

# Knowledge about pandemic influenza preparedness among vulnerable migrants in Thailand

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## SUMMARY

*This study was designed to assess factors associated with a high level of knowledge about influenza among displaced persons and labor migrants in Thailand. We conducted a cross-sectional study of 797 documented and undocumented migrants thought to be vulnerable to influenza during the early stages of the 2009 H1N1 pandemic. Data were collected on socio-demographic factors, migration status, health information sources, barriers to accessing public healthcare services and influenza-related knowledge using a 201-item interviewer-assisted questionnaire. Among the different types of influenza, participants' awareness of avian influenza was greatest (81%), followed by H1N1 (78%), human influenza (61%) and pandemic influenza (35%). Logistic regression*

*analyses identified 11 factors that significantly predicted a high level of knowledge about influenza. Six or more years of education completed [odds ratio (OR) 6.89 (95% confidence interval (CI) 3.58–13.24)] and recent participation in an influenza prevention activity [OR 5.27 (95% CI 2.78–9.98)] were the strongest predictors. Recommendations to aid public health efforts toward pandemic mitigation and prevention include increasing accessibility of education options for migrants and increasing frequency and accessibility of influenza prevention activities, such as community outreach and meetings. Future research should seek to identify which influenza prevention activities and education materials are most effective.*

**Key words:** pandemics; influenza; human; vulnerable populations

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## INTRODUCTION

Global pandemic preparedness activities are still important even though it has been several years since the last influenza pandemic. At the time of writing, two pathogens with pandemic potential were making headlines: emergence of a novel coronavirus (nCoV) in the Gulf region, and human cases of a subtype of avian influenza (H5N7) in China (World Health Organization, 2013a,b). Both serve as reminders that past and current efforts to enhance primary prevention efforts remain important in the interpandemic period.

In 2007, the International Organization for Migration (IOM) undertook a campaign to

increase influenza pandemic preparedness in migrants in Asia and Africa. During the 2009 H1N1 pandemic, IOM in collaboration with the McGill University Ingram School of Nursing undertook a study to identify factors associated with a high level of knowledge about influenza among migrants in Thailand. The results from the study were used to develop public health recommendations aimed at increasing primary prevention of influenza. Thailand is an important point of focus in terms of global pandemic preparedness due to its role as the major transportation hub for Southeast Asia, the endemic presence of multiple types of influenza and its role as a receiving country for migrants. Certain

groups of migrants in Thailand may be particularly vulnerable to pandemic influenza due to traditions in raising poultry and swine, poor personal hygiene and sanitation, low levels of health knowledge and awareness and limited access to health care (Ministry of Public Health, 2007; Sutic, 2007; Ahmed and Dibb, 2008; Jitthai, 2008). Furthermore, proximity to international borders may increase the likelihood of cross-border disease communication and occurrence of future pandemics (Haskew et al., 2010).

In 2003, IOM began a joint collaboration with the Thai Ministry of Public Health (MOPH) to improve the health and well-being of potentially vulnerable migrant groups. IOMs work is focused in 'priority provinces' that have been designated as such based on a high concentration of migrants and frequency of cross-border communication (i.e. movement of individuals and goods) and includes primary, secondary and tertiary prevention activities.

Public health education campaigns are a cornerstone of primary prevention (Gillam, 2006), particularly in situations where vaccine availability and access to health care are low. Numerous reports have been published that describe campaigns aimed at increasing knowledge about influenza (Beltran-Alcrudo et al., 2008; Leslie et al., 2008; Ardalan et al., 2009; Haider et al., 2010; World Health Organization, 2011). However, there is scant evidence about specific factors that may be utilized in order to facilitate the intake and retention of the material presented in these campaigns, particularly among displaced persons.

The aim of the current study was to collect information that could be used to aid public health efforts to increase primary prevention of influenza in Thailand and improve influenza pandemic preparedness worldwide. This article reports on a subset of results that addresses factors associated with a high level of knowledge about influenza and presents recommendations to increase levels of knowledge among displaced persons and other vulnerable migrant groups worldwide.

