Risk behaviors among villagers during a large outbreak of unidentified sudden death of poultry at a rural community in central of Thailand

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Abstract

This cross-sectional study aimed to describe risk behaviors among villagers of Khaothong sub-district, a rural community in central of Thailand. 814 participants from 12 villages were interviewed with a survey form that was created to investigate a large outbreak of unidentified sudden death of poultry during August 2017. The interview was performed by trained public health students. The result showed that 33.86% of participants exposed to the infected poultry carcass during the outbreak. Among of them, 52.38% did not protect themselves while contact to the infected poultry carcass and 12.50% did not wash their hand after contact to the infected poultry carcass. Furthermore, nearly all of them had an improper practice about disposal of infected poultry carcass. These finding revealed that an enormous of villagers still had risk behaviors. Although this cross-sectional study had some limitations, the result could benefit public health officer and public health decision maker to conduct interventions and measures that will help to reduce risk behaviors among this population.

Keywords: risk, behavior, poultry, sudden death, outbreak

Introduction

In the poultry, there are a few infectious diseases that are cause of sudden death with severe clinical signs including highly pathogenic avian influenza (HPAI), virulent Newcastle disease and fowl cholera (Einum, Kiupel, & Bolin, 2003; Kim et al, 2012; Dhaygude et al., 2017). Among these diseases, HPAI has recognized as a potential treat to animal and human health with a high fatality rate (Yamamoto et al., 2010; Belkhiria, Alkhamis, & Lopez, 2016). In human, most infections with HPAI have occurred by direct or close contact with infected poultry (Lohiniva et al., 2013). A study reported that touching dead or sick poultry was the most important risk factors for HPAI infection in human (Kang et al., 2017).

During August 2017, at Khaothong sub-district, Phayuhakiri district, Nakhonsawan, Thailand, there was an outbreak in the poultry that caused nearly all of the poultry have died. Most of the deaths have occurred within a few hours after the poultry showed clinical signs and lesions such as cyanosis and edema of the head, red discoloration of the shanks and feet, paralysis and dyspnea (Figure 1). In addition, some of these poultry suddenly died without any clinical signs. However, the etiology of disease in this outbreak was not confirmed by laboratory diagnosis.

Figure 1 Lesions of disease among the poultry in Khaothong sub-district that suddenly died during August 2017; (A) cyanosis and edema of head and (B) red discoloration of the shanks and feet

Although the confirmatory diagnosis has not been done during this outbreak, but the signs and lesions among these dead poultry is similar to the signs and lesion in infection of HPAI as report in several previous studies (Suzuki et al., 2009; Hagag et al., 2015; Mahmoud, 2015). Moreover, in Thailand, Nakhonsawan is one of province that has ever reported about HPAI outbreak in the past (Amonsin et al., 2010). Therefore, for this outbreak, the possibility of HPAI infection should be concerned.

Avoid sources of exposure is the best way to prevent the infection of any pathogens. But, in case of exposure with the source of infection cannot avoid, wearing of gloves and hand washing are the basic practice that help to decrease risk for infection (Dinh et al., 2004; Kampf, Loffler, & Gastmeier, 2009; Mathur, 2011). A Previous study showed good evidence about these as they reported that people who did not wash their hand after contact infected poultry had a higher risk for infection compared with people who infrequently performed this behavior (Nasreen et al, 2015). Thus, this study was conducted to explore risk behaviors among villagers during an outbreak of unidentified sudden death of poultry at Khaothong sub-district, Phayuhakiri district, Nakhonsawan, Thailand.

Methods

This survey is a cross-sectional study that was conducted among the villagers who lived in Khaothong sub-district during an outbreak of unidentified sudden death of poultry in August 2017. All villages of Khaothong sub-district were investigated in this study. For each village, a two-stage sampling method was used. In the first stage, from all households, 80 households were selected by convenience sampling. Then, in the second stage, trained public health students visited these selected households and interviewed a participant

who was at least 18 years old and resided in the house by randomly selected. Finally, after excluding the selected households that the members could not be contacted by interviewers and the participants who refused to join in this study, total 814 participants from 12 villages were recruited to this study.

