

HEALTH AND NUTRITION SURVEY OF TSUNAMI VICTIMS IN PHANG-NGA PROVINCE, THAILAND

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Abstract. The post-tsunami health and nutritional statuses of survivors were surveyed three months after the disaster struck. Non-participant observations and questionnaires were used to study the effects of the disaster on their lifestyles and health while residing in temporary shelters provided by the government and private donors. Anthropometrics were measured and dietary surveys conducted to elicit nutritional status. Our findings indicated good management of drinking water in the temporary shelters. Toilet construction and water supply were adequate, but wastewater and sewage systems were poorly managed. The study group still suffered from injuries after the disaster, and complained of back pain, stress, and sleep disorders. Most in the study group had unsatisfactory health behaviors, and obesity was an increasing problem among female participants.

INTRODUCTION

The Indian Ocean tsunami of 26 December 2004 caused a catastrophe in eight countries in Southeast Asia and Africa: India, Indonesia, Malaysia, Maldives, Seychelles, Somalia, Sri Lanka, and Thailand. Six provinces in Thailand: Krabi, Phang-Nga, Phuket, Ranong, Satun, and Trang were impacted. Its most immediate and tragic effects were upon the lives, habitations, occupations and businesses lost, especially in international tourist destinations. Many health-care personnel in the region were killed or injured, and hospitals and clinics were damaged or destroyed. A small hospital on Phi Phi Island, in Krabi Province, was destroyed by the tsunami, and four health clinics in coastal villages and islands were severely damaged or destroyed (WHO Thailand, 2005).

Unlike other countries affected by the tsunami disaster, Thailand was able to mobilize re-

habilitation and reconstruction efforts quickly. The response of the Thai Ministry of Public Health (MOPH) to the devastation was rapid, and effective in mitigating the health consequences of the tsunami among survivors. Mass casualty plans were immediately activated, and medical personnel, technical experts, and supplies arrived soon after the tsunami struck. Technical assistance was provided by the Thai MOPH-US CDC Collaboration (TUC) and the Armed Forces Research Institute of Medical Sciences (AFRIMS), with the support of the office of the World Health Organization (WHO) representative to Thailand. Large numbers of homeless people were obliged to live in temporary shelters, in crowded conditions with inadequate sanitation and waste management, which were risk conditions for disease outbreaks and other health problems. Emergency food, water and shelter were provided, and steps taken to avoid any epidemic outbreak were largely effective. Outbreak risks and sanitation, environmental, and community mental health needs were rapidly assessed and addressed. Health education programs on personal hygiene, water and food safety, garbage disposal, toilet construction, injury prevention, and mental health were initiated. (Watts, 2005; WHO Thailand, 2005).

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The disaster resulted in significant environmental damage and disturbance. Several inland water sites became brackish from being engulfed by sea water, leading to vector proliferation and an increase in mosquito-borne diseases, including malaria (Apiwathanasorn *et al*, 2005). Melioidosis cases were reported among tsunami survivors in Phang-nga, a region in southern Thailand where melioidosis is normally non-endemic (Chierakul *et al*, 2005). Contamination of water storage reservoirs with salt or poisonous waste, cramped living conditions, inadequate nutrition, and damage to crops, farmland and fishing fleets, compounded the risks. There is evidence that the impact of the disaster was particularly great on women and children, because the day of the disaster was a Sunday, when most mothers stayed home and took care of their children. Many of the young children who survived became vulnerable, with no mothers to care for them; some lost both parents (Carballo *et al*, 2005; Nolan and Forrest, 2005). Natural disasters frequently cause major problems, which affect a population's health. The problems of reconstruction and development for longer-term process health needs are deep and varied. The objective of this preliminary study was to survey the living situations and health behaviors of the people, to identify specific local needs, including a nutrition survey addressing anthropology and consumption patterns.

MATERIALS AND METHODS

Subjects

The study participants were 250 tsunami victims, recruited from each household in Takua Pa District, Phang-Nga Province. They were 69 men and 181 women, ages 18-77 years, from six temporary shelters in Lampom temple at Ban Nam Kem Village, Ban Nam Kem School at Ban Nam Kem Village, Ban Pru Teo at Bang No-Si, Ban Krom Sub at Bang Maung, and Ban Pakwiev and Ban Kuek Kuk at Kuek Kuk. Of the 181 female participants, one woman was pregnant and ten were lactating.