## METHODS

### Study population

Study participants ( $n = 801$ ) were recruited from two provinces in Northern Thailand adjacent to the Myanmar and Laos borders, Chiang Rai and

Tak. Four respondents were excluded from analyses due to incomplete questionnaires. Sample size was determined starting with the assumption of a 50:50 chance that participants would have a high level of knowledge. Under this assumption and seeking to estimate the true proportion to within 5% (i.e. between 45 and 55%) with 95% confidence (i.e.  $\alpha$  error set at 0.05), we required 384 participants (Hosmer and Lemeshow, 2000). In order to be able to offer each of the provincial health authorities results relevant to their areas, we aimed to reach this number for each province. In order to guard against loss to analysis due to missing data, we chose to recruit 400 participants in each province. One additional participant was included in the study due to a record-keeping oversight. With data from 384 participants available for analyses and assuming 50% ( $n = 192$ ) will have low knowledge levels, logistic models can reasonably be developed with 18 predictors (10 participants per predictor) in addition to the intercept. The number of predictors that could reasonably be accommodated by combining data from both provinces is more than double.

Participants were sampled from all known migrant-populated communities within these provinces. First, maps created by Migrant Community Health Workers (MCHWs) during a previous IOM/MOPH project that outlined the number and locations of households within each community were used to randomly select households. Second, data collectors approached members of the selected households and requested a volunteer from each household to complete the survey. The decision to seek volunteers from each household was made after extensive consultation with IOM and MCHWs as the most ethically and culturally appropriate method in this context. Consideration was given to sampling the household heads, but it was felt that this would have resulted in a predominantly male sample and put unintended pressure on this person to participate. Random selection of individuals was also considered, but it was likely that this method would have been culturally offensive to some groups. Data collectors attempted to recruit equal numbers of male and female migrants by requesting a female volunteer from the first household, a male from the second household, a female from the third and so forth. It was requested that volunteers be between the ages of 18 and 65 without any known psychological disability that would prevent them from completing the survey.

### Data collection and survey method

Interviewer-assisted questionnaires were administered between September and November, 2009, by MCHWs employed by the MOPH with support from IOM. MCHWs traveled to the communities where they are known to the migrant population and are familiar with the culture and language(s) spoken. MCHWs were responsible for describing the purpose of the study, the risks/benefits of participation, obtaining informed consent and collecting data. Prior to data collection, all MCHWs received training on research methodology, survey administration and research ethics. This study received ethical approval from the McGill University Research Ethics Committee and underwent review by IOM for cultural appropriateness prior to recruitment of participants.

Data were collected on socio-demographic factors, migration status, health information sources, barriers to accessing public healthcare services and pandemic preparedness activity/service exposure, knowledge, attitudes and practices. A 201-item interviewer-assisted questionnaire revised from a previous IOM influenza questionnaire to incorporate key components of the WHO's Pandemic Preparedness Checklist (World Health Organization, 2005) and related themes from the literature (Olsen et al., 2005; World Health Organization, 2005; Al-Shehri et al., 2006; Kristiansen et al., 2007; Lau et al., 2007; Sutic, 2007; Ahmed and Dibb, 2008; Di Giuseppe et al., 2008; Gaglia et al., 2008; Leslie et al., 2008) was used to collect data. Pandemic preparedness 'experts' currently working with IOM provided their feedback on the revised version and it was adjusted accordingly. Responses for each 'knowledge' question were assessed and a 'correct' answer for each was determined based on the current literature. The questionnaire was then translated from English into Thai using two independent translation services. Both translations were reviewed by one author (N.J.) and the superior version was blind back-translated (Brislin, 1970). The back-translation was compared with the original English version and necessary adjustments were made. MCHWs provided further feedback on the questionnaire during training sessions and suggested adjustments were made to ensure cultural appropriateness. The questionnaire was then piloted with non-study participants and revised one final time. Interpretation of the Thai questionnaire into the primary languages of the participants was rehearsed extensively during

training to ensure accuracy and equivalency between MCHWs.

