

**SITUATION ANALYSIS AND REVIEW OF DATA ON INFLUENZA ILLNESS IN  
VIETNAM**

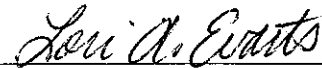
By

Humberto M. Carvalho

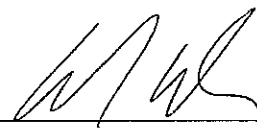
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Approved by:



*Advisor:* Lori A. Evarts, MPH PMP CPH



*Second Reader:* David T. Dennis, MD, MPH, DCMT

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*Date*

## **ABSTRACT**

HUMBERTO M. CARVALHO: Situation analysis and review of data on influenza illness in  
Vietnam  
(Under the direction of Lori Evarts, MPH PMP CPH)

Infectious disease agents continue to be an important cause of illness and death around the world, especially in developing countries. The unexpected spread of influenza A/H5N1 virus in flocks of chicken and ducks worldwide and the fact that this virus has crossed the species barrier to infect humans has raised concerns about a potential influenza pandemic. Avian influenza has caused human disease in 15 countries around the world and, even though the current number of confirmed cases is very low, H5N1 remains a candidate for the next highly pathogenic influenza pandemic (23). In the case of a pandemic, low income countries most likely will have difficulties managing their health care system in order to minimize fatalities and to control the spread of the disease. The expansion of health care usage to rural areas and making sure that each of the different groups in the population can access at least minimal levels of care are current barriers to the health care system in Vietnam, and would place a large burden on society in the event of an influenza pandemic. Active surveillance and understanding how the public responds to illness are important steps for an efficient case management control of influenza. Efforts should be considered in order to better understand how the Vietnamese populations engage with the available health systems and what steps should be taken to identify gaps that need to be filled to improve the health care system and the management of a possible influenza pandemic.

**MPH Advisor:**

Lori A. Evarts, MPH PMP CPH  
Clinical Assistant Professor  
Public Health Leadership Program  
UNC Gillings School of Global Public Health  
4109 McGavran-Greenberg Hall, 135 Dauer Drive, CB# 7469  
Chapel Hill, NC 27599-7469 USA  
Email: [lori\\_evarts@unc.edu](mailto:lori_evarts@unc.edu)

**Masters Paper Second Reader :**

David T. Dennis, MD, MPH, DCMT  
DUKE-NUS Graduate Medical School Singapore  
Program in Emerging Infectious Diseases, Vietnam  
19B Ha Hoi, Number 1104, Hoan Kiem, Hanoi  
Email: [www.duke-nus.edu.sg](http://www.duke-nus.edu.sg)

## **LIST OF ABBREVIATIONS**

CDC	Center for Disease Control and Prevention
FAO	Food and Agriculture Organization
ILI	Influenza Like Illness
NIHE	National Institute of Hygiene and Epidemiology
NISS	National Influenza Sentinel Surveillance Vietnam
PPE	Personal Protective Equipment
RT-PCR	Reverse Transcriptase-Polymerase Chain Reaction
WHO	World Health Organization

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## **I. INTRODUCTION**

Despite significant successes in controlling a number of communicable diseases in low and middle income countries, infectious disease agents continue to be an important cause of illness and death around the world, especially in developing countries. In order to contain outbreaks and possible pandemics, key priorities such as hygiene and sanitation, disease surveillance and response systems, immunization programs, other preventive measures, and early detection and treatment must be in place. The unexpected spread of influenza A/H5N1 virus in flocks of chicken and ducks worldwide, together with the ability of the currently circulating viruses that infect and cause severe illness and deaths in humans, has raised concerns about its epidemic potential and public health impact, highlighting the need to strengthen national preparedness to face a long overdue influenza pandemic (1).

In an era of emerging infectious disease threats and the potential for epidemics or pandemics, a lack of awareness by the public as well as health care facilities with poor quality or limited capacity may lead to under-utilization of services, misdiagnoses and inappropriate treatment, and under-detection of incident cases, allowing epidemics to gain a critical mass and spread. In the event of an influenza pandemic, it will be very important to understand what influences people's knowledge, attitudes and behaviors regarding their health, and how these factors can affect the usage of health services, in order to efficiently implement measures for prevention and treatment.

Several health promotion programs worldwide are focused on the idea that providing knowledge about the cause of diseases and choices of treatments available will promote a change in individual behavior towards more beneficial health seeking behavior. However, there is growing recognition, in both developed and developing countries, that providing

education and knowledge at the individual level is not sufficient in itself to promote a change in behavior (2).

In Vietnam, descriptive studies on health seeking behavior for influenza like illness (ILI) highlighting similar and unique factors and demonstrating the complexity of what influences an individual's behavior at a given time and place to look for care is in great need, especially because of the recognized threat of a potential epidemic involving influenza A/H5N1 virus.

The goal of achieving a good standard of health care services for all is far from being achieved in the Southeast Asia countries, including Vietnam. This lack of service improvement is in part due to insufficient attention being paid to some fundamental areas of health care. In addition, there is a lack of consensus among experts as to what level of service should be provided in order to constitute basic and essential care in the different levels of health care facilities.

## **II. VIETNAM CONTEXT**

Vietnam is predominantly an agricultural country with an emerging industrial base. This country has more than 50 ethnic minority groups, with the Kinh representing the greatest majority (86%) and the dominant culture. With a population of more than 84 million people, Vietnam is the 13<sup>th</sup> most populous country in the world (3). The population is concentrated in the alluvial deltas and coastal plains of the country and most ethnic minorities live in the highlands which cover two-thirds of the territory (Figure 1).

The Socialist Republic of Vietnam is a single-party state and a new state constitution was approved in 1992, replacing the 1975 version. The process of economic renovation

initiated in 1986 rapidly moved the country from a centrally planned to a market-oriented economy, with both positive and negative effects on the health system. User fees have been introduced and the concept of private health service providers operating in parallel to the public system was introduced. Many private facilities have been opened and most government health workers also work privately (4).

As a result of the social and economic developments, some groups of people receive health care that differs greatly in quality and access from the care offered to others. Among those who receive the lowest-quality of care and experience the poorest health outcomes are rural populations, the urban poor, ethnic minorities, women, older adults, children, and people with mental illness and physical disabilities (5).

In Vietnam there are still several barriers limiting the expansion of health insurance usage for the majority of the population. At a conference co-organized by the World Bank recently, the Vietnamese minister of health pointed out that the health insurance system in the country was still underdeveloped with only 44% of the population having health insurance coverage (6). Many business and enterprises have not bought health insurance for their workers, despite Government regulations making it compulsory. A critical part of health policy development and reform is monitoring the implementation and evaluation of the impact of policies and programs. The successful implementation of health insurance reform in Vietnam still requires further development and strengthening. Among other things, the Ministry of Health would need to develop a high quality computerized health information system at the national level to be able to effectively supervise service provision. To date no such system exists (7). There are also several problems related to the implementation of health insurance due to inconsistencies and lack of comprehensive guiding documents,



especially when it comes to hospital fee policies or the organization of local health care systems.