Study methods

The study focused on living conditions and health status, and a behavioral survey combined

anthropological and nutritional methods. The survey was conducted 78 days post-tsunami. Using non-participant observations, their domiciles, which were temporary shelters, and their environment, were thoroughly observed. Wastewater treatment and waste management were particularly carefully considered. The participants were interviewed to gather general, livelihood, health situation and behaviors, and food and drinking water information. Anthropometrics (weight, height, waist and hip circumference) and blood pressure, were measured. A dietary survey was completed by 24-hour recall. The amount eaten was estimated by equivalence to household measuring utensils. Nutrient intake was calculated by the computerized food program NutriSurvey 2005, and the food composition database provided by the Nutrition Division, Department of Health, Ministry of Public Health (2001). The resultant information was analyzed using descriptive statistics and non-parametric statistical methods with Stata version 5.0 for Windows (Stata Corp LP, College Station, TX).

RESULTS

Three months after the disaster devastated the region, all of the debris had been cleaned up, but some traces of ruin and sorrow remained. The observational study found that temporary shelters at 6 study sites were built quickly and simply, and of similar design. Each survivor family lived in a one-room house of 16 m², which were built to be connected together in rows (Fig 1). These domiciles were uncomfortable, since the weather was very hot during the day time, and at night when the people came back home they were crowded and noisy. Toilet construction and water supply were adequate. Wastewater treatment and waste management were not done well, except for Ban Pru Teo and some parts of Ban Nam Kem. The people were grief stricken due to the unforgettable event, discouraged, stressed and terrified. Two children homes in the 6 study sites were located at Lampom Temple in Ban Nam Kem Village and Ban Pru Teo Village. There, volunteers took care of orphans and provided daycare for young children and infants whose parents had to work during the day; this was supported by the government and the do-



Fig 1—Temporary shelters in Ban Kuek Kuk, one of the residential areas for Tsunami survivors.

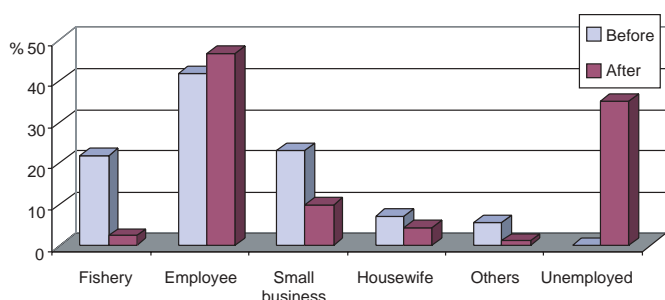


Fig 2—Occupations of the study group before and after the Tsunami.

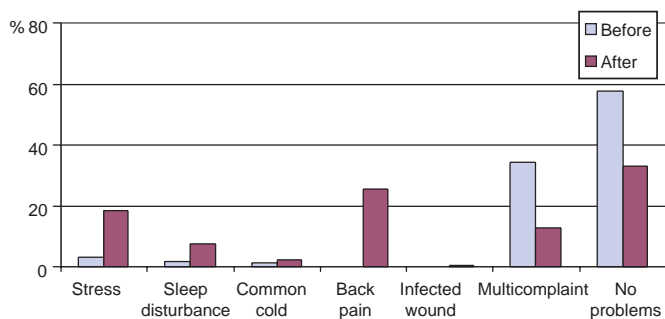


Fig 3—Health problems of the study group before and after the Tsunami.

nations from different sectors and NGOs.

The study participants had just faced an extremely traumatizing disaster. They had lost their homes, possessions, neighborhood and

communication with, or support from, close relations. Most of all, they had lost their jobs, which had supported their continuing livelihoods. Most participants had worked in fishing or were employees in the tourism sector before the disaster. Therefore, after that, their occupations were completely devastated. They had feelings of hopelessness, helplessness, and powerlessness. Employment at the time of the study consisted mostly temporary jobs on doing renovations. They were worried about their future lives (Fig 2). Emotional damage has the potential to interfere with health status. Complaints of health problems increased after the disaster, especially stress and sleep disturbances. Some suffered from back pain as a result of physical injury on the day they fled for their lives (Fig 3).

Obesity was apparent among the female participants, with an obesity rate of 21.8%; 34.1% for overweight. The rates in men were only 2.9% for obesity and 21.7% for overweight. About 4.3% of males and 5.3% of females were underweight, using BMI classification criteria of the WHO (1998). One pregnancy and ten lactating women were excluded from the calculation. Fig 4 shows the distribution of BMI by age group for the 170 female participants. The ages of most the overweight and obese women were between 30-50 years; 61.2% of female participants and 36.2% of male participants had waist-hip ratios above the cut-off point (female cut-off point=0.8 male=0.9) (Deshmukh *et al*, 2005). The Joint National Committee reports recommended therapy for blood pressure readings consistently higher than 140/90 mmHg (Collin *et al*, 1990). Five point eight percent of men and 4.7% of women had blood pressure readings above recommendation levels.

