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The effects of avian influenza on rural poultry farmers' livelihood

**A case study in Yen Son and
Tan Binh communes - Tam
Diep town - Ninh Binh
province, Vietnam.**

***Vu Thi Thu Hang, Goat and Rabbit Research
Centre, National Institute of Animal
Husbandry, Ha Noi, Vietnam, 2010***

Department of Urban and Rural
Development
Faculty of Natural Resources and
Agriculture Sciences
Swedish University of Agricultural
Sciences



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Vu Thi Thu Hang, Goat and Rabbit Research Centre, National Institute of Animal Husbandry, Ha Noi, Vietnam

Supervisors: Dr. Malin Beckman and Dr Britta Ogle, SLU

Assistant Supervisor: Associate Prof. Le Duc Ngoan, Hue University of Agriculture and Forestry, Vietnam

Examiner: Prof. Adam Pain and Dr Örjan Bartholdson, SLU

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Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agriculture Sciences
Department of Urban and Rural Development
Division of Rural Development

ABSTRACT

The objective of this research was to investigate how HPAI (highly pathogenic avian influenza) shocks and threats affected livelihood assets of poultry farmers. The policies helping poultry farmers to mitigate HPAI at national and local levels and what livelihood strategies did the poultry farmers have in order to accommodate threats and outcomes by avian influenza in Yen Son and Tan Binh communes - Tam Diep town – Ninh Binh province? The study combined both qualitative and quantitative approaches in collecting data and information.

The findings of this study find that poultry production can be considered as important for the livelihoods of rural people in Yen Son and Tan Binh communes. However, avian influenza broke out repeatedly in these two communes in four years of 2004, 2005, 2007 and early 2008. This affected both directly and indirectly, both negatively and positively the poultry farmers' livelihood.

Under the negative effects of avian influenza on poultry farmers' livelihood, the government at national as well as local levels has had the culling programme to reduce the spread of avian influenza. Coupled with the culling programme is a compensation policy for the poultry farmers. According to the ideas of the farmers who kept ducks, the compensation levels of Ninh Binh province in 2004, 2005, and 2007 were too low as compared to the market value, but they agree with the compensation level in 2008. Nevertheless, the farmers who kept the local chicken show that the compensation levels of province in four years were not suitable for their local chicken. In addition, the poultry farmers did not get the compensation money of Ninh Binh province until after 6 months as from their poultry were culled. Despite that, the poultry farmers still reported sick birds to veterinary staffs. Besides, vaccination support policy and training courses have been implemented to help the poultry farmers in these two communes mitigate avian influenza in the long term. It appears that the compensation and vaccination supporting policies can be considered as helping poultry farmers in avian influenza mitigation, but the training courses have not contributed much.

To cope with avian influenza shock in the short term, the poultry farmers get the assistance of both non-family and family network and came with temporary off-farm and non-farm employments such as working for Dong Giao farm, selling vegetable or construction work to earn a income for their living. To respond to avian influenza threats in the future, they have the risk management strategies decisions depending on household specific characteristics for example, many households stop poultry production and change to other activities. Nevertheless, the majority of households restarts poultry production, but makes technical changes and combines poultry production with other activities.

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ACRONYMS

AI	Avian Influenza
HPAI	High Pathogenic Avian Influenza
GSO	General Statistics Office
MARD	Ministry of Agriculture and Rural Development
FAO	Agriculture Organization of the United Nations
CED	Chronic Energy Deficiency
OIE	World Organization for Animal Health
VND	Vietnam Dong
USD	American Dollar

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CHAPTER I: INTRODUCTION

1.1 Background

In recent years, the national economy of Vietnam has grown rapidly. The GDP grew at 7.68 %, during the period of 1991- 2001 and the agricultural sector has grown at the rate of 4.26 percent per year. Agriculture creates employment for 70 % of the national labor force and is considered the backbone of the economy (Que, 2006). In most rural areas, agricultural production is an important income source and it is often the main livelihood of rural households.