Despite greater access to care in many areas, the availability of health care services is also still very limited in remote and rural areas, which means even fewer health insurance users in those areas. According to a 2008 World Bank report on Financing and Supplying Health Services in Vietnam, the country's health insurance system is facing three main challenges: expanding the usage to the wider population, developing the services to reduce the people's own expenses and cutting down other expenses (6).

### **III. A/H5N1 INFLUENZA VIRUS – THE POTENTIAL FOR CAUSING A PANDEMIC**

Avian influenza (“bird flu”) is an infectious disease of birds caused by type A influenza virus strains. This viral infection can cause a wide spectrum of symptoms in birds, ranging from mild illness, which may pass unnoticed, to a rapidly fatal disease. The A/H5N1 strain of influenza virus raises great concern for human health for two main reasons: 1) it has crossed the species barrier to infect humans producing high mortality rates; 2) if given enough opportunities, it can develop the characteristics it needs to start another influenza pandemic (8).

The influenza virus is an agent that can infect several animal species such as birds, pigs, horses, sea mammals, and humans (9). Aside from being able to infect both humans and other animals, it has a great potential for genetic changes to occur, either through antigen drift or antigen shift (10). Antigen shift is derived from re-assortment of gene segments

between viruses, and may result in an antigenically novel virus. The traditional concept of development of highly pathogenic forms of flu virus is based on the fact that flu virus with pandemic potential can arise as a result of mutation and/or genetic recombination events in flu viruses of avian, human or any other animal origin. Therefore, a significant role in the development of a flu pandemic can be attributed to the appearance of the virus in the human population of which a large group of people who have never had previous contact with the new variant of flu virus now become exposed (11).

According to the Center for Disease Control and Prevention (CDC), the influenza virus can cause a high rate of asymptomatic infections, with approximately 30%–50% of persons infected not developing symptoms, but still able to shed the virus. The flu symptoms are usually nonspecific and wide ranging, therefore difficult to differentiate from other respiratory illnesses (12). Also, the influenza virus has a short incubation period and it can also be easily transmitted from person to person, especially worrisome with today's global traffic (13).

Since 1900, several important influenza pandemics and large outbreaks with serious consequences have been identified around the world (Table 1). In 1997, the first cases of human infection with the highly pathogenic A/H5N1 virus were reported in Hong Kong (14). These cases resulted in deaths and coincided with outbreaks of highly pathogenic A/H5N1 in poultry on farms and in markets selling live poultry. Human cases rapidly ceased because of the rapid destruction of the entire chicken population in Hong Kong. In mid-2003, the highly pathogenic A/H5N1 virus began to circulate widely in poultry in parts of south-east Asia, spreading rapidly to affect eight countries in an outbreak unprecedented in its geographical

extent (15). In December 2003, the first human cases associated with this outbreak occurred in Vietnam (14). As a result of the spread of A/H5N1 virus, human cases have been identified in individuals from all age groups in several countries around the world (Figure 2).

In 2004, a scientific publication reported the clinical features and preliminary epidemiologic findings among the 10 patients with confirmed cases of avian influenza A/H5N1 who presented to hospitals in Ho Chi Minh City and Hanoi, Vietnam, from December 2003 to January 2004. In all 10 cases, the diagnosis of influenza A/H5N1 was confirmed by means of viral culture or reverse transcriptase-polymerase chain reaction (RT-PCR). According to this report, none of the 10 patients had preexisting medical conditions and nine of them had a clear history of direct contact with poultry. All patients presented with fever (38.5 to 40 °C), respiratory symptoms, and clinically significant lymphopenia; only seven patients had diarrhea. All patients also presented marked abnormalities on chest radiography. This report concluded that there was no definitive evidence of human-to-human transmission. From these first 10 cases, eight patients died (16). A more recent report by Liem et. al. (2009) revealed data obtained for 67 (72%) of 93 cases diagnosed in Vietnam between 2004 and 2006 (7). According to this report, patients presented to the hospital after a median duration of illness of 6 days with fever (75%), cough (89%), and dyspnea (81%). Diarrhea and mucosal bleeding at presentation were more common in fatal than in nonfatal cases. Common findings were bilateral pulmonary infiltrates on chest radiograph (72%), lymphopenia (73%), and increased serum transaminase levels. During this period of time 26 (39%) patients died and the most reliable predictor of a fatal outcome was the presence of both neutropenia and raised alanine aminotransferase level at admission, which correctly predicted 91% of deaths and 82% of survivals. They concluded that the risk of death was

higher among persons aged 16 years of age or less, compared with older persons ( $P < .001$ ); and also it was noted that death was more prevalent in those patients who did not receive oseltamivir treatment ( $P = .048$ ) (17).

Another recent review by Taylor et. al. (2010) described important epidemiological data regarding human infection with A/H5N1 virus. According to this review, the main route of transmission of A/H5N1 from poultry to humans is probably via the respiratory tract, but the eye (via the conjunctiva mucosa) and gut can also be considered possible routes for contamination (18). This review shows that the infection through the gut can occur by licking contaminated fingers or swallowing water contaminated by feces of infected poultry. Other important epidemiological data provided by this review is that bird feces is often used as fertilizer and fish feed in some countries, and the direct handling of infected poultry feces each represent risk factors for human infection with A/H5N1. Also, in areas where home rearing of poultry is common, chickens and ducks may infect ponds which are commonly used by children for bathing and playing. According to this review, infected individuals who visited wet markets where infected poultry were sold developed symptoms of infection with A/H5N1 about one week later. The determination of how they became infected is speculative but it could have been the result of self-inoculation after touching contaminated surfaces, such as eggs, or inhalation of aerosolized debris containing A/H5N1 virus (18).

The Vietnamese authorities recently shared the data concerning the first three human cases of avian influenza from 2010. In January, a 38-year-old woman in the southern province of Tien Giang died from bird flu. According to the head of the Health Ministry's Preventive Medicine and Environment Department, the other two cases involved a 3-year-old

girl in the central province of Khanh Hoa, and a 17-year-old girl from the northern province of Tuyen Quang. Outbreaks of avian influenza among poultry have already been reported in seven provinces this year. According to the official Vietnam News, the latest bird outbreak killed 10,000 fowl in the Khanh Hoa province (19). The Vietnamese Animal Health Department announced that the lack of adherence to vaccination programs was the main cause of the outbreak. The 17-year-old girl fell ill on mid-February and was hospitalized five days later. It was reported that she had culled her family's flock of chickens after they became ill (20). These three cases increased the number of human cases of bird flu in Vietnam to 115, since the disease appeared in 2003, with 58 deaths (Table 2).

Currently, the A/H5N1 avian flu virus is limited to outbreaks among poultry and persons with direct contact to infected poultry. Although the human cases infection appears to have been acquired directly from infected poultry, the potential exists for genetic reassortment with human influenza viruses and the evolution of human-to-human transmission (16). Even though human cases are still rare, the mortality rate among infected humans has been very high, about 70% overall (10).

