

Policy Analysis for Response to and Preparedness for an Avian Influenza Pandemic and/or Influenza in Thailand

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Abstract

Since 2005, a national strategic plan aimed at controlling and preventing a future avian influenza (AI) pandemic and/or outbreak of influenza in Thailand was established as a policy measure to tackle these public health threats. The objective of this paper is to study the formulation process of two policy measures for AI: vaccination of poultry and stockpiling of antiviral drugs for humans.

We used a qualitative approach with in-depth interviews of 38 key stakeholders from many organizations. In addition, a literature review was carried out along with the interviews. After collecting data from the literature and the in-depth interviews, we analyzed the emerging themes relevant to the policy formulation process in Thailand.

We found that policy formulation concerning poultry vaccination is a very complex and politically driven process since many stakeholders are involved with different special interests and powerful influences. Small-scale poultry producers representing rural people are the ones who would rather use vaccine, because non-vaccine measures, such as culling or using bio-security buildings and measures, are against their rural culture. However, the majority of key stakeholders were against the use of poultry vaccine. There are four major reasons: (a) evidence of vaccine effectiveness is not convincing and thus a public health threat remains possible; (b) the government has confidence in the infrastructure needed to fight AI outbreaks with non-vaccine measures; (c) the management system of vaccination (acquisition of good-quality vaccine, finance, logistics, monitoring and exit program) is not fully effective; and (d) the government implicitly wants to protect the poultry export industry. Thus, the government decided not to use poultry vaccine.

Contrary to the poultry vaccine policy, building stockpiles of antiviral drugs for use in humans is determined primarily by experts at the Ministry of Public Health, following World Health Organization guidelines, but under budget constraints. Other factors relevant to policy analysis are: government leadership, budget constraints, animal and human health co-ordination, scientific evidence and risk communication for the public.

Key words: policy analysis, pandemic influenza, avian influenza, Thailand

บทคัดย่อ การวิเคราะห์นโยบายเพื่อตอบสนองและเตรียมพร้อมสำหรับการระบาดของไข้หวัดนกและ/หรือไข้หวัดใหญ่ในประเทศไทย

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ปัญหาการระบาดของไข้หวัดนกตั้งแต่ต้นปี พ.ศ. 2547 ทำให้รัฐบาลต้องจัดทำแผนยุทธศาสตร์แห่งชาติเพื่อแก้ไข

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และควบคุมไข้หวัดนก และ/หรือไข้หวัดใหญ่ตั้งแต่ปี พ.ศ. 2548 โดยมีเป้าหมายเพื่อควบคุมและป้องกันปัญหาสาธารณสุขที่อาจเกิดขึ้น การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษากระบวนการกำหนดนโยบายที่เกี่ยวข้องกับการใช้วัคซีนในไก่ และการสะสมสต็อกยาด้านไวรัสสำหรับมนุษย์ เป็นการศึกษาเชิงคุณภาพด้วยการสัมภาษณ์เชิงลึกกลุ่มผู้เชี่ยวชาญจำนวน 38 คนจากหน่วยงานต่างๆ ที่เกี่ยวข้องกับการกำหนดนโยบายไข้หวัดนก นอกจากนี้มีการทบทวนวรรณกรรมไปพร้อมกับการสัมภาษณ์เชิงลึก วิเคราะห์ข้อมูลจากประเด็นสำคัญที่ได้จากการสัมภาษณ์ ร่วมกับการทบทวนวรรณกรรม จากนั้นจึงนำมาสรุปประเด็นที่เกี่ยวข้องกับการสังเคราะห์นโยบายไข้หวัดนกในประเทศไทย