Livestock production is one of the important components of agriculture. This sector has expanded strongly, since 1986 at an average rate of 5.7 percent per year, higher than crop and other agricultural service sectors. According to Nguyen, (2006), the value of Vietnam's livestock production reached 25% of the value of Vietnam's agricultural production in 2005. The Vietnamese poultry sector has been growing steadily for the past 20 years at approximately six percent per year prior to 2003 (Weaver, 2009). Its contribution to the national economy is in the order of 0.3 – 1.8 percent of the total GDP (Delquigny *et al.*, 2004). According to Epprecht, (2005 as cited in Hanh *et al.*, 2007) almost 80% of rural households are involved in poultry production through backyard and garden raising, because this is a traditional industry linked with rice cultivation. Connecting crop and animal production, especially with poultry such as chickens and ducks is a common component of mixed farming systems in rural areas, generating an integral part of village life with important social functions. Poultry production generates 5- 10 percent of rural family income or even 80 – 100 percent of total household income. It contributes almost all of the poultry products consumed in the villages (Weaver, 2009). Therefore, poultry production is considered to be very important for rural people (Burgos *et al.*, 2007). It contributes to many livelihood indicators for rural people including income, nutrition, food security, savings and insurance. In terms of income generation and food security, the sale of those poultry and their products (e.g. egg, meat) is important. Through sales, farmers can buy other kinds of food or inputs to produce other types of food (e.g. seed to produce grain). Besides, poultry raising functions as “insurance” in the fight against shocks and stresses, such as crop failures, sickness and deaths. It also has a function as a “saving account” which can be tapped into quickly to meet household needs, such as school fees, wedding costs and funerals. Poultry keeping also contributes to household nutrition, as many poor households rely on their own poultry production to provide the main part of their animal protein consumption. This provides not only protein but also micronutrients such as iron, vitamin A and others that are of crucial importance for health, especially for children (Epprecht *et al.*, 2008). Moreover, poultry keeping is a particularly important means for rural women in terms of income and employment(Weaver, 2009).

However, since 2003, avian flu has affected the bird populations of more than 60 countries in different regions of the world including Africa, Asia, Europe, and the Middle East. Hundreds of millions of poultry have died either directly due to the disease, or been culled by authorities in order to prevent further spread(Hancock & Cho, 2008). Vietnam has been one of the worst affected countries by highly pathogenic

avian influenza (HPAI) or (H5N1). Mainly in the period December 2003 to March 2004, the number of poultry lost through culling and deaths was 58 million equivalent to 17 percent of Vietnam's poultry population. Besides, 27 humans were infected by this disease, and of these, 16 persons died. In this period, 57 provinces, 382 districts and 2592 communes were affected. From April 2004 to November 2004, 80 thousand poultry deaths/ culled poultry and there were 64 human cases (21 fatal). During this period, 670 communes were affected by HPAI. In the third wave during the period December 2004 – September 2005, 2 million poultry were culled and there were two human cases. Avian influenza was detected in 186 districts of 36 provinces during this period (Lung et al., 2006). Despite considerable control efforts by the veterinary department, the AI virus (H5N1) continues to be detected in many communes (Hancock & Cho, 2008).

This illustrates that the avian influenza has caused heavy economic and social losses in Vietnam. Moreover, it has caused losses and threats directly or indirectly to the livelihoods of a large number of rural people in Vietnam.

1.2 Problem statement

From the first outbreak in December 2003 and until now, the avian influenza still occurs in many Vietnamese communes. Avian influenza has had a negative social- economic impact in Vietnam. As many as 58 million poultry have died and been culled and the estimated loss for the nation was around 0.3 – 0.5 percent of GDP in 2004(Delquigny *et al.*, 2004).

Moreover, highly pathogenic avian influenza (HPAI) has caused a big shock for poultry keeping farmers through the direct losses, which are on average from US\$ 70 to 180 per farmer. Even in some cases, the loss is more than US\$2000 per farm (Delquigny *et al.*, 2004). Many households got into debt as they had credits from the bank or others to fund poultry raising (McLeod *et al.*, 2004). Besides, the increased public awareness and fear for HPAI has led to a dramatical drop in the demand and price for poultry products. This causes income losses of about 5- 10 percent for farmers from poultry production (Epprecht *et al.*, 2008). The income loss of farmers can reach 80-100 percent of the total household income if their livelihood depends mainly on poultry production(Delquigny *et al.*, 2004). Rural poor women with few assets and no other animals than poultry are the most vulnerable group to income loss in poultry production and the income loss can have detrimental effect on women's voice both within the household and community (Hancock & Cho, 2008).