Avian influenza is endemic in Asia most likely because of the lack of regulations for poultry rearing in rural areas. Such birds often live in close proximity to humans and this can increase the chance of genetic recombination between human and avian influenza viruses (21), increasing the chances of a global pandemic (22). According to The World Health Organization (WHO), Southeast Asia remains a likely region from which future emerging infectious diseases, including the next influenza pandemic, are most likely to emerge (23). The question is, are we ready for an Avian Influenza pandemic? Are we prepared to face the

consequences of a massive outbreak of human cases of A/H5N1? According to experts in this field, the answer for these two questions is “No”. The main problems the world would face in this situation are the lack of an effective vaccine, very poor surge capacity in several regions, health care systems that could not accommodate even a modest pandemic, and erratic regional planning (13).

#### **IV. MEASURES FOR CONTAINING AND CONTROLLING AN INFLUENZA PANDEMIC**

Active surveillance activities, such as syndromic surveillance for human cases, increasing of specimen collection and testing from animals and suspect human cases, monitoring poultry farms, monitoring people’s exposure to infected animals, screening of travelers, as well as monitoring crowded flocks are some of the strategies that are efficacious for quick identification of cases and implementation of proactive measures to prevent the spread of bird flu (24). National Influenza Surveillance Systems for human cases comprised of sentinel sites, where samples are collected for further analysis and identification of circulating viral strains, have been established in Vietnam and other countries in the region. These sentinel sites should represent the major ecological regions of the country and contain adult and pediatric populations, and they also should include different levels of health services such as central referral hospitals, provincial hospitals, district hospitals, polyclinics and health centers.

According to the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) of the United Nations, as much as active surveillance, early detection and response are useful tools for preventing Avian Influenza outbreaks, there are several

major weaknesses identified in these types of systems around the world, especially in Asian countries. These major weaknesses as identified by FAO are as follows. First, the surveillance in most of the A/H5N1-infected countries is considered weak, since epidemiological information on disease incidence, infection and transmission dynamics is lacking, preventing or delaying the development and implementation of risk-based control measures which are cost-effective and practical. Second, many Asian countries lack expertise to develop and implement national surveillance plans; and third, the countries with weak economies do not have well-established disease information systems, therefore they do not have effective capabilities to share and analyze national data (25).

Even though the participatory and community-based surveillance programs in farms appear to be working well for detection of A/H5N1 poultry outbreaks in some Asian countries, these efforts require considerable investment and technical support for implementation and sustainability on a national scale (25). Efforts to reduce the risk of transmission between birds and humans and also between people to people are the keys to prevent the spread of influenza. Good practices such as the culling of infected bird flocks, vaccination of poultry, the use of personal protective equipment (PPE) when working in potentially infective environments, and the elimination of live poultry markets are recommended response efforts that may minimize the possibility of this pandemic (25). However, more than 70% of poultry in Vietnam are reared in households, so-called backyard flocks (26). The conditions at back yards and live bird markets in Vietnam and several other Asian countries can easily facilitate the transmission of the A/H5N1 strain from birds to birds, and potentially to humans. In the live markets, people usually pick out their chicken and have it slaughtered fresh before preparing it for a meal. These crowded city markets

enable thousands of people and chickens to come into close contact, greatly increasing the possibility for the spreading of the virus (26). According to the health authorities from Vietnam, it is impossible for animal health taskforces to check the markets on a daily basis.

Further, the Mekong and Red River Delta provinces in Vietnam also pose a great risk of a massive bird flu recurrence due to the free-range duck farming and the inadequate control of poultry transport and trade. As migratory waterfowl such as ducks and geese travel, the virus is excreted through the gastrointestinal tract. Free-range farming birds, such as chickens, ducks, and turkeys, are extremely susceptible to avian influenza and can become infected with the virus through the ingestion of fecal contaminated water (27). According to the Dong Thap Province's Department of Agriculture and Rural Development, large numbers of unvaccinated ducks are often observed roaming free around local rice farms. The situation seems to be the same in several other provinces through the country.

Disease surveillance is just one of the components of the key aspects of the management of a pandemic. Others related to the delivery of health care, that are crucial in order to contain and control the spread of the disease include: strategic planning involving hospital and clinic communications; education and training; triage and clinical evaluation; facility access; occupational health; use and administration of vaccines and antiviral drugs; surge capacity; and supply chain and access to critical inventory needs (24). Understanding what influences people to behave differently in relation to their health and how they use the health care services that are available for them is also an important step in order to manage influenza pandemic.



## **V. INFLUENZA SURVEILLANCE IN VIETNAM**

A study to clarify the epidemiology of laboratory-confirmed influenza in Vietnam was conducted in Hanoi from 2001 to 2003, before the start of avian influenza A/H5N1 outbreaks. This preliminary study enrolled patients with influenza like illness (ILI) symptoms who reported to several outpatient clinics in Hanoi. Influenza virus was isolated from 2.5% of the total patients with ILI symptoms. The results showed that the findings of year-round and biannual peak circulation of influenza strains in a subtropical area were in accordance with the results of previous studies in tropical and subtropical regions. These observations confirmed that the establishment of laboratory-based surveillance in tropical and sub-tropical countries is very important for taking actions for pandemic strategies (28).

In order to provide a more comprehensive understanding of influenza like illness in Vietnam, The Centers for Disease Control and Prevention (CDC) supported the National Institute of Hygiene and Epidemiology (NIHE) to develop the National Influenza Sentinel Surveillance Vietnam (NISS), which was established in 2005. The NISS mission was implemented in 2006-2009 at sentinel sites representing different ecological and geographical regions of Vietnam (Figure 3).

Data collection was fully implemented at seven sentinel sites on January 2006 and expanded to 15 sites by the middle of 2007. From January 2006 through December 2007, patient visits were recorded at the sentinel sites and ILI accounted for about 16% of all outpatient attendances. Of the patients presenting ILI symptoms, about 19% tested positive for influenza by RT-PCR. The highest proportion of ILI cases that tested positive for influenza was among persons aged 5–14 years (26%) and the lowest proportion was among persons aged greater than 64 years (13%). When adjusted for age of the sampled population

compared to the Vietnamese population, the overall proportion of influenza positives was 19.3%. The data also showed that influenza circulated at all times of the year in all regions, with annual bimodal peaks correlating with colder and wetter seasons and with only one strain of A/influenza predominating at each peak. It was also observed that individual A/influenza strains appeared to peak every two years, and the peaks of activity were highly correlated temporally between regions. This study suggested that influenza is a major cause of ILI illness in all regions in Vietnam (29).

Even though this surveillance system currently covers both adult and pediatric populations and involves different levels of health services offered in Vietnam, the sentinel site populations are not truly representative of the Vietnamese population overall. Unfortunately, this system does not have a defined population base so that accurate population generalizations and determination of infection rates in Vietnam are not possible.