The participants obtained food from donors

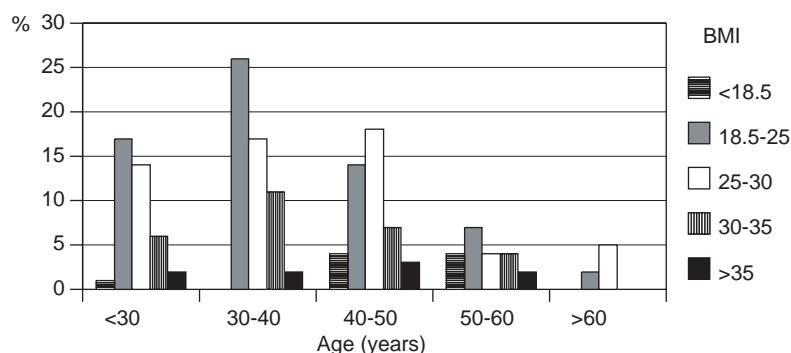


Fig 4—Distribution of BMI for the 170 female participants, by age group.

and occasional purchases. Safe drinking water was supplied regularly and free of charge. Compared with the recommended dietary intake for Thais (Nutrition Division, 2003), the average energy intake for the study groups and the protein intake for both women's groups were low (Table 1). Men and lactating women consumed rather low levels of fat. The average vitamin and mineral intake for all groups were low, except for vitamin A, and men's iron intake. Obesity was a problem among the women. A comparison of the women's macronutrient intake by BMI classification showed no statistical difference. The study participants obtained 7.2% of their food and 94.0% of their clean drinking water from

donations. Most of the participants ate deep-fried foods regularly (87.6%). Twelve point four percent ate raw foods, such as fish, meat, and fermented fish. Most of this study group (94.8%) ate fruits and vegetables nearly every day.

Cigarette and alcohol consumption was higher among the male participants: 71.0% of men smoked an average of 13.2 cigarettes/day, whereas 22.9% of women smoked 8.9

cigarettes/day. After the Tsunami, 17.4% of men smoked more and 17.4% smoked less, whereas 8.8% of women smoked more and 4.7% smoked less. The percentage of alcohol consumption was 68.0% for men and 13.5% for women: They drank beer, whisky and local alcoholic beverages regularly. Of the drinkers, men drank 69.2 ± 33.8 g/d and women drank 0.9 ± 8.9 g/d of alcohol. Some men (13.0%) and women (4.7%) drank more often after the Tsunami, whereas 18.8% of men and 2.4% of women drank less. It was concerning to find that 4 of 10 lactating women smoked 5.5 cigarettes/day and one of them sometimes drank beer. Forty point six percent of men and 37.0% of women exercised regu-

Table 1
Average nutrient intake of the participants and Recommended Dietary Intake for Thais, 2003.

	Men (n=69)		Women (n=170)		Lactating women (n=10)	
	Mean±SD	DRI	Mean±SD	DRI	Mean±SD	DRI
Energy (kcal/d)	1,630 ±685	2,100	1,321 ±910	1,750	1283.4 ±543.8	2,250
Protein (g/d)	60.5 ±24.6	57	47.4 ±24.9	52	53.2 ±21.7	77
Fat (g/d)	37.3 ±25.9		36.4 ±87.0		23.9 ±17.4	
Fat (% of energy/d)	19.5 ±10.1	20-35	20.2 ±10.6	20-35	15.8 ±10.2	20-35
Carbohydrate (g/d)	234.6 ±116.1		203.2 ±79.4		211.2 ±97.0	
Carbohydrate (% of energy/d)	59.2 ±13.3	45-65	64.6 ±11.2	45-65	66.0 ±9.1	45-65
Vitamin A (µg/d)	825.9 ±826.1	700	954.9 ±1,880.1	600	837.1 ±787.2	975
Vitamin B ₁ (mg/d)	0.8 ±0.5	1.2	0.6 ±0.5	1.1	0.6 ±0.4	1.4
Vitamin B ₂ (mg/d)	1.2 ±2.4	1.3	0.9 ±1.6	1.1	0.6 ±0.3	1.6
Vitamin B ₆ (mg/d)	2.1 ±7.8	1.3	0.01 ±0.03	1.3	0.0 ±0.0	2
Vitamin C (mg/d)	83.1 ±94.8	90	127.2 ±144.1	75	101.2 ±127.8	85
Calcium (mg/d)	327.8 ±293.8	800	389.2 ±569	800	451.4 ±720.2	800
Iron (mg/d)	16.8 ±8.5	10.4	14.5 ±10	24.7	10.6 ±5.1	15

larly. Regarding exercise, most men (78.6%) did light exercise, such as walking, stock dance, and 21.4% of men played football, badminton, and takraw. They exercised 4.6 times/week and took 48.0 minutes on average. More women (68.6%) did intensive sports, such as aerobic dance and badminton, and 31.4% did yoga, walked, and stock dance. They exercised for 47.8 minutes, 4.9 times/week. Twenty-eight point eight percent of the participants slept regularly without bed nets. In families with children, 15.6% permitted their children to defecate outside a latrine.

