

ORIGINAL RESEARCH

Control of highly pathogenic avian influenza in Quang Tri province, Vietnam: voices from the human–animal interface

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ABSTRACT

Introduction: Highly pathogenic avian influenza (HPAI) is caused by the haemagglutinin 5, neuraminidase 1 (H5N1) influenza A virus. Around 80% of households in rural Vietnam raise poultry, which provides food security and nutrition to their households and beyond. Of these, around 15–20% are semi-commercial producers, producing at least 28% of the country's chicken. Through learning the experiences of these semi-commercial farmers, this study aimed to explore the local understandings and sociocultural aspects of HPAI's impact, particularly the aetiology, diagnosis, and the prevention and control methods in one Vietnamese rural province.

Methods: This study was conducted in Quang Tri province, Vietnam. Quang Tri province has eight districts. Five of these districts were at high risk of HPAI during the study period, of which three were selected for the present study. Within these three districts, six communes were randomly selected for the study from the list of intervention communes in Quang Tri province. Six out of the 26 intervention communes in Quang Tri were therefore selected. Participants were randomly selected and recruited from lists of semi-commercial farmers, village animal health workers, village human health workers and local authorities so that the study population (representative population) included an amount of variability similar to that of the wider population.

Results: A key benefit of this village-level control program was the residential proximity of animal and human health professionals. Participants were well aware of the typical clinical signs for avian influenza and of the reporting process for suspect cases. However there was extensive room for improvement in Quang Tri province regarding access to the HPAI vaccine, essential medical equipment for animal use, and available financial support.



Conclusions: This qualitative research study provided an important insight for in-country policy makers and international stakeholders. It is vital that there are continued efforts to prevent and control highly pathogenic avian influenza through support programs that provide locally appropriate information and resources to those at the human–animal interface.

Key words: avian influenza, culture, reporting, rural Vietnam, village health worker.

Introduction

Highly pathogenic avian influenza (HPAI) is caused by the haemagglutinin 5, neuraminidase 1 (H5N1) influenza A virus. To date, over 50 million domestic birds have been slaughtered in Vietnam due to HPAI infection^{1,2}. In 2008, economic losses in the South-East Asian region had amounted to US\$10 billion³ and these continue to rise. Around 80% of households in rural Vietnam raise poultry, providing food security and household income^{4,5}. Of these, around 15–20% are semi-commercial producers, producing at least 28% of the country's chicken⁴.

The current human case rate in Vietnam is the third highest globally, at 50%⁶. According to WHO reports about human cases, there have been 125 confirmed cases and 61 deaths in Vietnam out of a global 637 cases and 378 deaths⁶. This endemic status of H5N1 HPAI in Vietnam⁷ results in a high risk of a human pandemic if the H5N1 virus developed the capability of transmission between humans^{1,5}.

Internationally and within Vietnam, HPAI places significant pressure on public health and economic resources as well as on social stability and food security⁸. Should human-to-human transmission capability develop, there could be 49.6 million disability adjusted life years⁹ in human loss of life in Asia. The WHO has calculated that global deaths would number up to 7.4 million¹⁰.

In Vietnam, prevention and control programs include vaccination, identification and culling of infected flocks, improved biosecurity in bird markets, community education via radio and television, capacity building of the medical sector and national surveillance systems. Mass media

messages encourage the community to vaccinate birds against HPAI H5N1 and report any unusual cases in their flocks. Although a vaccine was available in Vietnam during the study period, there were significant problems with its availability in remote areas, making culling an unavoidable and devastating measure.

Research objectives

The overall aim of this study was to explore the impact of HPAI control strategies at the village level in Vietnam. The three objectives were to:

- explore the cooperation between human and animal health sectors
- report on the local-level comprehension of control programs and resources
- add to the body of knowledge on village-level HPAI prevention and control within South-East Asia and globally.

By implementing this study in Quang Tri province the authors explored the social dimensions of the response efforts, which included personal experiences with HPAI and the related behaviors around information seeking, methods for healthy bird maintenance and methods of diagnosis for HPAI in poultry, farmers' motivations to report suspected cases of influenza in farmed birds, the level of farmers' comprehension of effective HPAI prevention and control, and the value and cultural significance of poultry rearing and the reliance on traditional medicine in farming and maintenance of human health.