## **VI. HOUSEHOLD HEALTH SEEKING BEHAVIOR**

The initial symptoms caused by the bird flu virus in humans include high fever, usually with temperature higher than 38°C, and influenza-like symptoms. Diarrhea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported as early symptoms in some patients. Also, watery diarrhea without blood seems to be more common in A/H5N1 avian influenza than in normal seasonal influenza (30).

The problem is that many other illnesses, including the common cold, can have similar symptoms in the early course of illness, and that can represent a serious barrier during the management of a pandemic caused by highly pathogenic bird flu virus. The disease caused by the A/H5N1 virus can follow an unusually aggressive clinical course, with rapid

deterioration and high fatality. Like most emerging disease, A/H5N1 influenza in humans is still poorly understood. Therefore, understanding the behavior of the public in relation to disease symptoms is vital for the management of a health crisis.

McKian explored health seeking behaviors by two perspectives: the process of response to the illness and by the utilization of the available health care system. She concluded that health seeking behavior is not a single isolated event. Health seeking behavior is impacted by a wide range of factors that include: the individual, their family and community that are each affected by a mix of social, personal, cultural and experiential factors. Consequently, the process of responding to illness or seeking health care involves multiple steps, and can rarely be described as a simple act, or be explained by a single model of health seeking behavior (2).

Clearly, one very important factor related to health seeking behavior is the utilization of the available health care system. The type and level of available care will often dictate health seeking behavior and the utilization of preferred or not preferred points of services. Another important factor is the individual's understanding and perception of the benefits of health care in relation to their illness. Several studies have demonstrated that patient's symptom recognition will not necessarily result in health care action by the individual. Even if a symptom is recognized, the treatment choices involve several factors such as the perception of the severity, pre-existing knowledge about the cause of the disease, the range of options and accessibility to treatment options, and their perceived efficacy (31).

## **VII. HOUSEHOLD SEEKING BEHAVIOR FOR INFLUENZA LIKE ILLNESS (ILI) IN VIETNAM**

The knowledge about the health-seeking behavior from ill patients is important in order to improve community health services. In poor countries, individuals usually face considerable logistical and financial barriers when seeking health care, even when they are in obvious need. The lack of a well organized referral system can result in several healthcare options being available but not necessarily being used by the population. The individual's final choice will depend on the type and severity of their illness, the costs and perceptions of available care, and accessibility (4).

The reasons why individuals seek or do not seek medical care for common minor symptoms such as ILI are not clearly defined in Vietnam. In other countries, such as Israel, a study conducted by Kahan et.al. during seasonal epidemics of influenza revealed that among the patients presenting ILI symptoms, the great majority consulted a physician for their symptoms. This study showed that those who sought medical assistance had more serious symptoms as perceived by the patients, and their main reason for seeking help was to rule out serious disease. This study also showed that self-employed patients were more likely than salaried workers to visit a clinician in order to rule out serious disease, rather than to obtain a prescription or sick note. The conclusion from this study suggested that, in Israel, individuals with flu symptoms tended to consult a physician, though there were significant variations in the reasons for doing so and these variations were based on a combination of socio demographic variables (32).

In Vietnam, data on health care seeking behavior is very limited. A study on health seeking behavior from injured patients in rural Vietnam, Hang and Byass have shown that

self-treatment was most common, even in cases of severe injury, with very low usage of public health services among injury patients. According to this study, the barriers for seeking health services included long distances, poor economic status, and residence in difficult geographic areas such as highlands and mountains. This study showed that the poor people on average spend a greater proportion of their income on health care than the rich, and often use less qualified or untrained private providers (4). While this study looked at the situation specifically in the context of injury treatment, it is likely that similar patterns apply in other areas of health care, including when dealing with ILI conditions.

The United States and Vietnam engage in a wide range of cooperative activities with the intention of strengthening the public health structure and programs. Currently there are several ongoing projects focusing on community mobilization for enhanced surveillance and prevention of avian influenza. Another effort seeks to understand the behavior from patients with ILI symptoms concerning the availability and the usage of health care services by this group.

CARE International has been funded by the U.S. CDC Influenza Program, Vietnam, to work closely with rural populations at the community, village, and district levels. The objective of the project is to develop community mobilization models that deliver behavioral change communication and enhance community based surveillance for avian and human influenza, including preparedness and response to a potential pandemic (33). The rationale behind this project involves developing a more robust surveillance strategy in which "a community that knows little about the symptoms of a disease and is not aware of the reporting mechanism will identify far fewer cases than a community implementing communication activities and training community level workers on identifying and reporting

cases." (33) One of the initiatives from this project is looking at the household health seeking behavior and case management for influenza-like illness in Vietnam.

For this project, surveys applying both qualitative and quantitative methods were conducted in two communes at Thai Binh province in the northern region and Tien Giang province in the southern region. More than 1,000 households in 2 communes were interviewed and screened for ILI. The survey included information on household economic status, demographics, number of members with ILI, severity of ILI, and also the social and cost burden. Approximately 270 persons were identified who had experienced at least one episode of ILI in the previous 3 months, and they were asked about their health seeking behaviors at the time of their latest ILI episode. Of these, 255 persons (somewhat greater than 90%) provided information on where they first sought help.

According to discussions with the advisor from CDC-Vietnam Influenza Program, preliminary results (34) from this study showed that a remarkably high 90-95% of persons sought health care assistance outside the home. Less than 1% went to a traditional healer, and approximately 5% sought help from a village health visitor, 30% from a private health practitioner, 28% from a government commune health station, 18% from a pharmacy, 15% from a government district hospital, and 1% from a provincial or central hospital. When asked "how many days you had fever before you seek medical help", the answer ranged from 0 (go to seek for medical help right after having fever) up to 30 days. More than 20 cases had sudden fever that quickly went away but experienced other symptoms that did not go away; these patients waited until day 10 or longer (maximum 30 days) before deciding to seek care. The reasons why the majority of the 5 to 10% of sick persons who did not take any action were: they did not think they were sick enough and they usually get better on their own;

treatment is too expensive; they were scared of injections; and could not easily take any medicine because of stomach problems.

An important preliminary result of these data was that the majority of the people who looked for medical services preferred to use the local services rather than district and provincial hospitals, even though these facilities usually have better capacity to diagnose and treat illness but are more expensive and less accessible. This finding points out the necessity of strengthening the capacity of commune health services to be able to provide at least the minimal necessary level of care in the event of a pandemic.

This study presented some limitations such as the sample size. Although the survey studied more than 1,000 households in two communes, the number of ILI cases detected was not large enough to include important independent variables into a logistic regression model that would help to identify promoting factors for health seeking behaviors at significant level. Recall bias may also have occurred in responses to the retrospective survey questions about length of the last episode of ILI, number of day's loss for patient and caregivers, and number of days with fever before seeking medical help.

