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Original Article

Prioritization of zoonotic diseases of public health significance in Vietnam

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Abstract

Introduction: Prioritization of zoonotic diseases is critical as it facilitates optimization of resources, greater understanding of zoonotic diseases and implementation of policies promoting multisectoral collaboration. This study aimed to establish strategic priorities for zoonotic diseases in Vietnam taking a key stakeholder approach.

Methodology: Two weeks prior to a workshop on zoonotic diseases a questionnaire was developed and posted to key professionals involved in different areas of zoonotic disease management in Vietnam. Respondents were asked to assess the relative priority of 12 zoonotic diseases using a number of evidence-based criteria, and to provide suggestions to strengthen multisectoral collaboration.

Results: A response rate of 69% (51/74) was obtained, and 75% (38/51) respondents worked in non-international Vietnamese organizations. Respondents identified the top five diseases for prioritization in Vietnam as: avian influenza, rabies, *Streptococcus suis* infection, pandemic influenza and foodborne bacterial diseases. The three criteria most used to rank diseases were severity of disease, outbreak potential and public attention. Avian influenza was ranked as the number one priority zoonotic disease in Vietnam by 57% of the respondents, followed by rabies (18%). Respondents identified coordination mechanisms, information sharing and capacity building as the most important areas for strengthening to enhance multisectoral collaboration.

Conclusions: This study is the first systematic and broad-based attempt to prioritize zoonotic diseases of public health significance in Vietnam using key stakeholders, and a comparative and transparent method. There is limited literature for policy makers and planners on this topic and the results of this study can be used to guide decision-making.

Key words: animal health; avian influenza; infectious diseases; prioritization; public health; zoonoses.

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Introduction

In Vietnam, and other countries with similar sociocultural practices, there is close animal-human interaction making the threat of emerging or re-emerging zoonotic diseases, or their potential amplification, an issue of serious concern [1]. Vietnam has been identified as one of the countries which is a "hotspot" for emerging infectious diseases, and was one of the first countries to report cases of highly pathogenic avian influenza (HPAI) in poultry [2,3]. It has also been one of the hardest hit by the human and economic costs of outbreaks of HPAI due to avian influenza (H5N1) [3,4]. However, other zoonotic diseases such as rabies and *Streptococcus suis* also impact on the health and livelihood of the population in Vietnam, particularly affecting those living in poor rural communities [3].

In low to middle income countries, such as Vietnam, lack of effective surveillance systems combined with low awareness or compliance with prevention and control measures for zoonotic diseases contributes to: an underestimate of their importance; lack of strategic prioritization, and; poorly coordinated action [5]. Additional major challenges for the prevention and control of zoonotic diseases include the wide range and number of pathogens and the great variation in each pathogen's epidemiology and severity [6].

In spite of these challenges and drawbacks, zoonotic disease prevention and control has been prioritised by the World Health Organization (WHO) Asia Pacific Strategy for Emerging Diseases (APSED 2010) [7]. This strategy covers both the South East Asia and Western Pacific Regions of WHO, and one of the major components is that it aims to provide a

framework to strengthen and guide collaboration between public health and animal health sectors [7].

In Vietnam, a workshop was jointly organised in Ha Noi in August 2011 by the Ministry of Health's General Department of Preventive Medicine (GDPM), and the Ministry of Agriculture and Rural Development's Department of Animal Health (DAH). They were supported by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO). A Steering Committee composed of GDPM, DAH, FAO and WHO staff was established to provide overall guidance and technical orientation to the event.

The main aims of the workshop included identifying priority zoonotic diseases in Vietnam, strengthening the links between the human and animal health sectors, and increasing the coordination, collaboration and networking on zoonoses prevention and control activities among stakeholders in Vietnam. A rapid assessment was conducted in advance of the workshop to identify the types of activity being conducted by those invited to the workshop and, to determine the participants' views on priority zoonotic diseases in Vietnam. In addition, suggestions on how to improve multi-sectoral collaboration for zoonotic disease activities in Vietnam were gathered. The objective of this paper is to provide an overview of the findings from the rapid assessment.

Methodology

A questionnaire-based survey was conducted in Vietnam, between July and early August 2011, of animal and public health professionals invited to attend a two-day zoonoses workshop to be held in August 2011 in Hanoi, Vietnam. For this study, zoonotic diseases were defined as diseases and infections that are naturally transmitted between vertebrate animals and humans [8].