Examining the local processes of a program is a pivotal aspect of its successful implementation. A concurrent objective of this study was to understand the village-level processes within the United States Agency for International Development (USAID) Avian and Pandemic Influenza Initiative (APII) Community Based Surveillance (CBS) program. Collecting information about the intervention in the context of the culture and society in which it is implemented is crucial in maintaining effective prevention programs.

USAID APII CBS program description

Community education and awareness are vital to HPAI prevention and control in Vietnam¹¹. The APII CBS program, initiated and supported by USAID and implemented in Vietnam by the consultancy firm Abt Associates, was a village-level, grassroots-style animal and human public health system strengthening model.

APII was a 4-year program during which village animal health workers and village human health workers (VAHW and VHHW), also referred to as collaborators, were selected by commune authorities and provided with training and ongoing support. The APII project was implemented from November 2009 to September 2013, and the CBS component was implemented from March 2010 to September 2012. Directed at the forefront of the epidemic, the program focused on filling the gap between national disease surveillance and endeavors at the community level. It was implemented in a total of 26 communes with 150 villages.

The CBS network was composed of VAHW and VHHW performing targeted community surveillance activities such as regular household visits, communicating with animal and human drug suppliers, liaising with poultry and feed sellers at marketplaces, village education and training, follow-up of rumors and poultry vaccination campaigns¹². Collaborators gave advice to different members of the community, including information about case definition, reporting and response with animal and human drug suppliers; vaccination schedule and coverage with poultry and feed sellers at marketplaces; and basic education regarding hygiene practices

and biosecurity, including correct hand washing and environmental decontamination skills in education and training sessions to which all village community members were invited. There was a focus upon integration of the program's educational activities into village events such as farmers' and women's union meetings.

These specific modes of communication were introduced to the intervention villages by the CBS program. This program utilized an already existing communication system, whereby every commune in Vietnam has a loud-speaker system that broadcasts news for around 15–30 minutes to community members every morning (referred to locally as 'giant voice'). The 'giant voice' introduced the CBS intervention and its collaborators to the community.

Prior to the implementation of the CBS program, the VAHW and VHHW followed a passive approach to disease detection, reporting and response. Both groups had similar responsibilities – the detection of HPAI cases in birds and humans. Group members had some basic professional training and activities related to vaccination programs and primary healthcare.

Initially, collaborators received a 2–3-day training course on identifying and responding to a suspected HPAI case. The VAHW collaborators were given packages that included a sterilizable syringe and needles, and educational promotional materials promoting the key message of 'early detection, immediate reporting and rapid response'. Later, ongoing training sessions were held every 6–12 months.

During household visits, VAHW and VHHW explained the general principles of prevention of HPAI in humans and animals, and asked general disease surveillance questions. The symptoms sought by human health collaborators were influenza-like symptoms. Human patients suspected of having HPAI were transferred to a tertiary care or central hospital. In birds, a case was suspected if there was sudden death in flocks, or weakness (often manifesting in a droopy neck), lack of appetite, diarrhea, swelling of the face and neck or ataxia. The recommended method of culling farmed birds was to



bury them alive, a practice approved within Vietnam national biosecurity procedures. Despite close supervision of the VAHW by the collaborators, personal protective equipment such as masks or clothing were not supplied.

Collaborators were trained to report suspected cases in either humans or farmed birds to the commune or district level through a clear reporting pathway and case reporting forms, so that suspected cases in farmed birds or humans could be diagnosed quickly (ideally within 24–48 hours). The VAHW and VHHW held monthly meetings to discuss recent activities. They were each paid 80 000 VND (US\$4) per month.

A vaccine is available for HPAI in birds but not in humans. Vaccine was distributed to provinces by the national program and the provincial authorities. Vaccination was supported by the district authorities and was free to farmers. The CBS animal health collaborators supported the national HPAI vaccination program by administering the vaccine – they were not involved in its distribution.