## **VIII. PUBLIC HEALTH INTERVENTIONS**

According to the data produce by the NISS, 16% of the outpatient attendances at the health facilities are due to ILI (29). It is clear that ILI is an important cause of outpatient attendance at government health facilities in Vietnam. Therefore it is important to understand the relationship between the health seeking behavior with the different levels of health services available in different settings throughout Vietnam in order to coordinate the

improvement of the capacity for all regions to deliver the necessary care needed to treat and guide the patients with such symptoms.

Since 1997, the largest epidemic of highly pathogenic avian influenza A/H5N1 ever recorded has caused close to 300 human deaths and several millions of bird deaths world wide (35). By looking at population behavior, several studies have shown that live poultry exposures have declined in some areas in Asia due to heavy efforts focused on the public's education. In Vietnam, domestic backyard exposures to poultry are likely more relevant than retail exposures (35), therefore the population must be aware of the symptoms and risks for the transmission of A/H5N1 virus.

Some other Asian countries have collected important data related to their population behavior in regards to ILI symptoms and their awareness and preparedness programs for handling a possible pandemic. For instance, a random anonymous cross-sectional telephone survey of adults in Hong Kong revealed that in the event of a human-to-human A/H5N1 outbreak, the public is likely to adopt preventive measures that may help contain the spread of the virus in the community by adopting self-protective behaviors (e.g., wearing facemask in public venues, increasing the frequency of hand washing) and behaviors that protect others (e.g., wearing face masks when experiencing influenza-like illness, immediately seeking medical consultation, complying to quarantine policies). Multivariate analyses in this study indicated that factors related to age, full-time employment, perceived susceptibility, perceived efficacy of preventive measures, perceived higher fatality as compared to SARS, perceived chance of a major local outbreak, and being worried about self/family members contracting the virus were significantly associated with the inclination to adopt self-protective measures (36).



Health care planning and public encouragement is essential in order to decrease the impact of public health emergencies. A study to understand the public's response to community mitigation interventions for a severe outbreak of pandemic influenza was conducted by Harvard University (37). This study concluded that, in the US, if community mitigation measures are instituted, most respondents would comply with recommendations, but would be challenged to do so if their income or job were severely compromised. This study also showed that community mitigation measures could cause problems for persons with lower incomes and for racial and ethnic minorities. Almost a quarter of the participants this study reported that they would not have anyone available to take care of them if they became sick with pandemic influenza (37). Studies of this nature are in high demand in Vietnam in order to establish parameters on how the public in different areas of the country would respond in the case of a pandemic of highly infectious influenza A/H5N1.

Recently, with the help of the US Agency for International Development (USAID), communes in Hung Yen (north) and Can Tho (south) Provinces, Vietnam, demonstrated their ability to recognize and respond to the threat of avian and pandemic influenza in humans and poultry through simulations of outbreaks in their communities. This was the first time this kind of intervention was conducted at the community level in Vietnam. More than 350 people in the two provinces took part in this exercise that focused on the community level, which is where the threat of avian and pandemic influenza remains and where initial detection and response efforts are essential to limit the impact of future outbreaks. The exercise consisted of responding to unscripted scenarios, where the communities had to identify households where a suspected outbreak might be occurring and then to follow

procedures to report the outbreak and organize and coordinate appropriate responses at their level (38).

The objective of this exercise was to work with selected communities in order to develop effective and sustainable intervention models in the areas of community-based surveillance, biosecurity, case management and infection control, and to strengthen networks of animal health workers and behavior change communication. This model, developed and demonstrated through the exercise, was well received by the Vietnamese government and it can be extended to address other community public health threats.

Still, there is a great need to develop other forms of interventions to guarantee that all communities can achieve a reasonable level of preparedness in the case of a pandemic. If an influenza pandemic emerges, the limited supply of antiviral medication and vaccines will mean that non-pharmaceutical interventions will have a major role to play in mitigating disease spread.

## **IX. CONCLUSION**

In 2003, Vietnam reported its first human and animal cases of avian influenza. Since then, the country has experienced more than 100 human cases, half of which resulted in deaths, and hundreds of animal outbreaks involving millions of birds (14). Research has shown that this highly pathogenic avian influenza A/H5N1 virus lineage has undergone extensive genetic re-assortment with viruses from different sources to produce numerous A/H5N1 genotypes, and also developed into multiple genetically distinct sub lineages in China. The ecological success of this virus in diverse species of both poultry and wild birds,

with frequent introduction to humans, suggests that it is a likely source of the next human pandemic (39).

Currently, the number of human and animal cases has dropped significantly in Vietnam as the government has implemented measures against the spread of bird flu. The WHO 2005 Global Influenza Preparedness Plan outlines the objectives and actions that should be taken in the case of a pandemic flu (23). These actions are divided into five categories: 1) planning and coordination; 2) situation monitoring and assessment; 3) prevention and containment (i.e., non-pharmaceutical public health interventions, vaccines, antiviral); 4) health system response; 5) communications (40).

Vietnam is country that still requires stronger local capacities, including a larger pool of primary health care professionals, systems, and infrastructure. With these improvements, this country will be better prepared to address local health challenges, improve preventive care, and encourage healthy behaviors. Since global availability of vaccine and antiviral agents against influenza caused by novel human subtypes is currently insufficient, WHO recommends non-pharmaceutical public health interventions to help to contain infection, delay spread, and reduce the impact of a possible influenza pandemic. However, some practices such as screening and quarantining travelers at international borders did not substantially delay virus introduction in past pandemics, except in some island countries, and will likely be even less effective in the modern era. Therefore, it is clear that the most appropriate focus of interventions against pandemic influenza spread should be at national and community levels rather than international borders (40).

In addition to the many types of health interventions that have been applied on their own or in conjunction with International Organizations, low income countries can apply several other strategies to help to strengthen the delivery of health services. Some of these activities include the expansion of community based services and initiatives. For instance, the education and the participation of members of the communities are very important in order to maximize the efficiency of health care delivery.

During the past decade, several governmental and non-governmental partners have been supporting the government of Vietnam to establish a national surveillance system for influenza and also to strengthen the country's capacity for health care delivery and education of the public in regards to bird flu and many other infectious diseases. Several gaps still exist in many resource categories, such as infrastructure, personnel, equipments, and surveillance capacity. Such gaps are likely to be profound if a severe pandemic occurs.

Consequently, the public health missions of commune and district level primary health care facilities are extremely important and must include: the ability to rapidly detect and investigate communicable diseases and environmental health hazards; provide prevention-focused education; manage an efficient referral system; and institute control measures to reduce and prevent the impact of diseases. In Vietnam, confirmatory or more sophisticated testing for infectious diseases is usually only available at the secondary and tertiary health care facilities such as district or provincial hospitals. But even these facilities are often over-worked, have limited resources, lack experienced staff and advanced technology equipment to cope with these testing needs. Inadequate communication, reporting, and feedback mechanisms within and between the various levels of the health care system also delays needed treatment and interventions within Vietnam. Health facilities in

different provinces are currently operating with very different levels of support and standards. Also, according to information provided by CDC, a great number of primary health care facilities currently do not have the capacity to perform the majority of laboratory tests recommended by the Vietnamese Ministry of Health (34).

