AVIAN INFLUENZA PROTECTION KNOWLEDGE, AWARENESS, AND BEHAVIORS IN A HIGH-RISK POPULATION IN SUPHAN BURI PROVINCE, THAILAND

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Abstract. Avian influenza (AI) had outbreaks in Thailand from January 2004 to December 2005, which resulted in 22 human cases, and 14 deaths. Three confirmed cases were reported in Suphan Buri Province in 2004, one of whom died. A cross-sectional study aimed to investigate knowledge, attitudes, and practices about AI in Song Phi Nong District of Suphan Buri Province. Most of the respondents had moderate levels of knowledge. Most of their attitudes towards and practices of the prevention and control of AI were also appropriate. However, the peoples' knowledge about major signs and symptoms of AI was limited. The study suggested that those who had received information from media had better attitudes towards and practices of AI prevention and control, compared with those who had not received information from media. Therefore, the media played an important role in improving knowledge, attitudes, and behaviors; but for the better protection from AI, continuing health education will be necessary in Thailand.

INTRODUCTION

In 1997, the first case of an invasive avian influenza (AI) that was transmitted from avian to human was reported in Hong Kong (Chan, 2002). The ensuing outbreak caused 18 human infections, of which 11 were children and six died from acute respiratory distress syndrome (ARDS). The event occurred at the same time that avian flocks were dying from H5N1 viruses. Avian influenza, however, may not develop syndromes in non-invasive cases (Yuen *et al*, 1998). Infection may be caused by direct contact with poultry or infected animals and indirect contact, for example, through surface contamination with secretions, such as feces, mucus, tears, and saliva. High-risk groups are persons who have contact with poultry, such as those who slaughter, farm, transport, sell, garbage collectors, and children playing with poultry, veterinarians, veterinary technicians, and persons raising fighting roosters (Lochindarat, Personal communication). The latest outbreak of H5N1 viruses began in Vietnam, in the middle of December 2003 and currently involves eight countries: Cambodia, China, Indonesia, Japan, Korea, Lao PDR, Thailand, and Vietnam. In Vietnam, AI has caused 22 human cases and 15 deaths (68% fatality rate) (Hien *et al*, 2004).

In Thailand, the first human cases were reported in Suphan Buri and Kanchanaburi in January 2004 (Arichockchai *et al*, 2004). Eight million chickens and ducks were destroyed, which affected 33,661 farmers. They were compensated by the government with 758,763,420 baht. Later, three confirmed cases were reported in Suphan Buri between January and February 2004; two died and one survived. All three cases had histories of con-

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tact with chickens, while one had consumed the meat of a dead chicken. The second attack took place in Suphan Buri between June and October 2004 when AI was transmitted between poultry flocks throughout the province. In order to limit the transmission of AI, the Department of Livestock culled 109,896 birds, including 60,879 ducks, 21,859 chicken, 21,848 quails, and other birds (Communicable Disease Section, 2004). More recently, there were two fatalities from confirmed AI; one who had contact with dead chicken with bare hands, and the second who had contact by daily application of traditional medicine to the eyes of sick chickens (Ministry of Public Health, 2006).

To control AI, knowledge, attitudes, and practices (KAP) concerning AI play important roles. A KAP survey conducted in Vietnam found that only half of participants washed their hands every time after handling poultry, while around one-fourth never changed their clothes (Academy for Educational Development, 2006). In addition, a majority of households lacked knowledge of avian symptoms. A survey study of KAP conducted in Cambodia concluded that participants had high levels of anxiety concerning AI symptoms (Academy for Educational Development, 2005). However, they were uncertain of the risk factors. These behaviors will definitely be concerned for the infection and outbreak of the disease in the future. Consequently, UNICEF adopted a program of interventions in Vietnam, Cambodia, and Lao PDR that focuses on hand-washing campaigns, the development of sources of AI information, and other media to improve the AI prevention practices of these populations (Tan, 2006).

However, little study has been undertaken in Thailand on knowledge, attitudes, and practices of AI. A KAP survey in 2004 in Nakhon Phanom Province, Thailand (Praphasiri *et al*, 2004), found that about 98% of the study population received information about AI from the mass media, especially through television programs. The study indicated that, among people who live in contaminated areas in Thailand, 68.5% did not know the symptoms or characteristics of the disease. Therefore, there is a need to assess knowledge attitudes, and practices of people in risk areas to use the information obtained for further prevention of the disease. The present study aimed to investigate the KAP of a sample community in Thailand, after the second attack of AI.