Setting: Quang Tri province

Quang Tri province is located in North Central Vietnam¹³. It was severely affected by World War II and the Vietnam War. Despite the economy's steady rise over recent decades, it remains one of the poorest provinces in Vietnam. Its gross domestic product per person was around US\$250 in 2005¹⁴. The province has the sixth-lowest life expectancy in the country¹⁵.

Quang Tri province is one of the most vulnerable provinces in the country to floods¹⁵. Due to high rainfall, the type of bird farming is predominantly duck with some chicken raising. Poultry are mostly free range but some larger scale producers enclose their birds overnight. Multiple HPAI outbreaks in Quang Tri poultry have occurred, but no cases of HPAI in humans have been reported¹⁶. The APII program had been in operation for 17 months in Quang Tri when the present study was conducted. The APII CBS program employed around 350 village- and commune-level

collaborators in the province, with equal numbers of VAHWs to VHHWs.

Methods

A qualitative research approach was used in this study. This approach provided the opportunity to collect insightful and relevant information as the participants were allowed to speak about what was of most concern to them. Data were collected in the informants' villages.

The study was conducted in November and December 2011 and included the three districts in which USAID's APII had been implemented in Quang Tri province. Two communes were randomly selected from each district; therefore, 6 out of the 26 intervention communes in Quang Tri province were selected. Participants were randomly selected and recruited by local Abt Associates staff (Table 1).

The participating semi-commercial farmers, all of whom were from participating villages, owned around 50 to 3000 intermittently housed or free-roaming birds, which were farmed for both meat and eggs. The participating VHHWs and VAHWs were collaborators in the USAID APII project.

Data were collected over 7 days through semi-structured focus group discussions (FGDs) and in-depth interviews and were conducted in Vietnamese. Prepared guidelines followed the three project objectives listed earlier. Data collection occurred at the informants' village community hall or commune meeting room. All participants signed consent forms. Sessions lasted approximately 1 hour and participants were compensated 50 000 VND (US\$2.50) for their time. Government officials were interviewed outside of their work hours.

All FGDs and interviews were led by the same interviewer, with simultaneous language interpretation by one interpreter of the questions followed by the participants' responses. Data were electronically recorded and type transcribed in English during the interviews.



The audio recordings were reviewed by the interviewer and compared to the transcripts to ensure consistency. Any discrepancies were resolved through discussion between the interviewer and interpreter. After completing the fieldwork, the interviewer held a detailed debriefing meeting with the research team. Discussion of the preliminary results and trends observed assisted with the validation and enhanced rigor of the data. The written transcripts were coded in the weeks following the data collection. Transcripts were created using Microsoft Word and studied through a framework analysis process¹⁷. The authors re-read the transcripts and listened to the audio recordings in order to familiarize the data. Common themes emerged during this process, enabling the development of a coding scheme.

The data were indexed and arranged according to themes¹⁷. These themes form the basis of the findings and analysis presented in this article. Information about collaboration between the animal and human health sectors was identified as one theme. Other themes that related to farmers' care for their birds were arranged using an underlying conceptual framework which categorized data into farmers' care-seeking behavior for their birds, diagnosis of HPAI, prevention of HPAI, knowledge and attitudes of and about HPAI, and the implications of the local culture on the CBS prevention and control program.

Ethics approval

Institutional ethics approval was gained from the University of Sydney Human Research Ethics Committee (14234) and the Hanoi School of Public Health Institutional Review Board (20111104). Permission was sought and granted by the provincial authorities of Quang Tri province.

Results

Findings from the FGDs and in-depth interviews were coded into six themes: (1) collegiality between village animal health and human health sectors, (2) participants' care-seeking behavior to maintain healthy birds, (3) diagnosis of HPAI in farmed birds and the subsequent response, (4) vaccination against HPAI and farmers' motivations to report suspected H5N1 cases, (5) farmers' level of knowledge about HPAI, attitudes and access to

information and resources, and (6) the value and cultural significance of poultry rearing including traditional medicine. These themes closely corresponded with the project objectives.