The quick identification and reduction of the burden caused by infectious diseases usually relies on the ability of early detection and the proper case management at the primary health care facilities. The importance of having well trained health workers, an efficient referral system, and laboratory test capability for rapid detection and intervention is crucial to prevent the spread of diseases.

More importantly, the question is whether all populations, especially the poor people, can access the health care services they will need in the case of a pandemic. Recent reports from the United Nations have showed that the poor use and spend less on health services than the rich. In addition, a great portion of the Vietnamese population do not have health insurance and the lower income groups usually access poor quality health services, which are often not responsive to their needs.

An ideal plan to prepare for a possible pandemic would require an effective influenza vaccine, but unfortunately several obstacles still stand in the way of producing such tool. This vaccine would require a good antigenic match with the epidemic strain and the countries would need to have a substantial capacity for production and distribution (41/42).

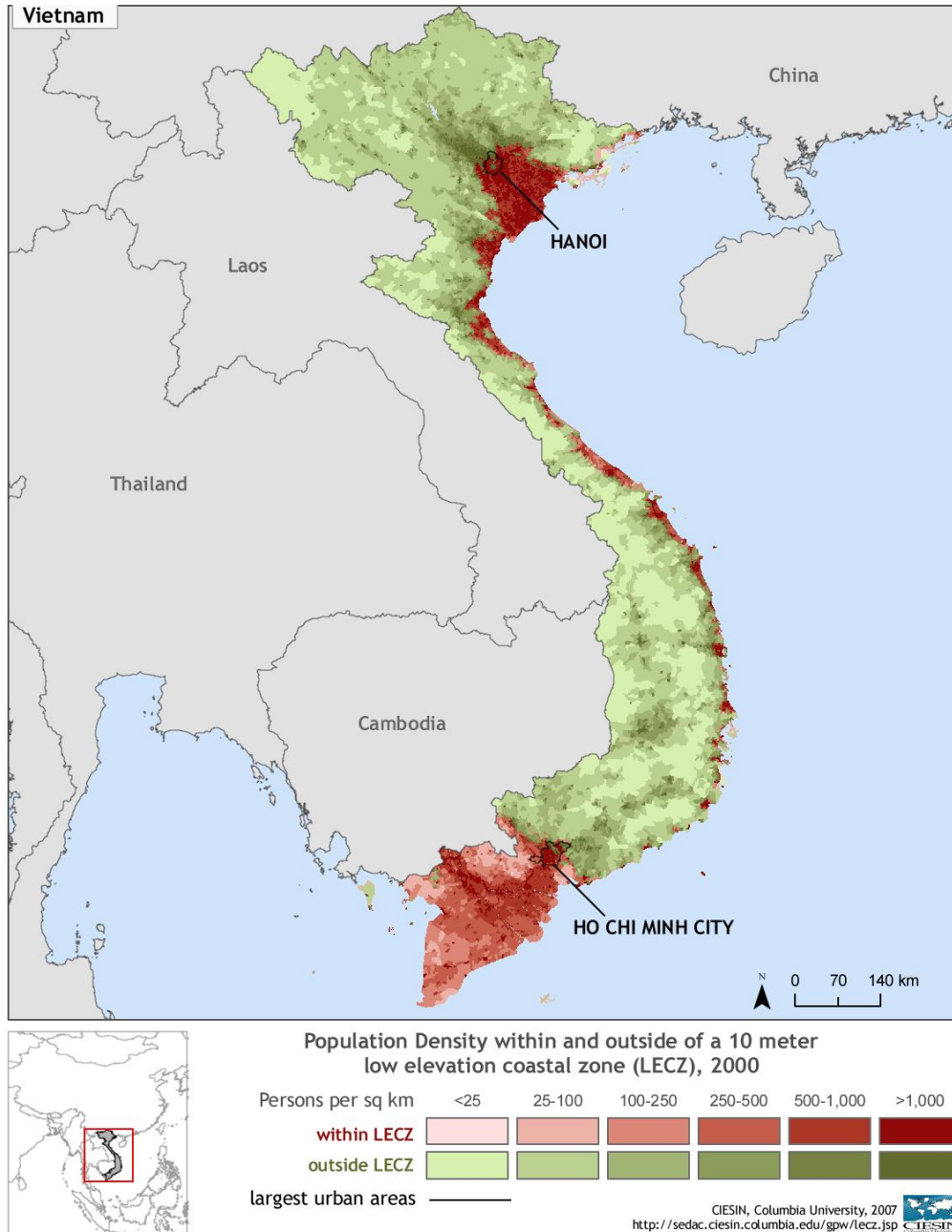
According to Vietnamese Ministry of Foreign Affairs, since March 2005, the National Institute of Hygiene and Epidemiology (NIHE) has developed and maintained a national influenza surveillance system, which has received international recognition. NIHE has received support from WHO and US CDC, and in the coming years, this project intends

to improve the quality of information about seasonal flu epidemics, outbreak spots and their negative impacts; monitor the spread of flu viruses; as well as take part in the global influenza surveillance network and produce flu vaccines. By strengthening its influenza surveillance system, Vietnam will also be able to contribute more to the WHO global influenza surveillance network (43).

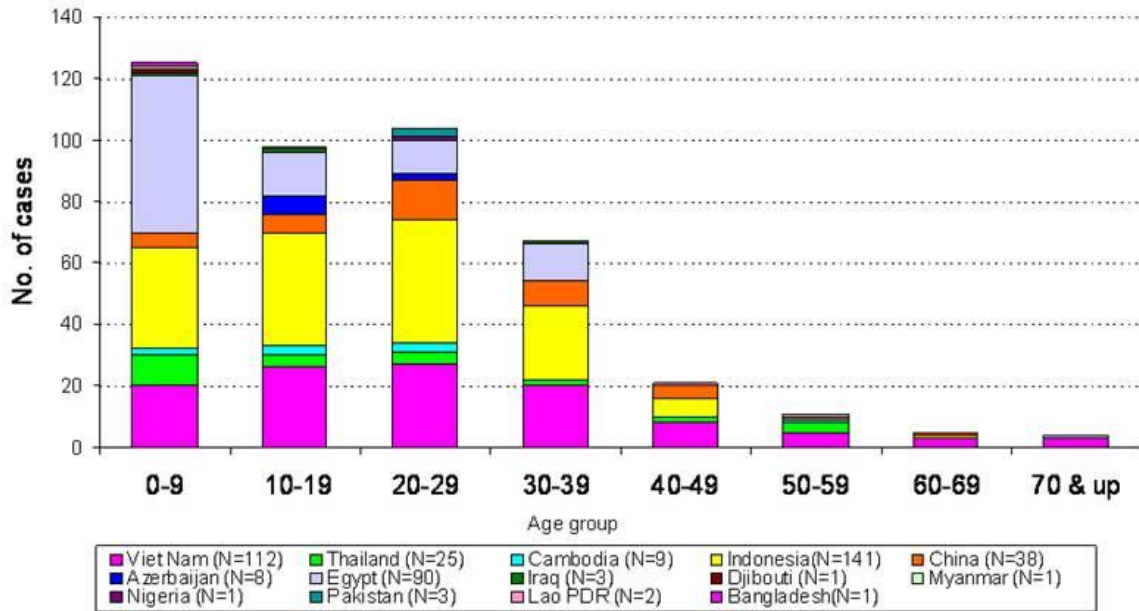
Therefore, this review reaches the conclusion that expanded efforts should be considered in order to better understand how the Vietnamese populations engage with the available health systems. Further, the use of health seeking behavior studies to describe when and how individuals are engaging with these services is required. Information obtained will open a broader arena for the involvement of community organizations, development of health and social capacities, as well as helping to identify the gaps that need to be filled to improve the management of a possible influenza pandemic in Vietnam.