Questionnaire format

An evidence-based self-administered questionnaire was developed and divided into three main sections. The first section gathered general information about the participant, their work, their areas of expertise, and zoonotic disease activities that they were undertaking. The second section was based upon available national surveillance data, and presented a list of twelve common zoonotic diseases in Vietnam. From the list of zoonotic diseases provided, respondents were asked to identify the five most important zoonotic diseases (not in rank order) in Vietnam. Space was provided on the questionnaire for respondents to add additional diseases that were not included by the researchers.

Fourteen criteria (defined in the questionnaire to ensure common understanding) were provided for participants to justify prioritization (Table 1). The criteria were adapted from published literature on disease and pathogen assessment and prioritization [3,9,10]. For each disease identified a score of one (01) was assigned to each criteria. From the five diseases identified as being the most important, respondents were then asked to identify one zoonotic disease in Vietnam that should be given the highest priority by the Government of Vietnam, and to provide

Table 1. List of criteria used to prioritise zoonotic diseases in Viet Nam

Criteria	Definitions
Burden of disease	
Incidence	Infection rate per 100,000 population
Severity of disease	Based on frequency of hospitalization, days of work lost, occurrence of persisting handicaps
Mortality	Number of deaths per year
Epidemiologic dynamic	
Outbreak potential	Frequency of outbreak occurrence
Trend	Trend of incidence rate
Emerging potential	Potential for the disease to be introduced into the country and become widespread
Information needs	
Evidence for risk factors/groups	Risk factors and risk groups are identified based on scientific evidence
Validity of epidemiologic information	Epidemiologic information is well known and scientifically valid
International obligations	Need to follow any international duties (e.g. reporting under the revised International Health Regulations (IHR 2005))
Public attention	Present in the political agenda or attracts public attention
Evidence for pathogenesis	Information on pathogenesis and transmission routes is available and well supported by scientific evidence
Health gain opportunity	
Treatability	Effective medical treatment is available
Drug resistance	Potential for the emergence of strains resistant to antimicrobials

reasons to justify their selection.

The last section of the questionnaire was divided into two main parts. Firstly, participants were asked to identify other stakeholders working on zoonotic diseases in Vietnam. Stakeholders were considered to be organizations, institutions, networks or groups, both national and international, involved in activities on zoonotic diseases. These activities encompassed decision-making, management, research, training, education and communication regarding zoonotic diseases. Secondly, participants were asked to suggest ways to improve future collaboration between stakeholders.

The questionnaire was anonymised, developed in English, pre-tested and revised following comments. The English version was translated into Vietnamese for Vietnamese participants. Invited participants from international organizations received the amended English version. The questionnaire, a cover letter and the workshop invitation was mailed to all invited participants two weeks before the workshop. Potential workshop participants were identified by members of the Steering Committee based on their knowledge of the invitees interest, skills, experience, expertise, and knowledge in the area of zoonoses. All invited participants received questionnaires, and consideration was given to ensure invitations and questionnaires were sent to appropriate actors in the animal and public health sectors. Invited participants represented government offices at the national and provincial level, hospitals, research institutes, universities, donor organizations, international organizations, non-governmental organizations (NGO) and, other key stakeholders working in the area of zoonoses.

Respondents were given one week to compile and return the questionnaire to the workshop organizers, either by post, email or fax.

Data analysis

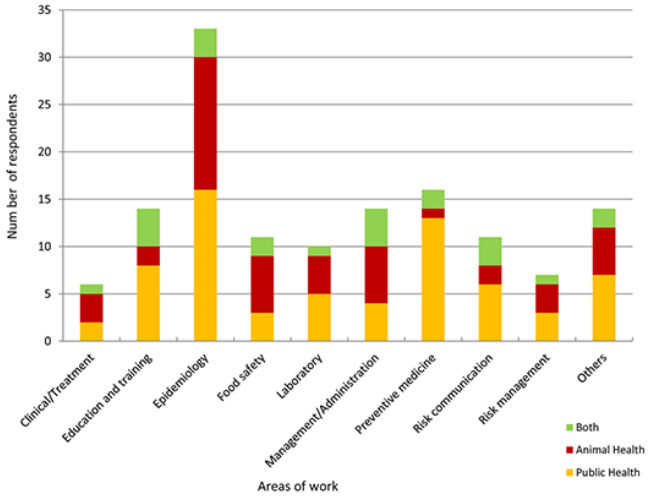
Quantitative and qualitative data were entered into Microsoft Excel 2007. Statistical software, STATA 10, was used for quantitative data analysis.

Results

Respondent characteristics

A total of 74 questionnaires, representing 58 organizations, were sent to workshop invitees. The individual questionnaire response rate was 69% (51/74) from 48 organizations. Twenty-seven percent (13/48) of responses were from international organizations, including donor agencies and international NGOs. Approximately 75% (38/51) of the individual respondents were from Vietnamese organizations, including government offices at national, regional and provincial levels, research institutes, universities, and hospitals. Twenty-one respondents were from the public health sector, 23 from the animal health sector and, seven individuals worked in both sectors.

