Ph.D. Program, Grant No. PHD/0294/2549.

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the authorship and/or publication of this article.

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