## X. APPENDIX: TABLES AND FIGURES

APPENDIX A; Figure 1: Population density in Vietnam



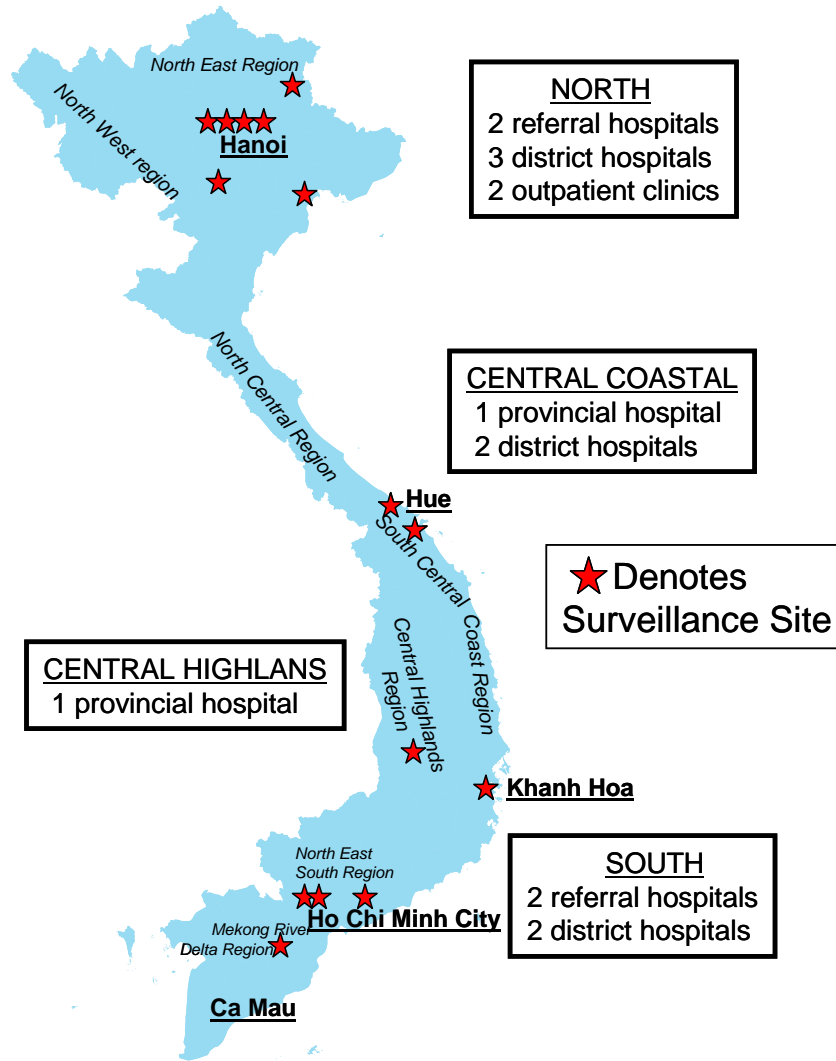
APPENDIX B; Figure 2: Human Influenza A/H5N1 cases by Age Group and Country  
(n=435) as of 30 December 2009



Source: WHO at [http://www.wpro.who.int/sites/csr/data/data\\_Graphs.htm](http://www.wpro.who.int/sites/csr/data/data_Graphs.htm)



APPENDIX C; Figure 3: Map of Vietnam with national influenza surveillance system sites



Source: Nguyen HT et al, 2009 (26)

APPENDIX D; Table 1: Animal and human influenza cases through the years

<i>Year</i>	<i>Outcomes</i>
1918	<ul style="list-style-type: none"> <li>• H1N1 influenza pandemic swept across the world and killed around 50 million people worldwide.</li> </ul>
1959	<ul style="list-style-type: none"> <li>• H5N1 outbreak in birds in Scotland.</li> <li>• H7N7 infects a 46-year-old man in the United States after overseas travel.</li> </ul>
1961	<ul style="list-style-type: none"> <li>• H5N1 is first isolated from birds (terns) in South Africa.</li> </ul>
1995	<ul style="list-style-type: none"> <li>• H5N2 outbreak in birds in Mexico with significant spread to numerous farms, resulting in great economic losses.</li> <li>• H7N7 infects a 43-year-old woman in the United Kingdom, resulting in conjunctivitis.</li> </ul>
1997	<ul style="list-style-type: none"> <li>• H7N4 outbreak in birds in Australia.</li> <li>• H5N1 outbreak in birds and humans in Hong Kong.</li> <li>• H5N2 outbreak in birds in Italy.</li> </ul>
1999	<ul style="list-style-type: none"> <li>• H7N1 outbreak in birds in Italy with significant spread to numerous farms, resulting in great economic losses.</li> <li>• H9N2 infects 2 girls in Hong Kong.</li> </ul>
2001	<ul style="list-style-type: none"> <li>• H5N1 outbreak in birds in Hong Kong.</li> <li>• H7N3 outbreak in birds in Chile.</li> </ul>
2003	<ul style="list-style-type: none"> <li>• H7N7 outbreak in birds and humans in the Netherlands with significant spread to numerous farms, resulting in great economic losses. By March, 89 human infections are reported and a 57-year-old veterinarian dies.</li> <li>• H5N1 infects a 9-year-old boy and his 33-year-old father in Hong Kong in February.</li> <li>• H9N2 infects a 5-year-old boy in Hong Kong in March.</li> </ul>
2004	<ul style="list-style-type: none"> <li>• H7N3 outbreak in birds in Pakistan.</li> <li>• H5N2 outbreak in birds in the United States (Texas).</li> <li>• H7N3 outbreak in poultry in Canada (British Columbia). Two human infections of conjunctivitis from infected poultry.</li> <li>• H5N2 outbreak in birds in South Africa.</li> <li>• H5N1 infects 33 and kills 25 in Vietnam, and infects 17 and kills 12 in Thailand. Thirty-seven deaths from 50 cases is a very high mortality rate (74%).</li> </ul>
2009	<ul style="list-style-type: none"> <li>• A novel H1N1 influenza outbreak, referred as the “swine-flu”, was detected in mid-April. The outbreak began in Mexico and since then this virus spread as a pandemic throughout the entire world. As of December 2009, there have been more than 14,000 confirmed deaths worldwide.</li> </ul>