MATERIALS AND METHODS

Design

A cross-sectional analytical study collected KAP data through interviews, using a structured questionnaire, during May-July 2005. Using this design, we collected data to explore relationships between human behaviors and potential exposures to AI.

Instrument

A structured questionnaire was designed and pre-tested in a similar geographical district in Suphan Buri. The main parts of the questionnaire consisted of demographic characteristics and KAP concerning AI.

Knowledge of AI. This refers to the understanding of concepts of AI related to: causative agent, mode of transmission, risk groups, prevention of transmission, and control measures against AI. This section consisted of 18 items, and the items were scored with 1 or 0 for correct or incorrect answer, respectively. Levels of knowledge were categorized as “mild”, “satisfactory”, and “good”.

Attitudes towards AI. This section refers to the degree of positive or negative agreements with statements concerning the severity of AI, eating behaviors, contacting poultry, hand washing with soap, raising fighting roosters, and personal protection equipment according to beliefs and intentions to act concerning AI and AI prevention. These were measured by three-

point Likert self-rating scales (Bloom, 1971). There were 17 items. Each item contained three choices: "agree", "unsure", and "disagree". Each item was scored with 3, 2, or 1, respectively. The levels of attitude scores were grouped into three categories as "mild", "satisfactory", and "good".

Practices related to AI. This section consists of 15 questions that refer to AI-related preventive behaviors including preparation of food from fresh chicken, personal hygiene and hand washing with soap, use of protective masks and gloves, antiseptic spraying of animal barns, and environmental management around the house. The following scoring method was applied for each item: 2 points were given for "regular practice", 1 point for "sometimes practice", and 0 for "never". Practices were categorized as "mild", "satisfactory", and "good".

Study settings and population samples

Suphan Buri was selected as the target area because of its high transmission of H5N1 viruses among poultry. A preliminary survey was conducted in 14 sub-districts of Song Phi Nong District, Suphan Buri, approximately 80 kilometers northwest of Bangkok. Fourteen sub-districts were selected because they represented variation in practices of raising poultry. Song Phi Nong is located in the southernmost part of the province, and it had total population of 116,722 in 2005, comprised of 54,757 males and 61,965 females.

The calculation of the study samples used the formula of Lemeshow (Lemeshow, *et al,* 1990). Using a multi-stage random sampling technique, we selected 784 household heads from 24,086 households in 140 villages of 14 sub-districts. The 784 household heads were randomly selected for interview by a simple random sampling method using the numbers assigned in population census.

Before the interview, the researcher informed each participant that participant confidentiality and anonymity would be maintained and assured them that their participation was voluntary; if they wished to withdraw from the study, they could leave at any point without any obligation. Then, their written consents to participation were obtained. Ethics board approval for this study was obtained from Mahidol University Ethical Committee Members.

Data-collection and analysis methods

We hired five local persons who had basic health backgrounds to serve as interviewers. Then we trained them for data collection procedures, to conduct the face-to-face interviews and household visits. Training included interview techniques, observation techniques, data transcription, and coding. The collected quantitative data were transcribed and coded according to the standardized mutual performance of the interviewers.

The information was analyzed according to socio-demographic variables and the distributions of factors relating to KAP on AI. The data were then analyzed in a series of frequency distributions and tables that described the distributions of key independent variables: age, sex, place of residence, family economics, educational background, knowledge of risk and disease transmission, and their relationships to the dependent variables of the study populations. These dependent variables included: perceptions, attitudes, knowledge of risk and disease transmission, poultry raising, history of contacts with animals, behaviors of poultry consumption, raising, slaughtering, self-protection, and so forth. The data were analyzed using the STATA software program and presented as follows. Descriptive statistics, such as mean, standard deviation, frequency, and percent distribution, were used to describe the socio-demographic characteristics of the study population. The chi-square test was used to examine relationships between socio-demographic characteristics and knowledge, attitudes, and practices regarding AI.

RESULTS

Socio-demographic characteristics

The age of the respondents ranged from 15 to 65 years, 54.8% were aged between 32-48 years. Of the total 71.6 % were female. Almost all the study respondents were Buddhist. Regarding education, 75.1% of them finished primary school; and for marital status, 78.6% were married. For occupation, 42.3% were farmers, and 40.4% were laborers. Of the total, 46.4% earned between 5,000-10,000 baht per month, and 43.6% earned less than 5,000 baht. For household membership, 80.6% reported that they had elderly and/or children living in their houses, and 48.6% had children aged less than 15 years old.