Collegiality between human and animal health sectors

Collegiality between VHHWs and VHHWs was demonstrated at significant times, but commonly at the village level. For example, during an outbreak of HPAI in June 2011 in commune 5 (C5), district 3 (D3), a VHHW explained, 'The VAHWs also visited households with suspected cases [in farmed birds] and we exchanged ideas with them and reported to higher levels for help'.

Collegial acts were less obvious at the district and provincial level. A typical comment was, 'I haven't met the vet collaborators in my district' (IDI, representative from district human health center, D2).

Collaborators in the same commune had good knowledge about recent outbreaks and, when asked about recent outbreaks their accounts cross-matched. The VAHW in C6, D3 acknowledged how the project strengthened the services provided by animal health professionals who were not part of the APII program and some even attended the monthly meetings.

Participants at all levels agreed that more collaboration between animal health and human health sectors would be favorable.

Care-seeking behavior to maintain healthy birds

The purchase of human and animal medicines for the treatment of farmed birds was widely reported. One farmer in C1, D2, said, 'When we raise ducks and chickens and they display [typical] symptoms [of HPAI], we just go to the pharmacy to seek treatment for our animals'. Medicines suppliers were seen as suppliers of information: 'Yes [we are aware of farmers buying antibiotics directly] but they ask for information and advice from the seller. It's good for the vet to save time but bad at the same time because (only) the vet officers can give exact disease diagnosis' (VAHW, C4, D2).



Date	District	Commune	Schedule
28.11.11	D1	C1 (HPAI)	<ol style="list-style-type: none"> 1. FGD 7 human health collaborators and head village animal health station 2. FGD 10 farmers 3. FGD 8 animal health collaborators
29.11.11	D1	C2 (HPAI)	<ol style="list-style-type: none"> 1. FGD 2 members commune HPAI steering committee 2. IDI commune head veterinarian 3. FGD 10 farmers 4. FGD 7 human health collaborators[†] and 5 animal health collaborators
30.11.11	D2	C3 (HPAI)	<ol style="list-style-type: none"> 1. FGD head of district veterinary station and 2 technical officers in district vet station 2. FGD 9 farmers 3. FGD 10 animal and human health collaborators 4. IDI vice-chairperson of commune people's committee and chairperson of steering committee for avian influenza prevention
1.12.11	D2	C4 (HPAI)	<ol style="list-style-type: none"> 1. FGD 7 human and animal health Collaborators and 1 head veterinarian for commune 2. IDI representative of district preventative health center 3. FGD 14 farmers
2.12.11	D3	C5 (HPAI)	<ol style="list-style-type: none"> 1. FGD 5 animal health collaborators 2. FGD 10 farmers 3. FGD 4 commune steering committee officials
5.12.11	D3	C6 (HPAI)	<ol style="list-style-type: none"> 1. FGD 5 animal health collaborators 2. FGD 5 human health collaborators 3. FGD 10 farmers
6.12.11	D3	C5 (HPAI)	FGD 3 human health collaborators
Total	3 districts	6 communes	136 informants Animal health collaborators = 31, all FGD Human health collaborators = 31, all FGD Farmers = 63, all FGD Government officials = 11, 3 IDI, 8 FGD

[†]Village animal or human health workers working in USAID APII project.

C, commune. D, district. FGD, focus group discussion. (HPAI), highly pathogenic avian influenza reported in that commune by participants. IDI, in-depth interview.

Two farmers in C3, D2 blamed a decreased quality of veterinary pharmaceutical products for the deterioration of the health status of their birds: 'We think the company now makes it more diluted so we have to buy more'.

Access to reliable information about healthy birds, including advice on the acquisition of 'safe' birds from breeders, was desired. Farmers preferred to source birds from HPAI-outbreak-free farms.

Diagnosis of HPAI in farmed birds and the subsequent response

Farmers and village- and commune-level animal health professionals did not have direct access to laboratory diagnostic services. Therefore, physical symptoms were the mainstay for suspected diagnosis of HPAI. Participants reported the following physical signs: massive death, floppy necks (VAHW, C2, D1), ducks with long necks and green rather than white manure (farmer, C1, D1). All participants



understood that large-scale sudden death should be reported as a potential HPAI outbreak.