Two days of data collection were observed in each province by one author (J.H.) to ensure that data collection occurred as set out in training and that questionnaire administration was consistent across data collectors. Additionally, each data collectors' first three interviews were audio-recorded and reviewed by J.H. to ensure that subsequent administrations of the questionnaire were consistent. MCHWs were required to review completed questionnaires for missing or unclear responses immediately after completing the survey and to resolve these issues with the participant before leaving the household. Questionnaires underwent a second review by a research assistant prior to data entry. If answers were unclear or incomplete, the research assistant immediately contacted the MCHW to address the issue before data were entered into the database. The first 20 questionnaires entered by each data-entry clerk were re-entered by one author (J.H.) in their entirety to assess for errors. If discovered, feedback was given to the data-entry clerks and/or MCHWs, the error corrected and the next 20 records examined similarly. This process continued until no errors were found. A 5% random sample of questionnaires was then re-entered to confirm data quality.

### Data analysis

Responses for each 'knowledge' question ( $n = 25$ ) were individually assessed against the correct answers, scored and subsequently combined to create a total knowledge (K) score for each respondent. As expected, knowledge scores were not normally distributed, therefore, participants who achieved the median score or higher were categorized as having a high 'K level' in order to permit further analyses (i.e. logistic regression).

'K level' was used to conduct bivariate analyses with variables known to be associated with knowledge (e.g. age, education, income, migration status, as well as modifiable factors such as information source; Sutic, 2007; Ahmed and Dibb, 2008; Di Giuseppe et al., 2008; Leslie et al., 2008). 'K level' also served as the dependent variable in logistic regression models with the predictors in these models including those identified as important in the literature and found to statistically differ at  $p \leq 0.25$  in the aforementioned bivariate analyses. Once predictors were entered into the

model, a stepwise procedure was used to eliminate variables with minor contribution to the model (Lemeshow et al., 1990): variables were removed from the model one by one and excluded if the coefficients for the other variables changed <10% from their original value. If a coefficient(s) changed by >10% the variable was re-entered. This process was continued until no further variables could be removed from the model. Results were similar in the two provinces thus their combined results are presented here. All analyses were performed using EpiInfo™ 3.5.1.

## RESULTS

A total of 797 participants (99.6% of those surveyed) were included in analyses, 397 from Tak and 400 from Chiang Rai provinces. A denominator of 797 was used to calculate all results presented as a percentage in the following subsections.

### Socio-demographic characteristics

Forty-nine percent of participants were between 18 and 35 years of age; 51% were female. Education levels were low, with the largest proportion having no formal education (46%), and few having completed >6 years (13%). Seventy-five percent were able to have at least a basic conversation in Thai. Over one in five were unemployed and of those employed, the most common job reported was daily laborer (40%). The median family income was USD 94 (THB 3000) per month and supported an average household of 4.6 family members (SD 2.32, range 0–15).

### Migration

Most had migrated to Thailand from Myanmar (89%) and had been living in Thailand for  $\geq 5$  years (77%). Better living conditions (37%), better wages (35%) and escape from political conflict/war (27%) were the main reasons for migrating. Nearly one in four (23%) had returned to visit their country of origin and about half of these (12%) had been back more than twice. A substantial proportion (41%) did not have a valid government-issued ID card, meaning that they were undocumented and had no official status in Thailand.

### Access to public health care

One-third had been sick (35%) and most of these migrants had sought health care at a hospital or a

clinic in the past 6 months (31%). One in four reported barriers to accessing health care services. The most common barriers included: cost of accessing service (23%), cost of treatment (22%), fear of arrest/deportation (20%) and language barrier (19%). The most common sources of health and/or influenza information in the past months were doctor/public health professionals, MCHWs and television (34, 20 and 21%, respectively). Concern about influenza was high, with 62% reporting that they were 'very worried' that influenza would spread in their community. Over one in ten had attended some type of influenza prevention activity (e.g. community outreach) during the past 6 months.

### Knowledge

Participants' awareness of avian influenza was greatest (81%), followed by H1N1 (78%), human influenza (61%) and pandemic influenza (35%). Only 26–58% (depending on the type) were aware that humans could contract influenza, and knowledge of common methods of human-to-human transmission (e.g. being coughed/sneezed on by a sick person) ranged from 25 to 32%. Scores on all 25 knowledge items are presented in Table 1.