ผลการศึกษาพบว่า กระบวนการที่เกี่ยวข้องกับการใช้วัคซีนไข้หวัดนกในไก่ เกี่ยวข้องกับผู้คนจำนวนมากที่มีมุมมองของผลประโยชน์ของแต่ละกลุ่มที่แตกต่างกัน และอาจมีผลประโยชน์ทับซ้อนซึ่งมีอิทธิพลต่อการกำหนดนโยบาย กลุ่มผู้สนับสนุนการใช้วัคซีนในไก่ คือผู้ประกอบการรายย่อยซึ่งเป็นตัวแทนของชาวชนบท ทั้งนี้เพราะมาตรการของการไม่ใช้วัคซีน เช่น การฆ่าไก่ หรือกักบริเวณไก่อ้นั้น ชัดกับวัฒนธรรมพื้นบ้านของชาวชนบทที่เลี้ยงไก่เป็นสัตว์เลี้ยงในบ้าน ส่วนผู้ที่ไม่ต้องการใช้วัคซีนในไก่ มีเหตุผลสำคัญ 4 ประการ คือ 1) ประสิทธิภาพของวัคซีนยังไม่เป็นที่ประจักษ์ และอาจนำไปสู่ปัญหาสาธารณสุขได้, 2) รัฐบาลมีความพร้อมเชิงโครงสร้างเพื่อรับมือการระบาดของไข้หวัดนก ด้วยมาตรการต่างๆ ที่ไม่ต้องการใช้วัคซีน, 3) ระบบการจัดการทั้งหมดที่เกี่ยวข้องกับการใช้วัคซีนยังไม่ดีนัก เพราะต้องมีระบบที่ครบวงจร ทั้งวัคซีนที่มีคุณภาพ การจัดการงบประมาณ ระบบโลจิสติกส์ การเฝ้าระวัง และกำหนดเวลาการยกเลิกการใช้วัคซีน, และ 4) รัฐบาลมีนโยบายที่ต้องการปกป้องธุรกิจส่งออกไก่ ด้วยเหตุนี้รัฐบาลจึงกำหนดนโยบายห้ามใช้วัคซีนในไก่ แต่การกำหนดนโยบายการสะสมสต็อกยาด้านไวรัสสำหรับคน มีความแตกต่างกันมากเพราะถูกกำหนดโดยนักวิชาการในกระทรวงสาธารณสุขเป็นหลัก ตามคำแนะนำขององค์การอนามัยโลก แต่ขึ้นกับปัจจัยงบประมาณที่มีจำกัด ในกระบวนการกำหนดนโยบาย ยังมีปัจจัยอื่นๆ อีก ได้แก่ สภาวะผู้นำของรัฐบาล ข้อจำกัดด้านงบประมาณ ความร่วมมือระหว่างหน่วยงานที่เกี่ยวข้องกับสุขภาพสัตว์และสุขภาพคน หลักฐานทางวิชาการ และการสื่อสารเรื่องความเสี่ยงต่อสาธารณะ

คำสำคัญ: วิเคราะห์นโยบาย การระบาดของใหญ่ของไข้หวัดใหญ่ ไข้หวัดนก ประเทศไทย

Introduction

Outbreaks of H5N1 avian influenza (AI) in poultry have been widespread around the world in recent years. Since 1997, H5N1 has been reported in 61 countries in every continent. The H5N1 virus has now become endemic in Thailand and up to late 2009, there have been six rounds of AI outbreaks in poultry.⁽¹⁾ The deadly disease has been transmitted to humans in 15 countries, mainly in Asia, and some in Europe and Africa, and has become a public health threat with a high percentage of deaths.⁽²⁾ The World Health Organization (WHO) has reported that as of April 11, 2011 there have been 549 confirmed cases with 320 deaths (58.3%) around the world.⁽³⁾ In Thailand, between 2004 and 2006, there were 25 confirmed cases of H5N1 infection in humans, 17 of whom died (68%). However, there has been no H5N1 human case report since 2007.

The H5N1 outbreaks during the period 2004 - 2007 resulted in tremendous losses for the poultry

industry, in terms of both chickens for export and native backyard chickens. Over 75 million birds⁽⁴⁾ had been culled as of mid-2007, resulting in an overwhelming economic burden for both the farmers concerned and the government. In 2004, the first year of the outbreak, the government spent 5,200 million baht for compensating farmers for the loss of over 60 million birds that had been culled.⁽⁵⁾ In addition, Thailand is an export-led economy, 70 percent of its revenues depend on exports, and chickens comprise one of the country's major agricultural products. The AI outbreaks have had negative impacts on the exports of chicken, with the value having dropped more than 42 percent in 2004 compared with 2003, particularly to the Japanese and European markets.⁽⁶⁾ It was estimated that, in the first couple of years, economic loss to the poultry industry alone exceeded US \$3 billion.⁽⁷⁾

The outbreaks of H5N1 were a wake-up call for the predicted more serious consequences of a pandemic influenza which is expected to occur soon.^(8,9)