Figure 1. In rank order, the type of work currently done by respondents in the public health and animal health sectors



Others: Animal inspection; aquatic health; behaviour change and communication; coordination and information sharing; development work; infection control; outbreak response; pandemic preparedness; program management; and, wildlife disease surveillance.

Stakeholder activities

Respondents reported involvement in a variety of activities, with the majority involved in epidemiology (public or animal health), preventive medicine, administration or management, and education and training (Figure 1). A number of other working areas which were not listed in the questionnaire were provided by respondents, including wildlife disease surveillance, behaviour change and communication, aquatic health, pandemic preparedness, animal quarantine and inspection, coordination and information sharing, infection control, program management and development work.

Ninety-two percent (47/51) of respondents said that their organizations were involved in activities related to avian influenza (A/H5N1), followed by rabies, *Streptococcus suis* infection, anthrax, leptospirosis and pandemic influenza (A/H1N1). Less common zoonotic diseases reported by respondents included Hanta virus infection, trichinellosis, Nipah virus infection, tuberculosis and Japanese encephalitis. The majority of respondents involved in avian influenza related activities were involved in

surveillance (Figure 2). There was also high involvement in outbreak investigation and response, epidemiology, and prevention and control.

Priority zoonotic diseases

Overall, the five most important zoonotic diseases identified by the respondents were avian influenza, rabies, *S. suis* infection, pandemic influenza and foodborne bacterial diseases (Figure 3). Other additional zoonotic diseases identified as being important by the respondents were anthrax, foodborne parasitic diseases, leptospirosis, and plague.

The respondents' rating of the prioritization criteria for avian influenza by professional group are shown in Table 2. Both groups appear to be most influenced by the 'burden of disease' group of criteria and least by the 'health gain opportunity' group. Overall, severity of disease (43/51), outbreak potential (36/51) and public attention (35/51) were the three individual criterion (in decreasing order of importance) deemed to be most important for prioritizing zoonotic diseases in Vietnam.

The priority zoonotic disease in Vietnam

Avian influenza was selected by 59% (30/51) of the respondents as the number one priority zoonotic disease in Vietnam. Reasons provided for selecting avian influenza included the severity and high mortality in both human and animal populations, the continuous mutation of the virus, the pandemic potential and the severe economic impact resulting from the destruction of infected poultry flocks. Other reasons given were the difficulties in controlling avian influenza in Vietnam because of the large quantity of small-scale poultry farms, the lack of farming bio-security, and the traditional poultry husbandry practices and food consumption habits of the Vietnamese people. The number two and three priority diseases were rabies (9/51, 17.7%) and *S. suis* infection (2/51, 3.9%) respectively.

Improving multi-sector collaboration

Respondents provided a number of suggestions to improve the collaboration between different sectors and organizations working on zoonotic diseases in Vietnam. These were grouped into five themes consistent with the APSED (2010) zoonotic disease framework [6]: (i) the establishment of a collaboration and coordination mechanism; (ii) enhanced information sharing and exchange; (iii) development of a legal framework for collaboration; (iv) joint capacity building, and; (v) financial support. Further detail is given in Table 3.

Figure 2. The types of avian influenza activities reported by respondents in the public and animal health sectors.

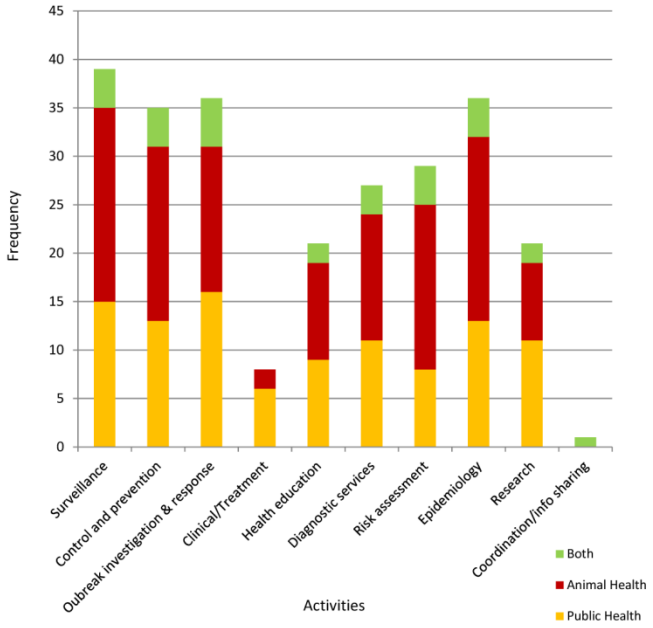


Figure 3. In rank order, respondents' priority zoonotic diseases.