Table 2 shows results of the logistic regression procedure. Eleven variables significantly predicted a high level of knowledge about influenza. The strongest predictors were education, with those who had completed >6 years of education being more likely to have a high level of knowledge [odds ratio (OR) 6.89 (95% confidence interval (CI) 3.58–13.24)], and influenza prevention activity, with those who had participated in any such type of activity during the past six months also being more likely to have a high level of knowledge [OR 5.27 (95% CI 2.78–9.98)]. Of the remaining predictors, those that could be acted upon without additional external support or major change in societal structures included receiving health information from a MCHW [OR 3.13 (95% CI 1.79–5.47)], seeking health care at a hospital/clinic [OR 2.44 (95% CI 1.60–3.72)] and receiving health information from television [OR 2.35 (95% CI 1.41–3.91)]. Predictors requiring more support and resources included completing 1–6 years of formal education [OR 4.44 (95% CI 2.67–7.39)], being able to have a basic conversation in Thai [OR 1.73 (95% CI 1.03–2.89)] and having a family income >USD 62/month [OR 1.66 (95% CI 1.11–2.50)].

**Table 1:** Knowledge of influenza among 797 displaced persons and labor migrants in Thailand

| Variable   | Percent correct mean (SD) |
|--|---------------------------|
| <b>Avian influenza</b>   |                           |
| 1. Had heard of avian influenza or the bird flu  | 81 (0.39)                 |
| 2. Named two types of poultries that can be infected with bird flu                             | 79 (0.40)                 |
| 3. Named at least one of the signs/symptoms of bird flu in poultry                             | 65 (0.48)                 |
| 4. Aware that sick birds can spread the disease to humans                                      | 51 (0.50)                 |
| 5. Chose at least four ways a human can catch avian influenza                                  | 28 (0.32)                 |
| 6. Aware that avian influenza cannot spread from human to human                                | 6 (0.24)                  |
| 7. Named at least three signs/symptoms of avian influenza in humans                            | 65 (0.43)                 |
| <b>Human (seasonal) influenza</b>  |                           |
| 8. Had heard of human influenza or the flu   | 61 (0.49)                 |
| 9. Aware that humans be infected with the flu  | 56 (0.50)                 |
| 10. Named at least two groups at high risk for the flu   | 40 (0.47)                 |
| 11. Named at least three signs/symptoms of the flu   | 47 (0.48)                 |
| 12. Aware that the flu can spread from human to human  | 49 (0.50)                 |
| 13. Chose four correct ways the flu can spread from human to human                             | 31 (0.37)                 |
| 14. Had heard of the seasonal influenza vaccine or flu shot                                    | 32 (0.47)                 |
| 15. Named at least two groups who should be vaccinated against flu                             | 29 (0.45)                 |
| <b>H1N1 influenza</b>  |                           |
| 16. Had heard of the swine flu or 2009 influenza   | 78 (0.42)                 |
| 17. Aware that humans can be infected with swine flu   | 56 (0.50)                 |
| 18. Stated that humans can only catch swine flu from infected person                           | 7 (0.25)                  |
| 19. Aware that swine flu can be passed from human to human                                     | 49 (0.50)                 |
| 20. Aware that there are humans in Thailand infected with swine flu                            | 40 (0.49)                 |
| 21. Chose four correct ways swine flu can spread between humans                                | 32 (0.39)                 |
| <b>Pandemic influenza</b>  |                           |
| 22. Had heard of a 'pandemic' or diseases that can spread to many countries at the same time   | 35 (0.48)                 |
| 23. Aware that humans can be infected with pandemic influenza                                  | 46 (0.50)                 |
| 24. Aware pandemic influenza can be transmitted between humans                                 | 41 (0.49)                 |
| 25. Chose four correct answers from a list of ways pandemic flu can spread from human to human | 25 (0.34)                 |