Data were collected via an interview with survey form that was developed to gather information from the villagers to control the outbreak. In this study, we focused on their practices including self-protection (wearing of gloves and face mask) while contact to the infected poultry carcass, hand washing (the practice of cleansing the hands with plain or antimicrobial soap and water) after contact to the infected poultry carcass and disposal of infected poultry carcass. The survey form also inquired on poultry husbandry, poultry dead, direct contact with infected poultry carcass, influenza-like illness (an acute respiratory infection with the following symptoms: fever 38 C^{o} or higher, and; cough, and/or; sore throat) among participants in last month and the position of each house that was determined using a Global Positioning System (GPS) Garmin Etrex 10. Data collection was performed in early of September 2017 by trained public health students after getting permission from the participants. In addition, the participants had the right to skip any question that they did not want to answer.

Descriptive statistic was used to analyze the data. In addition, binary logistic regression was also used to explore the possible relationship between the direct contact with infected poultry carcass and influenza-like illness in this study. The relationship was explained by odd ratios (OR) with 95% confidence intervals. Statistical analysis was performed with Statistical Package for the Social Sciences V.18 (SPSS Inc, Chicago, Illinois, USA). In addition, to visualize geographic distribution of event of sudden death in poultry, a simple map was constructed from the GPS data by using Quantum GIS (QGIS) Version 1.7.4.

Results

Most households of Khaothong is located together as a community that is in the central area of sub-district, except the households of the Village XI that locate near the boundary of sub-district at the northeast. Around the community of Khaothong, most area is used for agriculture such as planting rice, sugar cane, cassava and corn. And most of the poultry husbandry usually has been done at the backyard of their households.

There were 814 participants from 12 villages join to this study. 56.76% of them had the poultry husbandry around area of their house and among these participants, 82.68% of them reported that a lot of their poultry had suddenly died during August 2017. The result demonstrated that the event of sudden death in poultry had been found in all villages of Khaothong sub-district. Geographic distribution of observed household that had reporting about sudden death in poultry was showed in Figure 2.

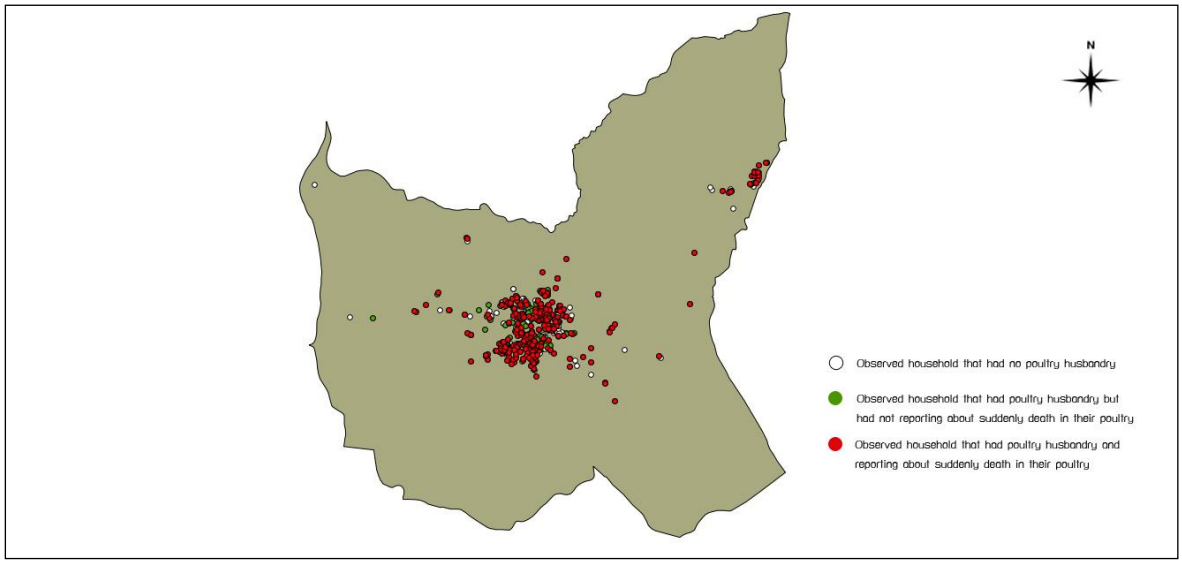

Figure 2 Geographic distribution of observed household with event of sudden death in poultry (red spot), Khaothong sub-district, Nakhonsawan, Thailand, 2017