DISCUSSION

A natural disaster like the Tsunami exposes large segments of the world's population to shock and disruption. The findings of this study indicate that the disaster has far-reaching effects on livelihoods at a macroeconomic level. The grief and worry created by the catastrophe has affected the health status of the study population. Suppressed emotional needs manifested as physical symptoms, such as fatigue, sleeplessness, and relationship difficulties. At the time of the survey, the study group still depended on support from different organizations, donations, and temporary employment. Moreover, the people were suffering grief and bereavement. Therefore, the interviews had to proceed very cautiously. The stress responses of some members of the population required psychiatric intervention and/or hospitalization. Psychological healing is a gradual process and requires time. Helping disaster survivors, family members, and disaster relief personnel, requires preparation, sensitivity, assertiveness, flexibility, and commonsense (Parameswaran, 2004).

The nutritional survey found a growing problem of obesity among the female subjects. The prevalence of a high waist-hip ratio was 61.2% for women and 36.2% for men in the study group. Higher abdominal fat is known to be a greater risk factor for coronary artery disease than accumulation of body fat around the hips, and is associated with hypertension, hypertriglyceridemia, hyperinsulinemia, and diabetes. The waist-hip ratio is used to evaluate body-fat distribution. Hongtong *et al* (2004) reported

strong associations between cardiovascular risk and waist-hip ratio, especially among Thai women. Our findings indicated obesity and a risk for non-communicable chronic diseases among the participants, especially the women. In contrast, the dietary pattern of this study population was characterized as of low variety and low-volume food intake, resulting in inadequate intake of energy and nutrients. Compared with the Thai female obesity study in 2002 by Viroonudomphol, the average fat intake of the overweight-to-obese groups was 54.3 g/d. The female participants in the current study had an intake of 36.4 g/d. The dietary pattern of the participants did not reflect the problem of obesity that was seen among these women. The food patterns at that time reflected the psychological problems, which were still troublesome due to the adversity and deteriorating conditions in the temporary shelters. Based on 24-hour recall, 8% of the participants interviewed were only eating one meal per day, while another 47% were only eating two meals per day at the time of interview. The dietary quality of some meals was poor, *eg*, they ate instant noodles alone or drank only local alcohol beverages. Some participants complained that they had no appetite. Fortunately, most of them preferred fruits and vegetables. Although obesity was a problem, 4.3% of men and 5.3% of women were found to be at risk for chronic energy deficiency, with a BMI of <18.5.

Normally, obesity develops gradually over a long period. The obese group lacked physical activity and had a high intake of calorie-dense foods, which was evidenced by their general preference for deep-fried foods. Although some of the participants did exercise regularly (40.6% of men and 37.0% of women), among the female overweight/obese group, 62.1% of the overweight (BMI=25-30) and 75.7% of the obese (BMI>30) did not exercise. The daily habits of the female group entailed reduced physical movement because of their type of work. Most male participants were fishermen, whose physical activity was more strenuous; consequently, obesity was less prevalent among the male group. The prevalence of alcohol consumption and cigarette smoking was quite high among the

study group, especially among the males. The average alcohol intake for over half of the male participants was classified as drinking category III (60 g pure alcohol and above per day), which is a risk for various types of cancer (RR=1.7-5.39), diabetes mellitus (RR=0.73), cardiovascular diseases (RR=1.0-4.1), and cirrhosis of the liver (RR=13.0) (WHO, 2004). Smoking at least one cigarette per day is a health hazard (Cutter *et al*, 2001). Most men, and some women, smoked regularly, even lactating women. Some of the participants did not sleep in bed nets regularly, ate raw foods, and let their children defecate anywhere, which are risk behaviors for infection from various diseases.

In summary, the tsunami disaster destroyed lives, residences, and occupations, leaving a trail of shattered families and anguished survivors. The survey three months later indicated that the tsunami victims were still suffering from post-traumatic stress. The living situation in the temporary shelters was unpleasant. Obesity was clearly observable among the female study participants and health behavior was unsatisfactory. Besides dwellings and careers, this vulnerable population required support and encouragement to get back into their lives, including health promotion programs. In addition, investigation of their food habits is recommended.

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