**Table 2:** Adjusted<sup>a</sup> logistic regression model of knowledge of influenza among 797 displaced persons and labor migrants, Thailand<sup>b</sup>

| Participant characteristics <sup>c</sup>  | OR   | 95% CI     | <i>p</i> Value |
|---|------|------------|----------------|
| Completed >6 years of formal education  | 6.89 | 3.58–13.24 | <0.001         |
| Participated in an influenza prevention activity (e.g. community outreach) <sup>d</sup> | 5.27 | 2.78–9.98  | <0.001         |
| Completed 1–6 years of formal education   | 4.44 | 2.67–7.39  | <0.001         |
| Lives in Tak Province   | 4.13 | 1.58–10.84 | 0.004          |
| Received health information from a MCHW/volunteer <sup>d</sup>                          | 3.13 | 1.79–5.47  | <0.001         |
| 'Very worried' that influenza will spread in community                                  | 3.12 | 2.00–4.86  | <0.001         |
| Returned to home country more than twice  | 2.49 | 1.34–4.62  | 0.004          |
| Sought health care at a hospital/clinic <sup>d</sup>                                    | 2.44 | 1.60–3.72  | <0.001         |
| Received health information from television <sup>d</sup>                                | 2.35 | 1.41–3.91  | 0.001          |
| Able to have a basic conversation in Thai   | 1.73 | 1.03–2.89  | 0.038          |
| Family income >USD 62/month   | 1.66 | 1.11–2.50  | 0.015          |

<sup>a</sup>Children under five in household, and country of birth were removed from initial models as being uninformative with regard to 'K level'.

<sup>b</sup>Initial set with 22 variables entered; log likelihood 723.7,  $X^2 = 301.61$ ,  $df 22$ ,  $p < 0.001$ .

<sup>c</sup>Adjusted for ethnicity, household size, health professional information source, time in Thailand, migration status, gender and barriers to health care.

<sup>d</sup>Within the previous 6 months.

Other predictors include living in Tak province [OR 4.13 (95% CI 1.58–10.84)], being ‘very worried’ that influenza will spread in the community [OR 3.12 (95% CI 2.00–4.86)] and returning to home country more than twice [OR 2.49 (95% CI 1.34–4.62)].

## DISCUSSION

This is the first study of which we are aware to examine pandemic influenza preparedness knowledge in vulnerable migrant groups during a pandemic. The results show that influenza knowledge is generally low in displaced persons and labor migrants in Thailand, placing them at risk for propagation of pandemic influenza. Several protective factors within the purview of the health sector and amenable to immediate response were identified: participation in an influenza prevention activity, receiving health information from a MCHW, seeking health care at a hospital/clinic and receiving health information from television. Additional protective factors requiring concerted multisectorial action were also identified: formal education, Thai language ability and family income.

Awareness about influenza varied by type, while specific knowledge of disease attributes was generally low across all types. Low knowledge about susceptibility and transmission is particularly worrisome in that this increases migrants’ vulnerability to pandemic influenza. Findings are consistent with two studies that previously assessed migrants’ pandemic preparedness in Serbia and Cairo (Sutic, 2007; Ahmed and Dibb, 2008).

The protective factors (Table 2) identified in our study offer information that might be used to increase influenza knowledge in vulnerable migrant groups. Of the factors within the immediate purview of the health sector, participation in an influenza prevention activity had the strongest association with a high level of knowledge. Although there are many examples of influenza prevention activities among vulnerable populations, there are few research studies that systematically describe effects of health promotion activities on knowledge uptake in migrants.

IOM and provincial health authorities employ and train individuals from migrant villages to be MCHWs. Participants who had received health or influenza information from a MCHW during the past 6 months were more likely to have a high level of knowledge. Community health

workers have been utilized in a range of health promotion programs including pandemic preparedness (National Training Center for the Prevention and Early Detection of Cancer, 1998; Andrews, et al., 2004), and this approach has been documented as an effective way to provide culturally competent, cost-effective services that can increase access to health services and knowledge (Andrews et al., 2004). Hiring and training MCHWs local to areas where health-related activities are to take place, and having local communities participate in the development of these activities, can increase efficacy of community education and behavior change promotion (Campbell and Scott, 2011).

Participants in this study who had visited a hospital or clinic during the past 6 months were more likely to have a high level of knowledge than those who had not. This was regardless of whether they had received health/influenza information directly from a doctor/public health professional, which suggests that other information sources are contributing to patient education. Encouraging migrants to seek health care when they are ill and increasing utilization of mobile clinics may help to increase influenza knowledge.

Participants who received health and/or influenza information from television were more likely to have a high level of knowledge. This finding was independent of educational level, language ability and family income. Television may be particularly effective at reaching people in isolated areas where it is difficult to access other sources of information. In addition, health messages on television are likely easier to remember as they are often aired (and viewed) repeatedly.