Among participants who reported a lot of their poultry had suddenly died, there was a few of them (6.28%) that disposed the infected poultry carcass using landfills at least 50 cm in depth and disinfection with chlorine or lime before landfills, while most of them (93.72%) had an improper practice about disposal of infected poultry carcass including throwing the carcass on the rice, sugar cane or cassava planning fields that located around the community and throwing the carcass on the garbage dump of village.

From all participants, 697 participants responded to the question about direct contact with infected poultry carcass. We found 33.86% of them (n=236) had directly exposed to the infected poultry carcass. Among them, there were 189 participants and 184 participants that answered the question about self-protection behavior during contact to the infected poultry carcass and hand washing behavior after contact to the infected poultry carcass respectively. The result showed that 52.38% (n=99) did not protect themselves while contact to the infected poultry carcass and 12.50% (n=23) did not wash their hand after contact to the infected poultry carcass.

The Village III had the highest proportion of participants who did not protect themselves while contact to the infected poultry carcass at 92.31%, follow by the Village II (66.67%), the Village X (57.14%), the Village I (55.56%) and the Village V (53.94%) respectively. For hand washing behavior, the Village IX had the highest proportion participants who did not wash their hand after contact to the infected poultry carcass at 28.57%, follow by the Village III (25.00%), the Village VIII (20.00%) and the Village X (15.00%).

Prevalence of influenza-like illness among participants in last month was 22.95%. However, we observed no relationship between the direct contact with infected poultry carcass and influenza-like illness (Table 1).

Table 1 OR for influenza-like illness among participants regarding the direct contact with infected poultry carcass: result of binary logistic regression

Variable	Participants, n (%),	Influenza-like illness among participants, n (%) (total=160)	OR	95% CI
Direct contact with infected poultry carcass				
Yes	236 (33.86)	48 (30.00)	0.80	0.54-1.17
No	461 (66.14)	112 (70.00)		

Discussion

Khaothong, a sub-district of Nakhonsawan province that locate at central region of Thailand is a rural community, consist of 12 villages with total population is around 7,500 from 3 ,000 households. Most occupation of villagers is agriculture. A lot of them have the backyard poultry husbandry. This correspond to our result that demonstrated around half of them had the poultry husbandry around area of their house.

Our results were examined by using data from 814 participants from 12 villages. However, in some questions, the participants did not answer the question that made the sample size decreased; from 814 to 697 participants for the question about direct contact with infected poultry carcass and influenza-like illness, from 236 to 189 participants for the question about self-protection behavior and from 236 to 184 participants for the question about hand washing behavior. This limitation should be considered when extrapolated the results of our study.

Descriptive analysis revealed the proportion of risk behaviors among the villagers seem high including lack of self- protection behavior while contact to the infected poultry carcass, lack of hand washing behavior after contact to the infected poultry carcass and improper practice about disposal of infected poultry carcass. These may be explained by knowledge-attitude-practice (KAP) model that assume knowledge, attitude and practice inter-related with one another (Bano, Al-Shammari, Fatima, & Al-Shammari, 2013) and health belief model. For example, a previous study reported that people with adequate knowledge of hygiene behavior were more likely to have a proper hygiene behavior (Vivas et al., 2010) and a prior study that revealed risk perception affect to preventive behavior among people (Weistein et al., 2007). For our finding, lack of understanding about proper hygiene behavior and possible zoonoses from the poultry among villagers may be a reason. However, this study did not explore the knowledge level (about hygiene behaviors and infected animal carcass disposal) and risk perceptions among this population. Thus, our suggestion is further studies and interventions should effort on these variables, especially among villagers in the Village III that both of the risk behaviors were high.