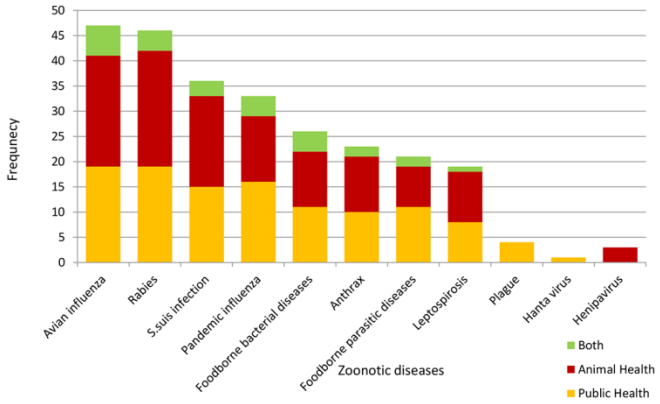


Table 2. Comparison of criteria ranking for importance of avian influenza by professional groups

Criteria	All respondents (n = 51)	Public Health (PH) (n = 21)	Animal Health (AH) (n = 23)	Mixed (AH & PH) (n = 7)
Burden of disease				
Incidence	23	6	15	2
Severity of disease	43	18	20	5
Mortality	33	13	15	5
Epidemiological dynamic				
Outbreak potential	36	12	19	5
Trend	13	4	5	4
Emerging potential	27	9	13	5
Information needs				
Evidence for risk factors/groups	21	7	9	5
Validity of epidemiologic info	20	8	9	3
International obligations (e.g. IHR)	23	11	9	3
Public attention	35	14	16	5
Evidence for pathogenesis	19	8	9	2
Health gain opportunity				
Preventability	28	11	12	5
Treatability	22	10	8	4
Drug resistance	11	5	3	3

Table 3. Suggestions to improve organizational collaboration on zoonotic diseases in Viet Nam

Themes	Suggestions
Establishment of a collaboration and coordination mechanism	• Establishment of a multi-stakeholder working group/steering committee/taskforce on zoonotic diseases at all levels, coordinated at the national level; • Closer sectoral collaboration at local level; • Recognition of the government wildlife management sector.
Enhanced information sharing and exchange	• More frequent organization of formal and informal meetings and workshops between the AH and PH sectors to share experiences; • Timely information exchange, especially during outbreaks; • Develop a website on zoonotic diseases and ensure information on the website is up to date and timely; • Create a forum for networking opportunities.
Development of a legal framework	• Clear policies/guidance regarding collaboration between organizations with roles and responsibilities of relevant organizations specified; • A signed memorandum/letter of understanding or circular guiding inter-sectoral collaboration and coordination.
Capacity building	• Joint-training in surveillance, response, diagnoses, prevention and control of zoonotic diseases; • More research, especially joint-research, on zoonotic disease; • Improve diagnostic and testing skills; • Exchange of expertise between sectors.
Increased financial support	• Increase the national budget for zoonotic disease related activities • Increased support required from international and bilateral donors, NGOs and other stakeholders.

Discussion

We surveyed a selected population of animal and public health professionals to determine the most important zoonotic diseases in Vietnam. Survey respondents identified avian influenza, rabies, *S. suis* infection, pandemic influenza, and foodborne bacterial diseases as the top five priority diseases and avian influenza as the number one priority zoonotic disease in Vietnam.

To our knowledge, this is the first time that a systematic exercise has been conducted to identify the activities and actors involved in zoonotic diseases in Vietnam. A previous attempt was made by Grace and colleagues as part of a multi-country study that involved interviewing key stakeholders in three countries in the Greater Mekong Sub-region, Cambodia, Lao People's Democratic Republic and Vietnam [11]. However, unlike this study Grace and colleagues did not include international public health organizations among their sample, used broad disease categories rather than a list of individual diseases and employed a limited number of criteria for ranking.

Stakeholder activities and collaboration

There was an almost equal representation of animal and public health sector organizations in the survey. However, it appears that some categories of stakeholder were not captured. These included those from the animal husbandry, animal hygiene and, environmental or forestry sectors, including wildlife management. Specific organizations working in these areas were mentioned by the respondents, including bilateral or international donor agencies and national or international NGOs. Lack of these predominantly animal health actors in the survey suggests a need for greater integration of animal health professional groups in approaching the challenges posed by zoonotic diseases.