The 2009 pandemic (H1N1) was officially declared on



July 11; on that date, the Director General of WHO declared that the novel H1N1 influenza was widespread around the world. This strain had become a pandemic very shortly after it became known to the public only a couple of months earlier in late April 2009.⁽¹⁰⁾

Owing to the seriousness of H5N1 and the substantial consequences of the disease it causes for public health as well as the agricultural sector, the government began investing considerable resources and made interventions to fight this deadly virus starting even earlier, in 2004. As a measure for both short- and long-term prevention and control of AI and pandemic influenza, national public policy was formulated and two National Strategic Plans^(11,12) were put in place: the first one for the period 2005-2007 and the second for the period 2008-2010.

During the past several years, two interventions have received substantial attention from policymakers and funding for implementation: vaccination of poultry and stockpiling of antiviral drugs for humans. During the first year of the outbreak, there was a lot of debate over whether or not to use vaccine in poultry, but eventually the government decided that vaccination of poultry should not be implemented⁽¹³⁾ and the policy is still in effect today even though the World Organization of Animal Health (OIE) in 2007 issued a policy recommendation to include vaccination in the control package for eradication of the disease.⁽¹⁴⁾ For public health, WHO in 2006 issued guidelines on the management of regional stockpiling of antiviral drugs.⁽¹⁵⁾ This regional stockpile was aimed at supplementing the national stockpile in order to contain the potential pandemic at its epicenter in countries where AI outbreaks were widespread.

The policies on poultry vaccination and antiviral stockpiling reflect the interpretation of scientific-based information, response to the recommendations of international organizations and local political decision-making for competing public health priorities. In this

study, we have investigated how public policy concerning public health was being formulated. Two aspects of the public policy being studied are whether to use vaccination in chickens and to stockpile antiviral drugs for humans.

Objectives

To describe and synthesize the policy formulation process concerning poultry vaccination and antiviral drug stockpiling for use in humans as measures to prevent and control AI in Thailand in 2004 and 2008.

Approval

The project was approved by the Ethics Committee of the Ethical Clearance for Human Research Institute, MoPH, in February 2008.

Methodology

The conceptual framework utilized in this retrospective study is a modification of the original framework by Walt and Gilson⁽¹⁶⁾ known as the policy triangle: context, content and process. Policy content was determined by reviewing policy documents. With regard to poultry vaccination, an official document was against the use of vaccine; as for antiviral stockpiling, the policy was implied from the national strategic plan and in-depth interviews with key stakeholders. The policy analysis is focused on the formulation process in order to explore the broad contextual environment leading to the policies and relationship between people and institutions in shaping the policies.

Data collection

Qualitative research methods were used. Data were collected by literature review of relevant information and in-depth interviews of key informants concerning AI. There were two sources of literature review.

1. Peer-reviewed articles. A systematic re-

view (using the key words: 'avian influenza' and 'policy' and/or 'Asia') was conducted searching several databases, namely PubMed, ScienceDirect, Springer Link, and Econlist. Only English-language full-text articles published from January 2003 to December 2007, and relevant to AI policy articles were screened.

2. Gray literature. These data were collected from several sources, such as newspapers (both Thai and English language), research reports, government documents and departmental annual reports, minutes, and WHO reports.

In-depth interviews

In-depth interviews with many stakeholders involved in policy formulation were carried out in order to get qualitative data on their roles and responsibilities as well as how much influence each key participant had on the policy formulation process. A semi-structured questionnaire was designed and tested before being used to guide the face-to-face interview process.

Semi-structured questionnaire

A questionnaire was constructed to solicit the contexts and contents of AI policy. The questions being asked were about the situational context during the outbreaks, the role and responsibility of each key informant concerning the AI policy and/or policy implementation, difficulty in policy formulation, and their suggestions about what should be done for future policy formulation. In order to determine the perspective on vaccines, there were questions regarding the opinion of the interviewees on the use of a vaccine in poultry. As for antiviral drug use, there were questions about oseltamivir stockpiling and logistics (procurement, storage and distribution), and the opinion of the interviewees toward the policy.