Our study found that almost the infected poultry carcasses were left in the planting fields (rice, sugar cane and cassava) and the garbage dump of village. If the infection among these poultry is HPAI, this improper disposal of infected poultry carcass is the introduction of the pathogens into the environment that can cause the spread of infection among the poultry and other susceptible hosts or even though human. In addition, around the garbage dump of village and planting fields, there were stray dogs, stray cats, small carnivores and scavenger birds that may be consumed the infected poultry carcasses. This made the pathogens can be circulated in the environment and spread to other susceptible hosts. Good evidence had been reported in 2004 as the previous studies found a fatal HPAI (H5N1) infection in a dog following ingestion of an H5N1-infected duck during an outbreak in Thailand (Songserm et al., 2006) and an infection of HPAI (H5N1) in a domestic cat that ate an infected pigeon carcass (Songserm et al., 2006). Thus, the need for monitoring of infection among these animals and the contamination of possible pathogens in the environment should be highlight. Moreover, the cause of infection among these poultry should be identified.

Since, we concerned about the possibility of HPAI infection, the relation between influenza-like illness and the direct contact with infected poultry carcass was analyzed. However, our finding indicated that the direct contact with infected poultry carcass was not association with influenza-like illness among villagers. However,

this finding has been limited because influenza-like illness variable was self-report and not identified by confirmatory diagnosis for the cause. This possible misclassification should be noted.

Conclusion and Suggestion

We revealed that an enormous of villagers still had risk behaviors; lack of self- protection behavior while contact to the infected poultry carcass, lack of hand washing behavior after contact to the infected poultry carcass and improper practice about disposal of infected poultry carcass. Regarding our finding, further studies should focus effort on possible factors that relate to self-protect and hygiene behaviors. In addition, the need for monitoring of the infection and contamination of possible pathogens in the environment (soil, water, stray dogs, stray cats, small carnivores and scavenger birds) should be raised.

Although, this cross-sectional study had some limitation, our finding indicates a point that is benefit for public health decision makers to improve hygiene behaviors among the villagers in rural area with interventions such as providing of health promotion. These will help the public to decrease the risk for their health.

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References

Amonsin, A., Lapkuntod, J., Suwannakarn, K., Kitikoon, P., Suradhat, S., Tantilertcharoen, R., ... Thanawongnuwech, R. (2010). Genetic characterization of 2008 reassortant influenza A virus (H5N1), Thailand. *Virology Journal*, *7*, 233.

Bano, R., Al-Shammari, E., Fatima, S. B., & Al-Shammari, N. A. (2013). A comparative study of knowledge, attitude, practice of nutrition and non-nutrition student towards a balance diet in Hail University. *IOSR Journal of Nursing and Health Science*, *2*(3), 29-36.

Belkhiria, J., Alkhamis, M., & Lopez, B. M. (2016). Application of Species Distribution Modeling for Avian Influenza surveillance in the United States considering the North America Migratory Flyways. *Scientific Reports*, *6*, 33161.

Dhaygude, V. S., Sawale, G. K., Chawak, M. M., Bulbule, N. R., Moregaonkar, S. D., & Gavhane, D. S. (2017). Molecular characterization of velogenic viscerotropic Ranikhet (Newcastle) disease virus from different outbreaks in desi chickens. *Vet World*, *10*(3), 319-323.

Dinh, P. N., Long, H. T., Tien, N. T. K., Hien, N. T., Mai, L. T. Q., Phong, L. H., … Phuong, N. T. (2006). Risk factors for human infection with avian influenza A H5N1, Vietnam, 2004. *Emerging Infectious Disease, 12*(12), 1841-1847.

Einum, P., Kiupel, M., & Bolin, C. (2003). An outbreak of fowl cholera in ring-necked phesants (Phasianus colchicus). *Avian Disease, 47*(3), 777-780.