HPAI also has a direct impact on food security of households through a reduction in food availability because of the high rate of dead poultry or through food access due to income loss and increased prices of other food (Iannotti, 2009). Besides, HPAI is of concern as it caused illness and death of people. At least 52 Vietnamese died by this from 2003 to 2008(Vu, 2009).

In Vietnam, poultry products have a cultural significance and they are commonly used as gifts on special occasions and are especially important during the Tet holidays. The loss of poultry production can lead to losses in social capital by families unable to adhere to social norms(Weaver, 2009).

HPAI not only causes loss to producers but also to traders, intermediaries and feed companies. According to Hall *et al.*,(2006), the traders and market sellers experienced an average 40% reduction of their income during HPAI crises. The companies would also sell less feed products as the demand for poultry feed dropped 60 – 70 percent (Otte *et al.*, 2008).

This suggests that avian influenza has a wide-ranging impact on the livelihoods of millions of people involved in producing, processing and selling poultry as well as food safety and ultimately public health.

A lot of research has been carried out about HPAI. Most of the research has been epidemiological, concentrating on the prevention of the infection both among poultry, and from poultry to humans (Morris *et al.*, 2005; Nguyen *et al.*, 2007; Nguyen, 2008). There have also been many economic studies, which focused on the social – economic impact of HPAI (Delquigny *et al.*, 2004; GSO, 2004; Van Luc *et al.*, 2007). There have been several studies on HPAI- related policies for control and management (Vu, 2009; Weaver, 2009). However, less attention has been paid to the effects of HPAI on rural people livelihoods. Therefore, from that context this study focused on the effects of avian influenza on the rural poultry keeping farmers' livelihoods.

1.3 Objective: The main objective of this study is to identify and understand the effect of avian influenza on poultry keeping farmer's livelihood in the study communes.

1.4 Research questions: In order to achieve the research objective, this research is designed to answer the main research question: How were the livelihoods of poultry farmers affected by highly pathogenic avian influenza (HPAI) in the study communes.

Specific research questions

- 1- How do HPAI outbreaks and threats affect livelihood assets of different groups of poultry keeping farmers?
- 2- What institutions help the farmers to mitigate HPAI at national and local levels? How do farmers in different groups access such institutions?
- 3-What livelihood strategies do the farmers in different groups have in order to accommodate threats and outcomes by HPAI outbreaks?

1.5 Delimitation of the study:

This study is based on the Sustainable Livelihoods framework to identify and understand the effects of avian influenza on rural poultry farmers' livelihood in the case study site. The discussion in this study would benefit from a deeper investigation into all five livelihood assets in order to provide more understanding about the effect of AI on poultry farmers' livelihood assets status. However, as the study time was limited, this study focused on investigating into the effects of AI on three assets, the financial assets, human assets, and social assets. It can be also interesting to understand the effect of avian influenza on gender but it is too broad to cover in this study.

1.6. Structure of thesis

This thesis includes seven chapters. The first is an introduction where the readers can see the reasons why the study issue was selected for the research, research objective and questions. The second chapter is a literature review that summarizes previous and related studies around the effect of avian influenza on poultry farmers' livelihood. The third chapter introduces the poultry production situation and history of avian influenza outbreaks in Vietnam. The fourth is on methodology and presents the approach periods, and methods used to collect and analyze the data. The fifth chapter depicts the research site. The most important chapter is chapter six with findings and discussions around the effect of avian influenza on poultry farmers' livelihood in the case study site. Chapter seven gives the main conclusions from the study.

