

# AWARENESS, PRACTICES, AND HEALTH PROBLEMS OF BACKPACKERS TRAVELING DURING FLOODING IN THAILAND DURING 2011

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**Abstract.** During late 2011, Thailand experienced its worst flooding in 50 years with over 4.6 million people directly affected. During the flooding we conducted a cross sectional survey of backpackers in the Khao San Road area of Bangkok to determine awareness, practices, and their incidence of health problems during the flooding. A total of 422 subjects completed questionnaires which were analyzed. Seventy percent were European and 12.3% were North American. The overall median age was 27 years and the median stay in Thailand was 22 days. Most of the backpackers were aware of the flooding in Thailand; some had sought travel health information prior to their trip from various sources including the internet, their family physician or a travel clinic. However, even in travel clinics specific health advice related to flooding, such as leptospirosis risk/prevention, was rarely given to travelers. Fifteen point four percent of subjects (65/422) had come into contact with floodwater; 30.8% of those (20/65) washed their feet/legs afterward. Our findings indicate most backpackers were inadequately aware of potential health hazards, such as leptospirosis, during the floods.

**Keywords:** travel, flood, backpacker, Thailand

## INTRODUCTION

In 2011, Thailand experienced its worst flooding in 50 years. Vast areas of northern and central Thailand, including Bangkok, were affected by the flooding. Over 1.7 million households (about 4.6

million people) were directly affected, and at least 675 were killed during this disaster (Department of Disease Control, 2011a). This flooding has been described as "the worst flooding yet in terms of the amount of water and people affected" (AFP, 2011). The World Bank estimated the flood caused economic losses of at least USD45 billion (The World Bank, 2011).

Travelers to Thailand were also affected directly or indirectly by the flooding. Many had to change or cancel their travel plans due to the flooding, while some traveled to or through flooded areas, coming into contact with floodwaters that posed

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a risk of disease, such as enteric diseases and leptospirosis. To our knowledge, no previous study has focused on the health problems of travelers in Southeast Asia during periods of major flooding.

This study focused on backpackers in the Khao San Road area, a major backpacker center for Southeast Asia. The study assessed their attitudes, practices, and the incidence of health problems, during the flooding.

## MATERIALS AND METHODS

This cross sectional, questionnaire-based study was conducted in Thailand during the flooding of 2011. Data were collected from foreign backpackers in the Khao San Road area, an inner, flood-free area of Bangkok. Khao San Road is a famous backpacker center. Most backpackers in the region use Khao San Road as their hub for exploring the rest of Southeast Asia (Wikipedia, 2011).

The questionnaire was drafted, tested, and revised before data collection. The final version of the questionnaire consisted of 14 questions divided into 2 parts: general information about the backpackers, their trip, their perceptions and practices related to the flooding, and their health problems during the trip. The sample size was calculated using the estimated number of backpackers in the Khao San area obtained from the Tourism Authority of Thailand and the standard Yamane sample-size table (Yamane, 1973). To achieve a 95% confidence level, at least 397 samples were required.

The accidental sampling method was used during data collection. Eligible participants were foreign backpackers aged >18 years, able to read and understand the English-language questionnaire. Expatriates and backpackers who traveled

to Southeast Asia for fewer than 5 days were excluded. During data collection, the investigating team invited any foreign travelers in the Khao San Road area to participate. Eligible foreign travelers, who considered themselves backpackers and were willing to participate in the study, filled out the questionnaire themselves. An investigating team member was available to help with clarification of the questionnaire. The study protocol and questionnaire were reviewed and approved by the Ethics Committee of the Faculty of Tropical Medicine, Mahidol University.

## Statistical analysis

Statistical analysis was conducted using SPSS for Windows, version 10.0.7 (SPSS, Chicago, IL) software. Continuous data were presented as means with standard deviations (for normally distributed data), or medians with ranges (for non-normally distributed data). Categorical data is presented as numbers and percentages. The Student's *t*-test was used to compare means between 2 groups, and the chi-square test was used for categorical data, where appropriate. A *p*-value < 0.05 was considered statistically significant.