Key informants

From the review of gray literature, key informants within several stakeholders were identified. The key informants included: policymakers at both the national

and ministerial levels, academics and experts in veterinarian medicine and medical practice, international organizations, such as FAO (Food and Agriculture Organization of the United Nations) and WHO, people involved in the stockpiling and the logistical supply of the anti-viral drug, oseltamivir, and people representing large- and small-scale chicken producers (including rural people who raised backyard chickens and/or fighting cocks).

Each key informant was asked to give an oral interview, and an appointment was made for that purpose. Before the interview, each key informant was briefed about the project and would give his/her consent. If allowed, a tape recorder was used. All the key informants were assured that the information they would give was strictly confidential in every respect. "Snowball" technique was used to further identify other key informants.

During the interviews, triangulation technique was used for cross-referencing the many responses from different respondents and with the documents. Two interviewees with special training in how to carry out this qualitative technique in a standardized manner did the in-depth interviews.

Small group discussion

During the literature review and interviews, a small group meeting was periodically convened to discuss the information gathered and the emerging themes relevant to policy formulation, and plan for more interviews or do information-sharing among the researchers.

Data analysis

Data analysis was done simultaneously with data collection from the literature and interviews. Themes from preliminary data analysis were supported by further analysis at the conclusion of data collection. With the interface of public health and the agricultural sector, an emphasis would be placed on analyzing the



similarities or differences between the policy formulation process with regard to poultry vaccine and stockpiling of drugs for human use.

Findings

Systematic review

In the four databases, no articles were found about policy formulation and analysis of AI per se. However, there were four related articles in Science Direct,⁽¹⁷⁻²⁰⁾ and one in PubMed,⁽²¹⁾ but these were for the implementation and management aspect of human influenza vaccine⁽¹⁷⁻¹⁹⁾ policy and antiviral drug stockpiles.^(20,21) These articles were based on technical knowledge of how to use human vaccines or to stockpile antiviral drugs effectively during a pandemic; thus, it was not quite relevant to policy formulation, which is the focus of this study.

In-depth interviews

From March 2008 to June 2009, we interviewed

38 key informants involved in the policy process and in implementing poultry vaccination, drug stockpiling and logistics. Table 1 shows the key informants interviewed and the group of stakeholders, and the level of influence they had on the policy formulation process. They are the Deputy Prime Minister, who chaired the National Committee on AI, and seven other committee members; plus five senior officers from the Ministry of Public Health (MoPH) and four from the Ministry of Agriculture and Co-operatives (MoAC), five academics, seven people from the pharmaceutical and vaccine industries, two small-scale and one large-scale poultry producer, two international agencies and four veterinary services.

Policy formulation

There is a vast difference in the formulation process regarding poultry vaccination compared with drug stockpiling. The former involves a large number of stakeholders in a heated debate about the contro-

Table 1 Thirty-eighty key informants among several stakeholders involved in avian influenza policy for poultry vaccination and antiviral stockpiling in Thailand

Stakeholders key informants	Number (and identity) of key informants	Level of influence
Office of the Deputy Prime Minister and National Advisory Committee	8 (#1, #7, #8, #9, #10, #12, #18, #26)	Very high
Ministry of Public Health	5 (#2, #3, #4, #11, #38)	High
Ministry of Agriculture and Co-operatives	4 (#28 - #31)	High
Academia	5 (#13, #14, #27, #32 - #33)	Medium
Pharmaceutical and vaccine industries	7 (#5, #6, #19, #20, #21, #22, #23)	Low
Small-scale poultry producers (including fighting cocks)	3 (#16, #17, #24)	Low
International organizations	2 (#15, #25)	Medium
Veterinary service providers	4 (#34 - #37)	Low

versy on the effectiveness of vaccination of poultry and politics concerning those who support vaccination and those who are against vaccination of poultry, whereas the latter policy was solely the responsibility of the Ministry of Public Health. All the parties involved are to support access to the drug use policy with stockpiling and logistics. In addition, the former policy was not following the international recommendation of OIE,⁽¹⁴⁾ but the latter was in line with WHO guidelines.⁽¹⁵⁾

Because of the complex circumstances involving the vaccination of poultry in terms of different interests among stakeholders, as well as inconclusive scientific evidence on its effectiveness, political intervention is very much involved in the policy formulation process. Whether to use or not to use vaccine was debated publicly and behind the scene.