CHAPTER II. LITERATURE REVIEW

This chapter reviews the current debates and related studies in the world and Vietnam on the effects of avian influenza on poultry farmers' livelihood, policies mitigating avian influenza, and livelihood strategies

2.1. The effects of avian influenza on poultry farmers' livelihood

2.1.1. Livelihood and sustainable livelihood

Livelihood thinking comes back to the work of Robert Chambers in the mid-1980s, when Chambers developed the idea of “sustainable livelihood” with the aim to enhance the efficiency of development cooperation. His concepts formulated the basis for the Sustainable Livelihood Approach. In 1997, SLA was expanded by the British Department for International Development (DFID), to become a core of its strategy for pro-poor policy (Kollmair, 2002). Today, various agencies (such as DFID, CARE, Oxfam and UNDP) are using sustainable livelihood approaches for poverty elimination in their programmes. The basic approach principles implemented by the different agencies are similar (Krantz, 2001).

There are many “sustainable livelihood” definitions but the one based on the work of Chambers and Conway (1992), is the most often cited. Chambers and Conway suggest that “*A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation*” (Chambers and Conway, 1992, as cited in Solesbury, 2003).

The Sustainable Livelihood Approach (SLA) puts people at the centre of development. It draws on the factors that affect the people's livelihood and the typical relationships among these factors (DFID, 1999). SLA has two main components including the framework and a set of principles to guide action. The sustainable livelihood framework helps us understanding and analysing the opportunities and constraints that affect people's livelihoods (DFID, 1999). Therefore, the literature review chapter uses the sustainable livelihood framework for understanding the effects of avian influenza on poultry farmer's livelihood.

The framework consists of four elements: A vulnerability context, an asset pentagon, transforming structures and processes, and livelihood strategies. The framework shows that these four inter-related elements contribute to livelihood outcome (Oparinde & Birol, No Date).

A vulnerability context is defined as the external environment of risk in which households/ individual exists (DFID, 1999). At present, poultry keeping farmers in the world as well as in Vietnam face more vulnerability by avian influenza shocks and threats.

2.1.2 Avian influenza

Avian influenza was first reported in its highly pathogenic form (HPAI) in poultry on a small farm in Scotland, UK in 1959 (Capua & Alexander, 2004). HPAI caused by the current H5N1 virus was recognized

in Southeast Asian countries in late 2003. From 2003 forward, the disease spread widely through East and South Asia in 2004 - 2006, then into Mongolia, Southern Russia, and the Middle East and to Europe, Africa, and South Asia in 2005-2006. In 2007, avian influenza outbreaks re-occurred in many different countries (Capua & Alexander, 2004). To date, 60 countries have reported outbreaks of HPAI in domestic poultry (Otte *et al.*, 2008). On a global scale, it is estimated that during 2003-2005, more than 250 million poultry died and were culled as a result of avian influenza and this caused socio-economic damage in affected countries (Ortu *et al.*, 2008). Poultry industries have been hit badly both through direct losses and through a fall in prices due to the drop in consumer confidence (Hancock & Cho, 2008). Moreover, avian influenza outbreaks caused the large losses for poultry farmers. Their livelihoods became vulnerable when they were unable to recover from the direct or indirect shocks associated with HPAI and control measures, and they fall into poverty (Miers, 2008a).

HPAI was first recognized in Vietnam in mid- 2003 and the country has experienced three big waves of outbreaks. Now, the avian influenza (AI) disease is endemic among the Vietnamese poultry population and migratory birds can transport the disease to and from other regions. This factor among others has made Vietnam a key country where HPAI should be monitored.

In 2000, the European Union Scientific Committee on Animal Health and Animal Welfare (EU SCAHAW) defined avian influenza as: “an infection of poultry caused by either any influenza A virus that has an intravenous pathogenicity index in 6-week-old chickens greater than 1.2 or any influenza A virus of H5 or H7 Subtype”(Capua & Alexander, 2004)

WHO simply defines AI as follows “Pathogenic avian influenza caused by the H5N1 virus, affects many species of birds. The virus mutated to a highly pathogenic form that can kill poultry within 48 hours, with a mortality reaching 100%. The virus crossed the species barrier to infect humans, with a high rate of mortality” (WHO, 2005)

In order to assess the effects of avian influenza shocks or threats on poultry farmer’s livelihood, it is necessary to begin with analysis the effects of avian influenza on poultry farmers’ livelihood assets. The issue of gender equality will be looked at briefly.