Avian influenza-related data

Regarding information about AI, 95.9% of respondents received information about it. The major source of information was television (91.5%). At home, 43.6% raised poultry. Only 0.5% worked in the poultry industry. For the type of poultry raised by respondents, 55.3% had domestic native chickens (in contrast to domestic hybrid chickens and to fighting roosters). Generally, the respondents raised native chicken as a household meat supplement. Of the total, 63.0% raised 10-50 native chicken per house, and more than 80% raised poultry in their compound. Among those who raised native chickens, 54.5% had never had direct contact with the poultry. Of those who did have contact, 75.7 % fed the poultry by themselves.

Culturally, Suphan Buri is well known for the rearing of fighting roosters; 34.5% of the respondents raised them at home, 39.8% raised between 10-20 roosters per household, and 80.5% allowed them free-range in the compound. Among those who raised fighting roosters, 36.4% had contact daily for feeding and caring; specifically, 70.3% of the respondents were exposed to the rooster, themselves.

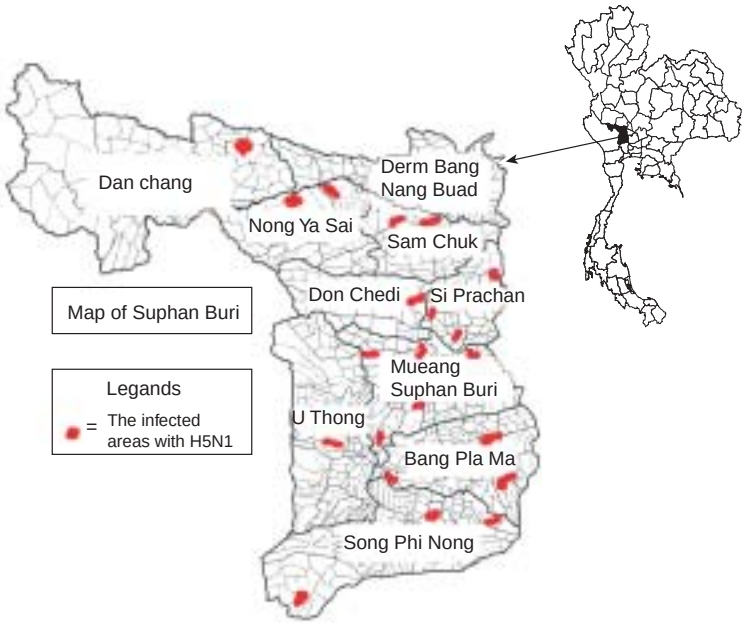

Fig 1–Map of Suphan Buri Province showing districts with H5N1 outbreaks.

Regarding the use of poultry meat for cooking and consuming at home, 74.9% preferred to purchase chicken meat from the fresh markets. The fresh market in Song Phi Nong municipality was the most popular source for respondents; 73.7% of them used it. Of the total respondents, 25.1% slaughtered the poultry they raised for consumption; while only 2.0% used a mask safeguard for protection. For slaughtering, 45.7% reported that they slaughtered the poultry themselves, and the most common location was the compound. The method used to kill native chickens for food was by cutting the neck (98.5%). People

Table 1
Number and percent of respondents according to KAP levels of AI, Suphan Buri, 2005.

KAP levels	Number (N = 784)	Percent
Knowledge score levels (Total scores = 18)		
Mild (1-6 scores)	22	2.8
Satisfactory (7-12 scores)	667	85.1
Good (13-18 scores)	95	12.1
Attitudes (Total scores = 51)		
Mild (1-17 scores)	0	0.0
Satisfactory (18-34 scores)	9	1.1
Good (35-51 scores)	775	98.9
Practices (Total scores = 30)		
Mild (1-10 scores)	25	3.2
Satisfactory (11-20 scores)	529	67.5
Good (21-30 scores)	230	29.3

in the district, traditionally, consumed well-cooked meat; although, sometimes the people cooked raw chicken meat.

KAP data

The levels of KAP concerning AI are presented in Table 1. The data show that 85.1% of the respondents had an intermediate knowledge level, with a range of 7-12 (mean = 10.6, SD =1.8). Regarding the attitude scores, 98.9% ranged at high levels of 35-51 (mean = 46.27, SD = 3.54). For practices, 67.5% of respondents were in the intermediate level of appropriate practices; ranging between 11-20 (mean = 18.2, SD = 4.0).

Behaviors of hand washing.

We collected data on how the respondents behaved to protect themselves from known or unknown infected animals.

Before eating food. We found that 674 of the household heads (86%) washed their hands every time before meals, and 409 of them (54.6%) washed their hands with soap.