When the AI outbreak became known and publicized, the very first reaction from international trading partners was to ban chicken exports from Thailand, particularly major importers such as Japan and EU.⁽²²⁻²⁴⁾ Another emerging issue was whether to use poultry vaccine to control the spread of the disease, with a lot of information flowing among those who supported the idea and those who were against vaccination.⁽²⁴⁻²⁷⁾ During the controversial debate, the government set up a committee to study the issue.⁽²⁸⁾ There was a lot of publicity in the press from both sides, people who supported and opposed poultry vaccination.^(22-27,29-31) Among those who did not want vaccination were chicken exporters^(24,26-27,30) for fear that vaccination would have negative impacts on chicken exports, whereas those who supported poultry vaccination were people who raised domestic chickens and/or fighting cocks, such as Ad Carabao,⁽²⁵⁾ a well-known singer, for the reason that the vaccine would protect the poultry from the disease. The debates went on for several months until the government decided on September 15, 2004 not to use poultry vaccine^(13,30,32) for academic reasons,

mainly because it would be safer for human health.

Pros and cons of poultry vaccination

From our interviews, the majority of stakeholders either were explicitly or implicitly against poultry vaccination. Only a minority of veterinarians and rural people who raised backyard chickens and/or fighting cocks supported use of vaccine. Even though both groups agreed that public health was the top priority, they saw things very differently with regard to poultry vaccination. The pro-vaccine group argued that non-vaccine measures, such as culling and/or movement control, ran against the culture and the rural people's way of life, whereas the anti-vaccine group said that the effectiveness of vaccination was not guaranteed, as evidence had shown in many countries. On the other hand, non-vaccine measures could be easily put in place with close co-ordination between MoPH and MoAC.

Pro-vaccine group. The key stakeholders who were staunch supporters of poultry vaccination were those who represented rural people who raised indigenous chickens in their backyard and/or fighting cocks (Interviews #16, #17, #24). These small-scale producers in rural areas had shouldered the highest economic consequences from AI outbreaks, as a result of culling. They were rural people who raised chickens, and/or fighting cocks in their backyard as a way of life. They said there was evidence that vaccine certainly helped reduce the virus considerably and thus would bring AI under control, even though the virus could not be eradicated, which is normal for any vaccine (Interviews #16, #17). One of them who was a veterinarian even mentioned that the "use of vaccine in Mexico showed that virus mutation had been reduced as well as viral shedding into the environment." The 2007 Verona Recommendation⁽¹⁴⁾ was also mentioned to back up the pro-vaccination argument (Interview #16). Another supporter of vaccination, who was a chicken farmer, pointed to the



fact that vaccines were effective in preventing other disease, such as Newcastle (Interview #24). He implied that this vaccine could help prevent AI as well.

On the other hand, non-vaccine measures (such as culling) were heavily criticized. The critics wanted to preserve the national heritage of rural culture:

“Raising backyard chickens is our national heritage. Thai people have been living with chickens for thousands of years and they both survive. The government never took human culture into consideration when formulating policy for AI” (Interviews #16, #17).

For bio-security measures, one key stakeholder said:

“Bio-security goes against the nature of fighting cocks. Fighting cocks can’t live together in the same place, by instinct, they will fight each other. For backyard chickens, putting them together in a bio-security pen would dilute their roaming behavior and that would kill this indigenous breed” (Interview #17).

Anti-vaccine group. The majority of the stakeholders were against poultry vaccination, at least for four major reasons.

First, evidence of the vaccine’s effectiveness was not convincing. Several key informants at MoAC and MoPH (Interviews #7, #11 #12, #13, #18) explicitly cited this factor as the prime reason for not adopting vaccination. Also, the veterinarians in both academia and the government agreed that there still were uncertainties about how the virus could be contained by the vaccine and how much would remain in the birds. Another concern was the possibility of virus mutation, that it could become another highly pathogenic type as well as how much viral shedding into the environment would be taking place. Therefore, use of poultry vaccine would do more harm than good to human health, since the public health threat still would remain.

An EID expert at MoPH said:

“Poultry vaccine may mask the symptoms in chickens, so it would be more difficult to detect and

therefore more difficult to protect humans from the disease” (Interview #7).

The same opinion was reflected by the high-ranking official at MoAC:

“Vaccination should be a supplementary measure, after all preventive measures have been done” (Interview #11).