There was cross-over when participants described HPAI and other poultry disease symptoms. For example 'lazy' birds were noted during an avian influenza outbreak and also noted as a symptom of infectious bursal disease.

All participants displayed confidence in the authorities' response should they report a suspected HPAI outbreak. However, answers about how long a response effort took varied from 1 to 5 days.

All farmers with confirmed HPAI cases had their poultry culled by the district or provincial animal health officials. The culling method used was to bury poultry alive. '(We) put live birds in bags, dig a hole and bury and cover in lime' (VAHW, C2, D1).

Vaccination against H5N1 and farmers' motivations to report suspected H5N1 cases

All communes in the study had experienced outbreaks of HPAI. Although vaccine was available in Vietnam during the study period, it was not always available to farmers in the study. VAHWs were unable at times to provide vaccine because it was distributed by the national authorities at the provincial level. When available, HPAI vaccine was free. The unreliability of access to vaccines resulted in irregular vaccination programs and non-prevention of HPAI: 'The reason for the recent outbreaks in our district is because of insufficient vaccine. After the outbreak, vaccine was supplied so thanks to that there have not been any outbreaks in our community since' (commune steering committee official, C5, D3); 'I asked for vaccination a month ago but haven't received it yet. Usually there is no delay with vaccination but ... the vaccine has not been available for more than 11 months' (farmer, C2, D1).

More than three-quarters of farmer participants and collaborators reported that if their poultry were vaccinated they would receive compensation if their poultry contracted

H5N1. As well, if vaccination was not currently available but a farmer's poultry was registered with the commune animal health officials, they would receive compensation. Not all farmers were aware of this.

Variation in the proportion of market value of poultry given to farmers for poultry loss was observed between the districts and communes studied. Generally 50–70% of market value was expected. This varied with the age and size of poultry.

Delays in compensation payment of 6–12 months were reported. The following quotation was typical of the sentiment portrayed when the topic of compensation was explored: 'There are two reasons [for underreporting of HPAI among farmers]: first because of knowledge limitation and second because of economic losses because for HPAI they are compensated but other diseases they are not compensated' (VHHW, C3, D2).

Farmers' levels of knowledge about HPAI, attitudes and access to information and resources

Resource access and availability were very low in the communities studied. The consistency with which participants alluded to this when asked to provide recommendations to the APII program is significant. 'Our commune has a large area with a huge number of poultry. We have 5 villages and one syringe for animal use is shared between them' (VAHW, C5, D3). This was a common situation and has obvious biosecurity and work efficiency concerns.

Neither the VAHW nor farmers owned or knew where to purchase respiratory protection aside from fabric face masks. Other protective equipment such as gloves and impermeable clothing were unavailable at the village level. A typical response to a question about what sort of protective clothing was available was that it was 'insufficient in daily life – only when there is an outbreak are farmers provided with clothing. I think this is an area of big concern because people can be exposed to the risk' (district animal health worker, C3, D2).



All farmers, VAHWs and VHHWs had regular access to radio broadcasts and many had access to television [in addition to the 'giant voice' mentioned earlier]. No farmers, and less than 5% of VHHWs and VAHWs, had access to the internet. All collaborators reported they had community interactions through household visits and VHHWs had participated in school education campaigns.

All farmers knew about the risks to human and animal health associated with HPAI. Collaborators reported good and improved awareness levels since the USAID APII commencement. As well, various improvements in risk minimization behavior were the result of the integrated education campaigns in the APII CBS program. The most frequently mentioned was the cessation of the practice of eating birds that had died of illness. There was also evidence that the program had helped participants feel less anxious about an outbreak: 'I think in comparison with 5 years ago, people are equipped with better knowledge and they are less scared as they know about disease prevention' (commune steering committee official, C5, D3).