Hagag, I. T., Mansour, S. M. G., Zhang, Z., Ali, A. A., Ismaiel, E. B. M., Salama, A. A., … Xing, Z. (2015). Pathogenicity of Highly Pathogenic Avian Influenza Virus H5N1 in naturally Infected poultry in Egypt. *PloS One, 10*(5), e0120061.

Kampf, G., Loffler, H., & Gastmeier, P. (2009). Hand hygiene for the prevention of nosocomial infections. *Deutsches Arzteblatt International, 106*(40), 649-655.

Kang, M., Lau, E. H. Y., Guan, W., Yang, Y., Song, T., Cowling, B. J., … Mok, C. K. P. (2017). Epidemiology of human infections with highly pathogenic avian influenza A(H7N9) virus in Guangdong, 2016 to 2017. *Euro Surveill, 22*(27), 30568.

Kim, H. R., Lee, Y. J., Park, K. C., Oem, J. K., Lee, O. S., Kang, H. M., … Bae, Y. C. (2012). Highly pathogenic influenza (H5N1) outbreak in wild birds and poultry, South Korea. *Emerge Infectious Disease, 18*(3), 480-483.

Lohiniva, A. L., Dueger, E., Talaat, M., Refaey, S., Zaki, A., Horton, K. C., & Kandeel, A. (2013). Poultry rearing and slaughtering practices in rural Egypt: an exploration of risk factors for H5N1 virus human transmission. *Influenza and Other Respiratory Viruses, 7*(6), 1251-1259.

Mahmoud, E. A. (2015). Hemato-biochemical and pathological changes on avian influenza in naturally infected domestic ducks in Egypt. *Veterinary World, 8*(10), 1177-1182.

Mathur, P. (2011). Hand hygiene: Back to the basics of infection control. *Indian journal of Medical Research, 134*(5), 611-620.

Nasreen, S., Khan, S. U., Luby, S. P., Gurley, E. S., Abedin, J., Zaman, R. U., … Azziz-Baumgartner, E. (2015). Highly pathogenic avian influenza A (H5N1) virus infection among workers at live bird markets, Bangladesh, 2009-2010. *Emerging Infectious Disease, 21*(4), 629-637.

Songserm, T., Amonsin, A., Jam-om, R., Sae-Heng, Meemak, N., Pariyothotn, N., … Poovorawan, Y. (2006). Avian influenza H5N1 in naturally infected domestic cat. *Emerging Infectious Disease, 12*(4), 681-683.

Songserm, T., Amonsin, A., Jam-om, R., Sae-Heng, N., Pariyothotn, N., Payongporn, S., … Poovorawan, Y. (2006). Fatal avian influenza A H5N1 in a dog. *Emerging Infectious Disease, 12*(11), 1744-1747.

Suzuki, K., Okada, H., Itoh, T., Tada, T., Mase, M., Nakamura, K., … Tsukamoto, K. (2009). Association of increased pathogenicity of Asian H5N1 highly pathogenic avian influenza viruses in chickens with highly efficient viral replication accompanied by early destruction of innate immune response. *Journal of Virology, 83*(15), 7475-7486.

Vivas, A., Gelaye, B., Aboset, N., Kumie, A., Berhane, Y., & Williams, M. A. (2010). Knowledge, attitude, and practices (KAP) of hygiene among school children in Angola, Ethiopia. *Journal of Preventive Medicine and Hygiene, 51*(2), 73-79.

Weinstein, N. D., Kwitel, A., McCaul, K. D., Magnan, R. E., Gerrard, M., & Gibbons, F. X. (2007). Risk perceptions: Assesment and relationship to influenza vaccination. *Health Psychology*, *26*(2), 146-151.

Yamamoto, Y., Nakamura, K., Yamada, M., & Mase, M. (2010). Persistence of Avian Influenza Virus (H5N1) in Feathers Detached from Bodies of Infected Domestic Ducks. *Applied Environmental Microbiology*, *76*(16), 5496-5499.