## RESULTS

The study was conducted in the Khao San Road area of Bangkok, during 2-16 December 2011, when the flood had just passed its peak. Downtown Bangkok and the Khao San Road area were not flooding but many other parts of Bangkok were still flooded and many roads, especially to the north, were still inaccessible.

Approximately 70% of backpackers approached were willing to participate in the study. Overall, 422 questionnaires were completed and analyzed. Fifty-eight percent of subjects were male with an

Table 1  
Demographic and travel characteristics  
(N=422).

	n (%)
Sex	
Male	246 (58.3)
Female	176 (41.7)
Age (yrs) (median 27; range 18-77)	
14-30	294 (69.7)
31-45	103 (24.4)
46-60	20 (4.7)
>60	5 (1.2)
Nationality	
European	297 (70.4)
North American	52 (12.3)
Australian-New Zealander	35 (8.2)
Asian	24 (5.7)
African	10 (2.4)
South and Central American	4 (0.9)
Reason for travel	
Tourism	372 (88.4)
Work or business	17 (4.0)
Visiting friends and relatives	17 (4.0)
Education and research	6 (1.4)
Other	9 (2.1)
Traveled to	
Thailand	422 (100.0)
Cambodia	96 (22.7)
Lao PDR	91 (21.6)
Vietnam	73 (17.3)
Malaysia	40 (9.5)
Myanmar	16 (3.8)

overall median age of 27 years. Seventy point four percent were European, 12.3% North American and 8.2% Australian or New Zealander. Tourism was the main purpose for travel to Thailand in 88.4% of participants. The median length of stay in Thailand was 22 days. The demographic data are shown in Table 1.

#### Awareness of flood in Thailand and preparations

Of the 422 participants, 74.9% had sought travel health advice prior to trav-

Table 2  
Pre-travel preparations.

	n (%)
Sought travel health information before this trip	
Yes	316 (74.9)
No	106 (25.1)
Source of travel-health information (n=316)	
Internet	157 (49.7)
Family practitioner	121 (38.3)
Travel clinic	117 (37.0)
Friends and relatives	82 (25.9)
Guidebooks/magazines/news	70 (22.2)
Pharmacists	51 (16.1)
Other	15 (4.7)
Aware of major flooding in Thailand	
Yes	311 (75.3)
No	102 (24.7)
Received health advice specific to flooding	
Yes	138 (33.3)
No	276 (66.7)

eling. The Internet was the most popular source of information, followed by their family physician, a travel clinic, friends and relatives and a guidebook. Three quarters of backpackers were aware of the flooding prior to coming to Thailand. Only 33% of backpackers had received health advice specific for traveling during a flood (Table 2).

#### Relationship between flood-specific health advice and travel clinic visit

Of the 422 backpackers, 117 (27.7%) received pre-travel advice from a travel clinic. Backpackers who had received advice from a travel clinic had significantly more vaccinations than those who did not visit a travel clinic. The most common vaccination was against hepatitis A. In the travel clinic group, 86.3% had been vaccinated against hepatitis A *versus* 67.2% of those who visited a non-travel clinic. Japanese encephalitis (JE) vaccination

Table 3  
Comparison between travel clinic group and non-travel clinic group.

Pre-travel preparation	Travel clinic group (n=117)	Non-travel clinic group (n=195)	p-value
Vaccinated before this trip			
Hepatitis A vaccine	86.3%	67.2%	<0.001
Hepatitis B vaccine	80.3%	64.1%	0.002
Tetanus toxoid	79.5%	62.6%	0.002
Typhoid vaccine	68.4%	46.7%	<0.001
Cholera vaccine	36.8%	10.8%	0.001
Rabies vaccine	29.1%	14.9%	0.003
Japanese encephalitis vaccine	17.1%	9.2%	0.04
Received specific health advice regarding major flooding			
Food and drink precautions	33.3%	29.4%	0.465
Leptospirosis risk	10.3%	12.9%	0.488
Skin care	10.3%	8.8%	0.661
Injury, including electrical hazards	8.5%	6.2%	0.431
Other health advice	2.6%	2.1%	0.7

Non-travel clinic group received health advice from other sources beside travel clinic.

was the least common vaccine among the subjects. Only 17.1% of those attending a travel clinic were vaccinated against JE while 9.2% of those who attended a non-travel clinic.