Recently, the concept of One Health has been discussed and adopted in different countries. It is a worldwide strategy for expanding multidisciplinary collaboration and communication in all aspects of health care for humans, animals and the environment [12]. This approach recognizes that the health of humans and animals, and the environment are inextricably linked. The challenges presented by the prevention and control of zoonotic disease, which are said to account for 60% of all infectious disease pathogens and 75% of all emerging pathogens [1,13], means that the *One Health* approach provides an important opportunity to facilitate and coordinate surveillance and control activities at the animal-human interface. In this questionnaire-based study, respondents provided a number of suggestions for promoting and enhancing multisectoral partnerships. These included an effective coordination mechanism between the human and animal health sectors, joint training and research, increased information exchange (including development of a zoonotic diseases website), closer collaboration at sub-national level (including joint outbreak response) and increased funding for zoonotic disease activities. These areas can serve not only to foster future collaborative action but also offer multiple entry points to achieve the APSED aim of strengthening links between the main actors at the human-animal interface through a number of mechanisms including capacity building and the development of systems and structures [7].

Prioritization of zoonotic diseases

Despite the significant impact of zoonoses on human and animal health there are few publications addressing the issue of prioritization of zoonotic diseases for disease surveillance or research from Asia [11,14,15]. None were identified for Vietnam.

The approach taken in this study was similar to that used by Horby *et al*. [16] in that a disease-based approach was taken and diseases prioritized using the knowledge and opinion of a wide range of professionals directly involved in zoonotic disease activities. Through this exercise a diverse range of diseases were identified and, avian influenza was ranked the number one priority zoonotic disease in Vietnam. This was in line with the findings from recent prioritization exercises in the Southeast Asia region where avian influenza is endemic [11,15]. It is also consistent with public and government concern and the strategic goals of international organizations [6,17-19]. In justifying the selection of this disease, respondents stated that avian influenza has a significant impact on human health and the poultry industry, because of its severity and high mortality, as well as the risk of virus mutation which may result in a pandemic.

The wide coverage given to avian influenza by the media, political and public attention, the abundant funding from international donors, as well as the potential pandemic threat of the disease are factors that may help to explain why avian influenza was viewed as the pre-eminent zoonotic disease in Vietnam by both public health and animal health professionals.

However, while avian influenza has attracted extensive international attention and financial resources to fund a variety of activities throughout the

country and across multiple sectors, activities on other zoonotic diseases have been less well resourced. This has led to a relatively poor knowledge base and lack of awareness in some areas. For example, few survey respondents stressed the importance of wildlife zoonotic diseases. Yet zoonoses from wildlife are said to represent the most significant, growing threat to global health of all emerging infectious diseases [1]. For better prevention and control of zoonotic diseases in Vietnam, there should be greater recognition of the growing importance of the wildlife management sector. Furthermore, although diseases such as Hantavirus, Japanese encephalitis and plague achieved a low ranking, they are still important and should not be ignored in Vietnam. Their low ranking should not result in reduced attention to prevention and control measures for these diseases.

Limitations

Given that stakeholders were identified by the workshop organizers, there was the potential for selection and respondent bias. For instance, there were no representatives from the private sector included in the survey, and although this may be seen as a weakness of the study, none of the respondents identified any private organizations working in the area of zoonoses that could have been invited to participate either in the survey or, subsequent workshop. Respondent bias was also a potential concern as the backgrounds, personal experiences and research interests of the selected respondents may have influenced their responses. It is however difficult to determine how these potential biases may have affected the results. Criteria for assessing the importance of each zoonotic disease in this study were not weighted [6,9]. This is similar to previous scoping studies carried out [11]. Others have employed more sophisticated methods using weighted or unweighted scoring systems, and a variety of criteria for priority setting [10,14]. There are however no generally agreed quantitative methods or criteria for prioritization. Although there may be differing perceptions regarding the validity of this, or any other prioritization setting exercise, the importance of the exercise should rest on its transparency and determining the relative position each disease occupies compared to others irrespective of the method used [6,9,10,20].

Conclusion

Zoonotic diseases and their impacts are complex and multidimensional requiring diverse methods for prevention and control, resources are however limited. Given this context, prioritization along with multi-sectoral coordination and collaboration are critical. This study was the first systematic and broad-based attempt to prioritize zoonotic diseases of public health significance in Vietnam. It is a key first step towards zoonotic disease control in Vietnam and has the potential to influence public policy and, strengthen the coordination mechanism between key stakeholders at the human-animal interface particularly with regard to the One Health approach and implementation of the APSED (2010) strategic framework for zoonotic disease prevention and control.

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