After using toilet. In the study areas, 784 of households (100%) were equipped with a toilet, and all people were using them. Of the total respondents, 725 (92.5%) washed their hands every time after using the toilet, and 467 of them (60.6%) washed their hands with soap.

After killing or cutting poultry meat. Of the total respondents, 147 (18.8%) slaughtered poultry or sliced poultry meat. Almost all of them, 144 (98.0%), reported that they washed their hands every time after slaughtering or slicing poultry; and 118 (80%) used soap regularly to wash their hands. Of all respondents, 339 (43.2%) handled or had contact with poultry.

After handling poultry. The majority, 317 (93.5%) of those who had contact with the fowl washed their hands every time after handling or contacting the fowl. Most of them, 279 (84.3%), used soap to wash their hands.

After cleaning up the coop/cage of poultry. Slightly more than two-thirds of the respondents (540, 68.9%) reported that they cleaned the cages of their poultry. Almost all of them, 231 (94.7%), washed their hands every time after cleaning the cages, and 199 (83.3%) washed their hands with soap.

After feeding and watering the poultry. Of the 535 (68.2%) respondents who fed or watered their fowl regularly, 230 (92.4%) washed their hands every time; 181 (74.5%) reported using soap to wash their hands.

After carrying and disposing garbage. Nearly all respondents, 738 (94.1%) dumped or handled garbage; 645 (87.4%) washed hands afterwards, and 467 (64.5 %) reported washing their hands with soap.

After touching carcasses. Over half of the respondents, 535 (68.2%), were involved with animal carcasses; 515 (96.3%) of them reported that they washed their hands every time after handling carcasses, and 392 (74.0%) used soap to wash their hands afterwards.

Factors associated with KAP toward avian influenza

The findings suggested associations between knowledge, attitude, and practice variables with the socio-economic variables.

Knowledge and practice variables were divided into three levels: "mild", "satisfactory", and "good" ratings. Attitude scores were divided into 2 levels: "un-favorable" and "favorable" concerning the occurrence of the disease.

Knowledge. The majority of respondents of all groups had knowledge of a moderate level (Table 2). The proportion of respondents who had finished high school or above had higher percentages of AI knowledge compared with those who had either finished primary school or who had never attained a school. The respondents who were laborers had slightly higher knowledge levels. In Table 2, the respondents who received information were also more likely to have better knowledge level about AI ($p < 0.001$).

Comparing the different levels of knowledge between respondents who fed and did not feed poultry was not significantly different ($\chi^2 = 0.593$, $p = 0.743$). There was no significant difference between the level of knowledge of the respondents who slaughtered and did not slaughter poultry ($p = 0.611$).

Attitudes. Although statistically significant, more than 90% of all income groups had positive attitudes towards AI; the difference in family income did not affect attitudes towards AI (Table 3). The most striking difference was seen between information receivers and non-receivers. The respondents who received information were more likely to have favorable attitudes towards AI ($p < 0.001$). Other factors, such as occupation, raising domestic poultry or not, and slaughtering poultry or not did not affect attitudes.

Practices. Practice scores were classified as "mild", "satisfactory", and "good" (Table 4). We

Table 2
Relationships between knowledge about AI and demographic variables.

Variables	Knowledge about AI (N= 784)						χ^2	df	p
	Low		Medium		High				
	No.	%	No.	%	No.	%			
Education							9.486	2	0.009
Primary school or never attained school (< 4 yrs)	22	3.5	534	85.6	68	10.9			
High school (12 yrs) and above	0	0.0	133	83.1	27	16.9			
Occupation							2.128	2	0.345
Labor and employee	7	2.2	266	83.9	44	13.9			
Agriculturalist	15	3.2	401	85.9	51	10.9			
Received information from media							34.32	2	<0.001
No	6	18.8	26	81.2	0	0.0			
Yes	16	2.1	641	82.3	95	12.6			
Raising poultry							0.593	2	0.743
No	12	2.7	373	84.4	57	12.9			
Yes	10	3.0	294	85.9	38	11.1			
Slaughtering poultry							0.984	2	0.611
No	16	2.7	496	84.5	75	12.8			
Yes	6	3.0	171	86.8	20	10.2			
Having children and elderly							2.743	2	0.254
No	3	2.0	125	82.2	24	15.8			
Yes	19	3.0	542	85.8	71	11.2			

Table 3
Relationships between attitudes toward avian influenza as health burden and some key independent variables.