Nevertheless, farmers' understandings of the primary mechanisms of spread and prevention of HPAI varied. One farmer stated, 'I would like to propose that when bird flu epidemics happen, very sick poultry must be slaughtered but less ill ones should be considered for treatment' (farmer, C2, D1). Another farmer from a village that had had a very recent HPAI outbreak stated, 'I think we have a good prevention system as avian influenza has happened for several years already but it looks like this village is immune' (farmer, C4, D2).

Collaborators found knowledge gained from the APII CBS program to be empowering, and all collaborators were happy to contribute to community welfare, regardless of financial remuneration. 'Our workload is really big and we work on disease prevention in poultry and mammals also. I have more than 10 years' working experience in this area ... allowance and salary is very low. Also there is the risk of disease transmission. Our occupation is mainly based on love' (VAHW, C2, D1).

Value and cultural significance of poultry rearing and traditional medicine

When farmers in C5, D3 were asked whether they enjoyed being poultry farmers, one stated, 'Yes we do [enjoy poultry farming] very much ... the benefit of farming is mainly economic. It also improves the diversity of our daily meal.' Many farmers acknowledged the difficulties of farming but none suggested that they would give it up. However, most said that they were not sure whether their children would be poultry farmers.

No farmer stated that rearing poultry held significant cultural value. However, conversations with project support staff and a provincial veterinary official revealed that responses would have been very different if smaller scale, household poultry owners had been asked the same question. They reported that there is a longstanding tradition of backyard farming in the villages studied and that this has cultural significance, as has the use of traditional medicine.

When the VAHW in C6, D3 were asked whether they recommended traditional systems of medicine to farmers for treatment of their birds, they said, 'Yes we do, and we also give recommendations to use alcohol and garlic for Newcastle Disease prevention because we don't have special antibiotics or medicine for this disease' (VAHW, C5, D3). 'They use different types of traditional medicine [for their farmed birds]. They use garlic and they give scorpions in alcohol and rice and feed them to the chickens ... many people combine traditional medicine recipes with modern drugs sold in the drug store. They observe from the start of the village the wind direction and inform the rest of the village so that the other end of the village can give garlic to prepare' (chairman, D2 steering committee for avian influenza).

Globally, traditional practices have been targeted as barriers to behavioral change, in the form of important disease prevention hygiene practices, for example. In this Vietnamese study traditional customary practices were considered one of the most challenging aspects of the control program. 'I think nowadays people wear masks and take other measures but it



is most difficult to encourage people to practice preventive methods such as washing hands because of longstanding practices and traditions [which are believed to be more effective at disease prevention]. Somehow people still don't do that even though they keep telling them' (VHHW, C1, D1).

Discussion

One of the real measures of village-level animal disease surveillance activities was the communication patterns of VAHWs and VHHWs who lived side-by-side and usually communicated with each other on an informal basis, often at marketplaces and social occasions. They tended to speak formally only when disease outbreaks occurred.

All VAHWs and VHHWs reported good compliance with the monthly meeting schedule that formed part of the APII program, where VAHWs and VHHWs met as individual groups. There were no scheduled formal meetings between VAHWs and VHHWs although record sharing occurred. Overall, the CBS program strengthened the communication network between VHHWs and VAHWs, between commune authorities and village workers, and village workers and households. It is recommended that future programs adopt a similar strategy to strengthen networks.

The protocol of burying affected birds alive raised severe animal welfare concerns and threatened ecological and food and water safety with the placement of chemicals such as chloramine B in the land, a practice widely reported. Culling of affected flocks is an important but temporary measure in terms of long-term HPAI prevention efforts⁵.

Behavior related to participants seeking and maintaining health in birds

It was commonplace for farmers to purchase antibiotics for treating symptoms of poor health observed in their birds. These practices are of concern globally because inappropriate use of antibiotics encourages antimicrobial resistance.

Of equal or greater concern is the delay in reporting a suspect HPAI outbreak if, as the first step, farmers purchase medications for their birds directly from the drug seller, rather than seeking the advice of an animal health worker about the most appropriate treatment. This knowledge gap is in urgent need of attention. Training programs for health workers and drug suppliers should include the principles of antimicrobial resistance and the clinical situations in which antibiotics are and are not appropriate.