Second, the government had confidence in the infrastructure to deal with all non-vaccine measure: culling, movement control and bio-security, for instance (Interviews #8, #11). Prior to the AI epidemic, the government faced the crisis of SARS and had all the proper management system in place to tackle other emerging diseases. For prevention and disease surveillance, MoPH had over 800,000 health volunteers spread out among every village throughout the country to do the job, which could be very helpful for animal health as well. For disease control in humans, a Special Rapid Response Team (SRRT) was ready to move to the suspected area (Interviews #2, #3). For crisis management, MoAC, whose major responsibility is for animal health in the agricultural sector, had been working in close cooperation and consultation with MoPH in the public health sector. From our interviews, their relationship seemed very cordial and synergistic in dealing with the crisis.

Third, the whole management system of vaccination was inadequate (Interviews #7, #15). For poultry vaccination to be effective, the management system had to be effective as well. One of the experts in veterinary medicine (Interview #15) at FAO said that several factors had to be taken into consideration and the process had to be properly carried out: vaccine quality and logistics, finance, post vaccination surveillance and exit programs as well. If any of these factors were inadequate, the effectiveness of the vaccination would be uncertain and the problem would remain. Similar concern was expressed by a prominent expert in virology at Mahidol University (Interview #12).

Fourth, the government wanted to protect the chicken export industry. Even though exports had never been explicitly mentioned as an important issue in the formal formulation of policy. The industry was faced with severe negative impacts from AI. When the crisis emerged, chicken exports (particularly frozen ones) to Japan and EU were halted until safety measures could be guaranteed (Interview #18). With the growth of the Thai economy being very much driven by exports, the government would never do anything to jeopardize any industry. The economic impact was also implicated in the approach to policy formulation by the Chairman of the National Committee; he personally believed that poultry vaccine was effective, but economic matters were more important (Interview #9).

Stockpile of antiviral drugs

When it became apparent that the disease was being transmitted to humans, it became an urgent task for MoPH to seek an available remedy to fight the highly pathogenic virus. In 2004, there was only one possible option: oseltamivir. The drug was available from only one source, so the government was facing the problem of whether to attempt to gain access to the drug since worldwide demand for the medication far exceeded the supply. The clinician we interviewed mentioned that the first batch of drug to treat infected patients had to be imported from overseas (Interview #8).

Budgeting would be another problem since the drug was quite expensive, approximately 1,200 baht (US\$ 30) for a course of treatment. However, MoPH followed the WHO recommendation to stockpile oseltamivir as a preparedness measure for both the influenza and AI pandemics.⁽¹⁵⁾ For drug stockpiles, MoPH had estimated that, at the time of a pandemic, 10 percent (6.5 million) of the Thai population would become infected.⁽³³⁾ However, budget constraints would be a problem since the cost of the drug was

high. As a result, a practical approach should be to stockpile what was affordable, that is, to have enough supply for the first cluster of patients and people at risk, as indicated by the EID expert and a high-ranking official (Interviews #7, #11). In 2004 and 2006, MoPH purchased limited supplies of the drug at a negotiated price and stopped buying when the Government Pharmaceutical Organization started local production in late 2007. Starting from 2007 until 2010, 100,000 courses of the drug were stockpiled annually so that the accumulated stockpile would be enough for 1 percent of the population.

Discussions

The policy formulation process with regard to the poultry vaccine and the antiviral drug stockpile was quite different in terms of complexity as the number of stakeholders involved was large and there were powerful influences in each party and various approaches by the decision-makers. Poultry vaccination involved many stakeholders with potential conflicts of interest and different degrees of influence and political lobbying, ranging from the top politicians (the Prime Minister and Deputy Prime Minister) who were the ultimate decision-makers, high-ranking government officers who were overseeing ministerial administrative work related to animal and human health, poultry producers, and academics. For poultry producers, there was a vast difference in their opinion on vaccine effectiveness and hence their willingness to support vaccination, plus a lot of politics became involved in the formulation process. Believing in the effectiveness of vaccine to protect poultry from the disease, small-scale producers and backyard chicken producers would rather use the vaccine, whereas large-scale producers would rather not use vaccine for fear that exports would be jeopardized. By nature, small-scale producers raised chickens as a way of life and wanted to preserve their cultural heritage, but big producers would rather protect the higher economic



returns from chicken exports and maintain the country's economic growth rate. In the end, it looked like the economic factor would prevail since poultry vaccination was prohibited and the export industry was thus protected.