Variables	Attitudes toward AI (N= 784)				χ^2	df	p
	Negative		Positive				
	n	%	n	%			
Family monthly income					1.966	1	0.189
< 5,000 baht	6	1.8	336	98.2			
5,000 baht and above	3	0.7	439	99.3			
Occupation					0.610	1	1.000
Labor and employee	4	1.3	313	98.7			
Agriculturalist and others	5	1.1	462	98.8			
Received information from media					25.38	1	< 0.001
No	8	25.0	24	75.0			
Yes	34	4.5	718	95.5			
Raising domestic poultry					0.047	1	0.828
No	23	5.2	419	94.8			
Yes	19	5.6	323	94.4			
Slaughtering poultry					0.323	1	0.570
No	33	5.6	554	94.4			
Yes	9	4.6	188	95.4			

Table 4
Relationships between preventive practice scores and some key independent variables.

Variables	Practicing scores toward AI prevention (N= 784)						χ^2	df	p
	Mild		Satisfactory		Good				
	No.	%	No.	%	No.	%			
Family monthly income (baht)							7.620	2	0.022
< 5,000 baht	14	4.1	244	71.3	84	24.6			
5,000 baht and above	11	2.5	285	64.5	146	33.0			
Having children or elderly							7.062	2	0.029
No	10	6.6	100	65.8	42	27.6			
Yes	15	2.4	429	67.9	188	29.7			
Received information from media							14.163	2	0.001
No	4	12.5	25	78.1	3	9.4			
Yes	21	2.8	504	67.0	227	30.2			
Raising poultry							80.415	2	< 0.001
No	16	3.6	353	79.9	73	16.5			
Yes	9	2.6	176	51.5	157	45.9			
Slaughtering poultry							10.187	2	0.006
No	21	3.6	411	70.0	155	26.4			
Yes	4	2.0	118	59.9	75	38.1			

found that those who had family income more than 10,000 baht were more likely to have higher scores in practices to prevent AI as compared with other, lower-income groups, although the difference was small ($p < 0.05$). The respondents having children or elderly were more likely to have higher scores in practices compared with those not having them ($p < 0.05$). Our results also indicated that the information receivers had higher scores in practices when compared with the non-receivers ($p = 0.001$). There was a difference in the proportion of respondents comparing those who raised and those who did not raise poultry. The respondents who raised domestic poultry had higher scores in practices to prevent AI ($p < 0.001$). Similarly, there was a significant difference in proportion between the respondents those who slaughtered and those who did not slaughter poultry. The respondents who slaughtered the poultry were more likely to have higher scores in practices to prevent AI ($p = 0.006$).

DISCUSSION

Our results suggested that our target population was generally aware of AI as a dangerous disease, although they did not clearly recognize some symptoms of severe AI infection. Due to the lack of appropriate knowledge, the target population might not respond to externally perceivable symptoms, including high fever, chill, headache, cough, and pneumonia that indicate severe H5N1 virus infection.

These findings are similar to a study carried out by Health Education Division, Department of Health Service, MOPH, Thailand (Health Education Division, 2004). They found that 68.5% of the respondents did not know the route of contraction by the snivel, saliva, or feces of poultry. Additionally, 69.1% of respondents did not know the symptoms characterized by high fever, headache, myalgia, sore throat, cough, and pneumonia. Results of this study also suggest that information, education, and communication (IEC) intervention of health education would probably induce rapid responses to changing the behaviors of AI prevention.

As our KAP survey analysis showed in Tables 2-4, those who received information had higher knowledge, more positive attitudes, and higher scores in practice indicators regarding AI. Most of the respondents gained knowledge from news and short spots in televised programs. The findings suggested that this information helped people to learn about AI, and the TV programs encouraged population's awareness on how to prevent AI. However, such knowledge tended to be superficial, and it did not adequately enable villagers to adopt appropriate protection practices, such as using a mask, gloves, and goggles while in contact with poultry. More effective health education services should be located where people are at risk of AI. Both internally and externally, more support is needed for a long-term IEC program for those who are in need.

This study has several limitations. First, the household representatives might understate the number of poultry they had because they may have concerned that their poultry would be destroyed by the Livestock Department authority if they gave the true number. Secondly, the study was conducted in only one district of the province, despite the extensive spread of the disease over a large area, due to the limitations of our resources.

In conclusion, the results of the study suggested that media played important roles for delivering AI-related information in the area where AI sufferers were reported. Therefore, receiving information was necessary for people to change attitudes and behaviors regarding AI prevention and control. People who received little information were more likely to be at risk of AI infection. Moreover, knowledge, attitudes, practices, and information gained from the study may be helpful in developing

AI prevention and control programs in future.

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