A level of complacency about poultry illness was demonstrated in farmer responses. It seemed acceptable to have some 'normal' or routine symptoms of poultry illness. VAHW attitudes to this phenomenon were somewhat accepting. These combined attitudes could increase the risk of failure to report signs of HPAI.

The finding that farmers partially blamed HPAI infection on poultry suppliers outside their commune is in contrast to that of Lockerbie, who states, 'People are not afraid of contracting avian influenza because they ... buy their poultry from the neighbours who they know to be trustworthy'¹⁸. These differing findings could be explained by the fact that larger scale farmers were the subjects of the present study, or an increased frequency of HPAI outbreaks at the time and place of this study compared to that of Lockerbie¹⁸.

Diagnosis of HPAI in farmed birds, and response efforts

Poultry diseases such as infectious bursal disease and Newcastle disease manifest in a variety of symptoms not distinguishable from HPAI based on physical signs alone^{19,20}. As HPAI infection can be asymptomatic in ducks²¹, the logistical and financial accessibility of laboratory services to people at the village and commune level is vital. This was problematic in rural Quang Tri where diagnosis of HPAI was based on physical symptoms. Access to laboratory testing is extremely limited in rural Vietnam.

The hierarchical bureaucratic structure in Vietnam appears to have lent itself well to the establishment of the outbreak



reporting system used in the CBS program, which was described consistently by participants.

Vaccination and motivation of farmers to report suspect H5N1 cases in farmed birds

Free vaccination to farmers, was not available frequently enough to prevent outbreaks of HPAI in all communes. A key recommendation is to ensure adequate supplies of vaccine that is stored according to the manufacturer's guidelines. Community members' motivation to report suspected H5N1 cases in farmed birds is a vital component of disease surveillance and management¹⁹. Fair and timely compensation programs play an important role¹⁹. To effectively foster this motivation, these vaccination programs must be consistent and reliable.

There was reluctance by study participants to report suspected outbreaks as farmers feared the poultry could have contracted a disease other than H5N1 and that their birds would be slaughtered by officials regardless. Farmers received no compensation for loss of birds to other diseases. Coupled with the low availability to laboratory diagnostic services in the area studied, this is an issue that requires attention.

Level of knowledge of farmers, and access to information and resources

This study indicates that farmers showed a lack of understanding of the severity of implications should an HPAI outbreak occur. Farmers shared information about poultry care with smaller scale farmers within their commune but did not necessarily know about recent outbreaks in neighboring communes, or were suspicious of neighboring communes being the source of infection. It is typical of Vietnamese culture for people to form tight village communities, but this is not necessarily the case between villages. This is a potential challenge for prevention programs, which would likely benefit from increased biosecurity measures at times of outbreaks in neighboring villages. Future programs should work to increase communication between villages.

At the start of FGDs or in-depth interviews, participants were asked to describe their experiences with identifying real or suspected cases of avian influenza. Their experiences focused primarily on the outward physical appearance of the birds when they contracted H5N1. This was an important finding because farmers' and VAHWs' heightened awareness of typical clinical signs for avian influenza suggested good awareness of the signs of a potential HPAI outbreak but poor availability of diagnostic services. Ensuring more widespread and timely access to laboratory diagnostic services is key to improved HPAI control efforts. This finding of HPAI awareness in the village communities studied was in contrast to those of Liao et al. who reported that in another rural Vietnamese study respondents were unaware or dismissive of the existence of HPAI²².

The low percentage of VAHWs and VHHWs with access to the internet highlighted the importance of support programs to provide accessible and frequent information for those at the human-animal interface. Information via radio, loud-speaker and small training sessions in community groups would be the most suitable methods to reach broad audiences in this context.

There was extensive room for improvement of essential medical equipment for animal use and the availability of financial support for local workers. The finding that no VAHWs or farmers owned or knew where they could purchase respiratory protection aside from fabric face masks, which provide inadequate prevention, calls for urgent action. In areas at risk of HPAI, such as the villages in this study, all farmers, their families, VAHW and other community members who come into contact with birds should be provided with full personal protective equipment prior to any outbreak so that it can be used immediately if one is suspected.