Thirty-three percent of subjects received specific flood-related health advice; there were no differences between the travel clinic and non-travel clinic groups. Advice about food and drink precautions was given to 33.3% of the travel clinic group and 29.4% of the non-travel clinic group; the difference was not statistically significant. Advice about the risk for leptospirosis and preventive measures was given to 10.3% of the travel clinic group and 12.9% of the non-travel clinic group; the difference was not statistically significant. Other flood-related advice, such as skin care during a flood, and accident prevention, was uncommon in both groups. The results are shown in Table 3.

#### Impact and incidence of health problems when traveling during the flood

Of the 422 subjects in our study, 80 (19%) had to change their travel plans due to the flood; 3.9% had to cancel parts of their itineraries because of the flood. About 15% of subjects (65/422) came into contact with floodwater; of whom only 20 (30.8%) washed their feet/legs after contact.

Sixty-one point one percent of subjects recalled at least one health problem during their trip. Respiratory tract symptoms were the most common (30%), followed by diarrhea (20%). Skin problems, fever and accidents, were reported by 13.8, 11.7, and 6.2%, respectively. Approximately 2% of subjects were bitten by a dog/cat during their trip (Table 4).

The incidences of health problems in backpackers exposed to flooded water and those who did not were not significantly

Table 4  
Impact and incidence of health problems during this trip.

	<i>n</i> (%)
Impact of flooding on travel plans	
Original destination not affected by flood	319 (76.9)
Changed itinerary to other area/province	64 (15.4)
Changed itinerary to nearby country	16 (3.9)
Cancelled some of itinerary because of flooding	16 (3.9)
Walked through or came into contact with floodwater	
Yes	65 (15.4)
No	357 (84.6)
Among those who came into contact with flood water	
washed feet/legs immediately after exposure	20 (30.8)
Did not wash feet/legs	45 (69.2)
Health problems during this trip ( <i>n</i> =419)	
Cough, sore throat, running nose	127 (30.3)
Diarrhea	83 (19.8)
Licked by a dog/cat	72 (17.2)
Skin rash or other skin problems	58 (13.8)
Fever	49 (11.7)
Injury	26 (6.2)
Bitten by a dog/cat	8 (1.9)

different between the two groups, except the incidence of accidents was higher in the flood-exposed group than in the flood non-exposed group (15.4% vs 4.3%,  $p < 0.002$ ).

#### DISCUSSION

The health impacts of flooding have been studied and reviewed in many articles (Wilder-Smith, 2005; Du *et al* 2010; Anthony, 2011; Bich *et al*, 2011; Kouadio *et al*, 2012). The immediate effects include drowning, injury and electrocution; later effects includes diarrheal diseases, wound infections, skin diseases, and leptospirosis (Du *et al*, 2010; Bich *et al*, 2011). However, most studies have been conducted among local people in flooded areas, not short-term tourists with different risks, especially if they are aware of their risks

prior to travel.

In our study, 75% of our subjects were aware of the flooding prior to their trip. This number seems unusually low considering the news coverage internationally. By November 2011, 20 countries, including the USA, UK, Germany, Canada, Australia and New Zealand, had issued travel warnings/alerts to their citizens planning to visit Thailand.

In our study, 27.7% of subjects had visited a travel clinic prior to travel. Vaccination rates were higher among those having attended a travel clinic. Several studies have found travel clinics are good sources of information about diseases and vaccines for travelers (Toovey *et al*, 2004; Piyaphanee *et al*, 2010). However, only 30% of those visiting a travel clinic received health advice regarding traveling



to a flooded area. The rates were similar in both the travel clinic and non-travel clinics. Some travelers may have visited a clinic prior to the flooding.