Of the factors requiring multisectorial support, formal education >6 years was most strongly associated with a high level of knowledge. Higher levels of education may improve migrants’ ability to obtain, process and understand health information (Lecerof et al., 2011), thus increasing health literacy (Centres for Disease Control and Prevention, 2004; Howard et al., 2006). Although intervention studies are limited in migrants, offering affordable and accessible educational options (e.g. night school, mobile education centers) to migrants and encouraging enrollment are two ways in which it might be possible to increase health literacy. Increasing education options may also have secondary benefits of increasing Thai language ability and income.

Participants who were worried about influenza had a higher level of knowledge, potentially through increased information gathering and/or attention to public health messages. Worry about health issues has been shown to encourage positive attitude and behavior change, hence the use of fear appeals in certain health campaigns (Witte and Allen, 2000; Terblanche-Smit and Terblanche, 2008). The use of fear appeals through influenza public service announcements has been suggested as a feasible way to ‘enhance communications and compliance of recommended health behavior’ (Siu, 2010). However, one author’s (N.J.) extensive experience working with vulnerable migrant populations has been that potential negative outcomes from fear appeals include increasing reluctance of undocumented migrants to seek health care early, and stigma for patients/high-risk groups. Thus, we would not recommend fear appeals as a public health strategy in this situation.

Thailand is a regional hub for vaccine production with support from the WHO, but at the time of the H1N1 pandemic the facility was still under development and unable to produce an adequate quantity of vaccine. Thus, information campaigns to promote hygienic practices, transmission prevention and adherence to non-medical interventions were, and remain, of great public health importance. Educational messages and materials should combine clear information on influenza attributes (e.g. signs and symptoms) with positive actions that individuals can take to protect themselves (Janssen et al., 2006). Vaughn and Tinker (Vaughn and Tinker, 2009) write that environmental factors, social and cultural characteristics and language all affect individual acceptance of public health messages. Included in recommendations to enhance communication were ‘strengthen the personal relevance of communications’, highlighting in particular, language, culture and outreach strategies, and ‘build self-efficacy and trust regarding pandemic interventions’, as well as the importance of involving trusted members of the community and providing clear advice about personal protective behaviors (Vaughn and Tinker, 2009). The results from the current study provide information that could be used to inform public health communication and education strategies within the context of vulnerable migrant populations worldwide. Recommendations are presented in Table 3.

**Table 3:** Key public health recommendations to increase pandemic influenza preparedness knowledge among vulnerable migrant populations

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|                                   |   |
|-----------------------------------|---|
| For public health practice/policy |   |
| 1.                                | Increase frequency and accessibility of influenza prevention activities                                       |
| 2.                                | Assess and potentially increase the provision of educational materials and programs in hospitals/clinics      |
| 3.                                | Increase utilization of MCHWs/volunteers  |
| 4.                                | Offer affordable and accessible formal education options to all age ranges, including basic language training |
| For research                      |   |
| 1.                                | Assess the efficacy of various influenza prevention activities/education materials                            |
| 2.                                | Examine effects of increasing influenza knowledge on influenza attitudes/practices                            |
| 3.                                | Continue utilizing community health workers/volunteers to conduct research                                    |

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## LIMITATIONS

Translation of some concepts (e.g. pandemic) into migrant languages was sometimes difficult. This difficulty was addressed by working with MCHWs to determine acceptable translations. In addition, data were collected at a single point in time. As such, we cannot infer causality between potential ‘predictors’ and knowledge. However, for some predictors, such as family income and Thai language fluency, it is difficult to imagine that a high level of knowledge would have been a cause as opposed to a result. Finally, we were forced to dichotomize the knowledge outcome variable, which may have introduced bias and led to a loss of power. However, this was the optimal approach available given that our data were not normally distributed.

## CONCLUSIONS

Participants show some degree of pandemic preparedness, but the majority have knowledge gaps that place them at risk for contracting and spreading influenza. Mutable predictive factors include education level, source of health information, influenza activity participation, family income and basic ability in a country’s primary language. These results can be used to inform public health policy and practice and improve influenza communication and education efforts.

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