Value and cultural significance of poultry rearing and use of traditional medicine

Despite the farmers' responses indicating that poultry raising was largely an economic pursuit and not a cultural one, it



should be noted that nutrition and cultural symbolism are, indeed, interlinked. Poultry and eggs are often offered to guests and consumed on special occasions such as the Tet festival in Vietnam^{5,23}. Loss of poultry to H5N1 can also have important social consequences related to stigma⁵.

Considering economics solely, reduced income of poultry farmers could well have an impact on their children's education, opportunities¹⁹, and healthcare²⁴. Making enough money was often prioritized in order for farmers to send their children to school. Similarly to the farmers in Hai Lang district, Liao et al. found that weather was a risk factor for poultry illness in poultry farmers' narratives in South-East Asia²². This demonstrates the generalizability of this finding.

It can be argued that local VAHWs and VHHWs are more likely to have the trust and respect of their constituents if they acknowledge the importance that community members place on these traditional approaches to caring for their poultry. Awareness and understanding of these practices can add to the broader knowledge of how traditional health-seeking behaviors should be considered in the development of prevention programs. A balance must be struck as traditional systems of medicine (TSM) should not replace biomedical treatments and infection control measures that are widely acknowledged to be effective in H5N1 prevention.

It is likely that cultural value is placed on TSM because it is more available than the HPAI vaccine. The widespread use of TSM in farmed birds is potentially another indicator that more animal health resources are required.

Limitations of this study and areas for future research

The study was conducted in only one province, which may affect the external validity of the results. Communes without APII CBS project activity were not included; nor were small-scale 'backyard farmers'. These groups are more vulnerable to an H5N1 outbreak⁵.

The methodology used was appropriate for the project aims to examine the multifaceted aspects of poultry rearing and animal and human disease management. The qualitative

approach allowed the flexibility to explore ties to the culture and social traditions of the participants. Potentially, the study could have been strengthened if data collection using the same interview and focus group guidelines occurred at different time points. This could form the basis for a follow-up study.

Whether or not offering remuneration to participants creates bias in the findings is a moot point as the payment covered only the cost of travel.

In any interview-based study, there was potential for recall bias. Further bias may have resulted from the fieldwork team being viewed as part of the USAID program or the government, or knowledge that the interviewer was a veterinarian, and therefore some opinions may have been held back. The FGD format allowed more participants to contribute than a series of individual interviews but led to less detailed responses from each individual participant than would have been gleaned from individual interviews.

Slight skewing of meaning may have occurred during interview translation from Vietnamese to English. The on-the-spot translation methodology allowed the interviewer to interpret informant responses in real time, allowing for more detail or clarification to be sought during the interview; however, a limitation was that some responses may have been a summary of lengthier and more detailed responses, with less recording of local terms.

Areas for further research include exploring the reasons for the reportedly recent low vaccine supplies for farmed birds, HPAI prevention approaches of different farming types, more detailed comparison of farmers within the semi-commercial farming category that was the focus of the present study, and a comparison of farmers who own 50 birds with those who own 3000.

Conclusions

This was a small-scale qualitative research study that provided policy-relevant insight for in-country authorities and



international stakeholders. It is recommended that behavior change and local technical-capacity-building interventions continue to be pitched at the village level and target increased communication between villages. This will hopefully increase communication between villagers, animal and human health workers and government authorities at the village, district, provincial, and national levels.

Continued program evaluation is essential, as Bagnol articulates well: 'the development of a participatory strategy involving technicians in a bottom-up approach to understand the constraints and the needs of the people in contact with poultry, and to study the different alternatives that they can suggest and adopt' is paramount²⁴.

Participants' responses varied as to whether future HPAI prevention programs should be supported by local government or international stakeholders. It is recommended that in the foreseeable future a shared approach be adopted, with an ultimate aim for the Vietnamese government to hold responsibility. As the economy continues to grow it is hoped that more resources will become available.

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