By contrast, when compared with the politically-oriented environment of poultry vaccination, the policy for stockpiling antiviral drugs was problem-oriented and involved a small number of stakeholders at the ministry level, namely clinicians and administrators at MoPH bolstered by recommendations from WHO. The top politician was absent from the policy formulation process on drug stockpiling.

During the policy formulation process, there were several determinants involved which contributed to the success of policy formulation and implementation. They were: government leadership; animal and human health coordination; budget constraints; scientific evidence; and risk communication.

Government leadership. The then Prime Minister and Deputy Prime Minister were highly praised by several interviewees for their strong leadership during the crisis. Even with the initial accusation of a cover-up⁽³⁴⁾ when the crisis went public, drastic action was urgently organized and immediately implemented. National and ministerial committees (comprising various members and experts in both human and animal health) were set up, daily meetings were organized for obtaining up-to-date information ("war room" meetings). The government not only took drastic action to tackle the outbreaks, but was able to pull together necessary resources, such as manpower and budget, to support the policy formulation and implementation processes.

Animal and human health coordination. Senior officials at MoAC and MoPH worked closely and synergistically in administering all the measures being taken to control the outbreaks. They held regular meetings to consult each other in a cordial atmosphere. One of the interviewees at MoPH said that "if it's

animal health, the MoAC will be in charge and we respect what they do" (Interview #8).

Scientific evidence. Scientific evidence on poultry vaccination played an important role in the policy debate. Various aspects of vaccine were mentioned by many key informants: reduction of clinical disease in poultry; viral shedding; mutation and re-assortment.⁽³⁵⁻³⁶⁾ However, different aspects of the vaccine were cited by the people who supported its use and people who were against vaccination. The former said that vaccination would prevent chickens from catching the disease, and thus help prevent humans from catching the disease. They also mentioned that in other countries where vaccination had been used, there was no known human case of catching the virus from healthy poultry; only sick birds were the source of the problem. Therefore, vaccination should be implemented (Interview #16). On the other hand, those who were against vaccination cited another concern about viral shedding, which at that time scientists did not know for certain the amount involved or its consequences.

Budget constraints. Even though 10 percent of the population was expected to fall victim to the virus, in a medium-income country like Thailand, this would be quite impossible in terms of budgeting. The cost of brand name medication was approximately 1,200 baht per treatment course, whereas the cost of locally-made oseltamivir was about one third that of the original. Even coverage of 1 percent of the population with the drug would cost 260 million baht (650,000 treatment courses at 400 baht each), a sizable amount of money, which also might end up with the drug eventually being destroyed, if the stockpile expired before being used. Nevertheless, even with the local production, the budgeting requirement was still enormous.

Risk communication. At the initial stage of the outbreaks, one of the key issues being considered by policymakers was how to communicate the extent of

the crisis to the public so that people would not panic. The government was initially accused of withholding information on the AI outbreak and thus, the manner in which to reveal the difficult situation to the public was a delicate task, to inform the public with accurate information but not to the point of causing panic. A few key informants, the Chairman of the National Committee, a university professor and WHO expert, had mentioned this particular sensitive issue. The Chairman of the National Committee said that the government had to set up a special channel of communication, with the duty to provide accurate information about the day-to-day situation, but at the same time, not cause fear and panic among the people.

Conclusions

For pandemic avian influenza in Thailand, the issue of the policy formulation process for poultry vaccine is a very complex one and politically-driven, involving a number of stakeholders (top politicians, government bureaucrats, academicians, big export businesses and rural people), with potential conflicts of interest, particularly between big chicken exporters and the rural culture of people raising backyard chickens; the former was against use of the vaccine, while the latter was for using the vaccine. The decision-makers for poultry vaccination seemed to put more weight on the economic side of the equation at the expense of the rural community. On the contrary, the policy for stockpiling of antiviral drugs involved two major stakeholders: MoPH which followed WHO recommendations, and the drug industry with budget constraints being a key determinant of how much to stockpile. Others factors contributing to the success or failure of the policy formulation process were: government leadership, budget constraints, animal and human health coordination, scientific evidence and risk communication to the public.

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