Source: University at Albany School of Public Health; Center for Public Health Preparedness School of Public Health Certificate Program: Preparedness and Community Response to Pandemics; Unit 3: Avian Influenza throughout the decades; at: <http://www.ualbanycphp.org/learning/default.cfm>

APPENDIX E; Table 2: Avian influenza - Timeline of major events in Vietnam

<b>Date</b>	<b>Events in Animals</b>	<b>Events in Humans</b>
8 Jan 2004	First reports A/ in poultry. Outbreaks continue to be reported on a regular basis	
11 Jan 2004		H5N1 identified as a cause of human cases of severe respiratory disease with high fatality. Sporadic human cases are reported through mid March
1 Feb 2004		Investigation of a family cluster of H5N1 cases, which occurred in Viet Nam in early January, cannot rule out the possibility of limited human-to-human transmission
18 Mar 2004		Research: case study of 10 patients in Vietnam point to close contact with infected poultry as the probable source of infection in most cases, but conclude that, in two family clusters, limited human-to-human transmission within the family cannot be ruled out.
Jun/Jul 2004	Outbreak reports of H5N1 poultry	
8 Jul 2004	Research results consider possible role of wild birds in spread, and concludes that H5N1 has found a new ecological niche in poultry, but is not yet fully adapted to this host.	
13 Jul 2004	Research shows that H5N1 has become progressively more lethal to mammals	
12 Aug 2004		Report of 3 new human cases, all fatal
7 Sep 2004		4 <sup>th</sup> fatal human case is reported
29 Oct 2004	Research confirms that domestic ducks can act as silent reservoirs, excreting large quantity of virus, yet showing few if any signs of illness	
Dec 2004	Poultry outbreaks continue through Dec 2005	
30 Dec 2004		Confirmation of new case
6 Jan 2005		Confirmation of 2 further cases
14 Jan 2005		Total number of human cases rises to 6. Sporadic cases continue to be reported over the coming months making Vietnam the hardest hit country
30 Jun 2005		WHO investigation finds no evidence that H5N1 has increased its transmissibility in humans in Vietnam
6 Oct 2005		Research describe reconstruction of the lethal 1918 pandemic virus, concludes that this virus was entirely avian, and finds some similarities with H5N1
9 Nov 2005		Confirmation of 65 <sup>th</sup> human case
23 Mar 2006		Research groups publish findings that may explain why H5N1 virus does not easily infect humans, like normal seasonal flu.

<b>Date</b>	<b>Events in Animals</b>	<b>Events in Humans</b>
30 Aug 2006	Reports of H5N1 in unvaccinated duck flocks and market ducks on routine surveillance. Duck did not show clinical signs	
30 Oct 2006	Surveillance study of H5N1 isolates from poultry in Southern China confirms that subtypes continue to emerge and their relative prevalence continues to change.	
19 Dec 2006	Reported H5N1 in unvaccinated poultry. Outbreaks become widespread in the southern part of the country.	
17 Jan 2007	Reports of H5N1 infection in farmed and village poultry	
24 May 2007	Reports of multiple outbreaks in unvaccinated poultry (primarily) from several provinces through the country.	
29 Jun 2007		Confirmation of a human case in Vinh Phuc and Thai Nguyen. No links between the 2 cases. Total of cases at this point = 95
31 Aug 2007		Vietnam retrospectively confirms its 96 <sup>th</sup> through 100 <sup>th</sup> cases: 1 in Ha nam, 2 in Thanh Hoa, 2 in Ha Tay.
11 Oct 2007	Reported of H5N1 in unvaccinated ducks in Tra Vinh.	
31 Oct 2007	Reports of H5N1 in unvaccinated poultry in 3 additional provinces	
17 Dec 2007	FAO report outbreaks in poultry in Tra Vinh, Cao Bang, Quang Tri	
28 Dec 2007		Confirmation of the 101 <sup>st</sup> human case in Son La
7 Jun 2008	Report of H5N1 in poultry in 4 provinces: Tra Vinh, Cao Bang, Thai Nguyen, and Quang Tri.	
24 Jan 2008		The 102 <sup>nd</sup> human case is reported in Tuyen Quang
15 Feb 2008		Confirmation of the 103 <sup>rd</sup> human case in Hai Duong
21 Feb 2008		Confirmation of the 104 <sup>th</sup> human case in Ninh Binh
25 Feb 2008	Reports of H5N1 outbreaks in several provinces	
26 Feb 2008		Confirmation of the 105 <sup>th</sup> human case in Phu Tho
16 Mar 2008		Confirmation of the 106 <sup>th</sup> human case in Ha Nam
1 April 2008	Reports of H5N1 outbreaks in several provinces	
23 April 2008	Reports of H5N1 outbreaks in several provinces	
14 Jul 2008	Reports of 15 outbreaks in 9 provinces through the country	

<b>Date</b>	<b>Events in Animals</b>	<b>Events in Humans</b>
30 Sep 2008	Reports of 9 outbreaks in 6 provinces trough the country	
27 Non 2008	Reports of H5N1 in Nhe An province	
29 Dec 2008	Reports of H5N1 in Thai Nguyen province	
7 Jan 2009		Confirmation of the 107 <sup>th</sup> human case in Thanh Hoa
3 Feb 2009	Reports of H5N1 in Ca Mau	
6 Feb 2009	Reports of H5N1 in Ca Mau, Soc Trang, and Nhe An provinces	
11 Feb 2009		Confirmation of the 108 <sup>th</sup> human case in Quang Ninh
16 Feb 2009	Reports of new or ongoing outbreaks of H5N1 in Bac Lieu, Khanh Hoa, Ninh Binh, and Quang Ninh provinces	
8 Apr 2009		Confirmation of the 110 <sup>th</sup> human case in Dong Thap
10 April 2009	Reports of H5N1 in Lai Chau and Quang Ninh	
6 May 2009		Confirmation of the 111 <sup>th</sup> human case in Thanh Hoa
	Reports of H5N1 in Dong Thap, Quang Nagi, Thanh Hoa and Ninh Long provinces	
26 Jun 2009	Reports of H5N1 outbreaks in household poultry in Quang Ninh	
5 Nov	Reports of H5N1 in Dien Bien. First outbreak reported since June 2009	
11 Dec 2009		Confirmation of the 112 <sup>th</sup> human case in Dien Bien
13 Dec 2009	Reports of H5N1 in Ca mau	
16 Dec 2009	Reports of H5N1 in Thai Nguyen	
27 Dec 2009	Reports of H5N1 in Cao Bang	
Jan/Feb 2010		Confirmation of 3 more human cases in Tien Giang, Tuyen Quang , and Khanh Hoa, bringing the number of human cases to 115

Source: data extracted from the World Health Organization report from January 4, 2010; H5N1 avian influenza: Timeline of major events

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