Leptospirosis is more common in flooded areas (Kouadio *et al*, 2012). Several studies have reported leptospirosis outbreaks after flooding, especially among local people (Karande *et al*, 2003; Pradutkanchana *et al*, 2003; Yang *et al*, 2005). Leptospirosis transmission occurs via penetration of skin or mucous membranes by the bacteria. The water becomes contaminated with infected rodent urine. Leptospirosis prevention is fairly simple: wearing appropriate clothing, limiting exposure to contaminated water, and cleaning contact areas immediately (Slack, 2010; Department of Disease Control, 2011b). Only 10% of travel clinics gave this advice to backpackers in our study. This indicates advice about leptospirosis prevention was not included in the visit; some travel-medicine practitioners may have been unfamiliar with leptospirosis. Although most cases of leptospirosis among travelers is related to water activities, such as rafting, swimming, and canoeing (Sejvar *et al*, 2003; Leshem *et al*, 2010); it should be kept in mind that leptospirosis can emerge in flooded areas. During the 2011 flooding, the Ministry of Public Health, Thailand reported 12 cases of leptospirosis among Thais (Department of Disease Control, 2011b). This confirms the risk of leptospirosis was real.

Although the flooding affected a large area, many tourist attractions were unaffected by the flooding; 77% of subjects did not change their travel plans due to flooding. Fifteen percent of subjects had direct contact with flood water. Only 30.8% of those who contact with flood water had washed their legs immediately

after exposure. This increases the risk for contracting leptospirosis and other skin-related problems.

Diarrheal diseases also occur with flooding, especially with population displacement, poor sanitation, and contamination of the water supply (Kondo *et al*, 2002; Schmid *et al*, 2005; WHO, 2006; Watson *et al*, 2007; Kouadio *et al*, 2012). Although the flooding lasted more than 2 months and caused substantial population displacement, the incidence of travelers' diarrhea in this study was lower than our previous backpacker survey in the Khao San Road area, in 2009 (19.8% *vs* 30.6%, respectively) (Piyaphanee *et al*, 2011). This might be because the 2009 study was conducted during summer in which diarrhea is common. During the flooding the water-treatment system and food supply were not disrupted, so there was no shortage of safe water/food.

Not only infectious diseases, physical dangers, such as drowning, electrocution and trauma are also the important health risks during flooding (Wilder-Smith, 2005; Du *et al*, 2010; Bich *et al*, 2011). In our study, injuries were more common among flood-exposed subjects. Although no direct causal effect can be proved by this study, it is prudent to advise travelers to flooded areas to pay attention to personal safety. The incidence of animals bites in this study was higher than a previous study (Piyaphanee *et al*, 2010) in a non-flooding situation (2% per month *vs* 0.7% per month). This higher incidence could be related to higher stress among animals due to displacements from their habitats and/or a shortage of food.

This study had several limitations. First, although this study asked about pre-travel preparation and health problems while traveling during the flood,

it was a cross sectional study, so causal relationships between the flood and health could not be determined. Backpackers were exposed to flood waters to different degrees and for different durations. Some just traveled through flooded areas, while others came into contact with floodwaters. Therefore, it was only possible to roughly estimate the incidence of health problems among backpackers traveling during a major flood.

Second, the study data were only collected in the Khao San Road area, which was flood-free. Although this is a major hub for backpackers, these subjects are not representative of all backpackers traveling during the flood, especially the more adventurous travelers, who might choose to travel or stay near flooded areas to obtain a first-hand experience or photograph the flood. Such backpackers might be at higher risk than those in the Khao San Road area.

We conclude that most of the subject did not receive specific health advice regarding travel during a major flood, and had limited awareness of the potential flood-related risks, such as leptospirosis. Specific health advice should be given to travelers at risk of encountering flooding.

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