2.1.3 The effects of avian influenza on poultry farmers’ livelihood capital and gender equality

2.1.3.1 The effect of avian influenza on financial capital

Large –scale farms/ commercial farms

Large-scale farmers/commercial farmers involved in poultry production are often highly dependent on this income and have few other income opportunities. A high 60 – 100 percent of their income is derived from poultry production. In addition, they invest most of their capital in this (Dolberg *et al.*, 2005). The assessments below of the direct on-farm loss resulting from the rate of death of poultry due to HPAI outbreaks and culling illustrate that large - scale farms and commercial farms endured significantly great losses.

The study by GSO, (2004) in Vietnam on 343 farms with flock sizes from 151 to 2000 birds, that were culled with an estimated average loss per farm of US\$ 1702. The income loss was 80-100 percent of the total of the household income (Delquigny *et al.*, 2004). Vétérinaires Sans Frontières (VSF) as cited in Otte *et al.*, (2008) who studied 17 commercial chicken farms in Cambodia found that prior to avian influenza outbreaks, the average income of commercial chicken farms was US\$2170 per month. Six farms were infected in the avian influenza outbreak. These farms did not generate income from poultry production for at least two months. The income of non-infected farms also dropped considerably to a minimum of about US\$ 700 per farm during avian influenza outbreak.

A survey result by Alam *et al.*, (2008) in Bangladesh concluded that avian influenza caused the great loss for large - scale chicken farms, the farms was estimated at least loss value of US\$ 54 and the farms lost at the highest value of US\$ 12304

Traditional, extensive backyard poultry production or small - scale poultry keeping

Poultry production in these systems is generally not the main household income generation activity. Otte *et al.*, (2008) argue that in developing countries, which have such systems; poultry is an important supply of protein and have a social value. The cash input costs are limited and products are used for subsistence. However, poultry can be converted into cash in case of emergency needs such as food, fuel, healthcare, medicine, funerals, education, clothing, pocket money, festivities. Thus, it has several functions as 'insurance' or 'savings account' for household (Otte *et al.*, 2008). The avian influenza outbreak caused the losses of small "insurance" or "saving accounts" for small- scale farmers(Otte *et al.*, 2008). The quantified economic losses in monetary terms are estimated as follows:

In Vietnam, a survey conducted by GSO (2004) showed that the direct loss in 109 villages where backyard producers had flock sizes smaller than 50 poultry, was more than one million VND per farm, equivalent to US\$ 69. Roland-Holst *et al.*, (2007b) estimated that in poor poultry keeping households, the income loss was less than 10 percent of total income. Van Luc *et al.*, (2007) concluded that traditional small farmers in Vietnam would lose on average 3 percent of their total income.

The avian influenza can transmit to humans. The worry among consumers also meant that consumer demand for poultry products reduced during and after avian influenza outbreaks. As a result, the income loss of the farmers from poultry keeping was not only affected directly through mortality by avian influenza, but also reduced because of less consumer demand for poultry products.

A study by Burgos *et al.*, (No date) in Cambodia showed that the prices of poultry products dropped 75 percent and people reduced their consumption of poultry by 80 to 90 percent. In Vietnam, the price of poultry products were 50 percent less than prior to avian influenza outbreaks and people were afraid of avian influenza being transmitted to them. 50 percent of consumers avoided meat and eggs of birds during avian influenza outbreaks (Otte *et al.*, 2008). Also in Indonesia, during the avian influenza outbreak in 2005, almost 50% of the respondents changed eating habits and the price of poultry products decreased by 50 percent (Dolberg *et al.*, 2005). There were many other studies such as Yalcin *et al.*, (2006) in Turkey; Alam

et al., (2008) in Bangladesh; and Ibrahim *et al.*, (2007) in Egypt who also concluded that avian influenza outbreaks caused decreases in poultry prices and in the demand of consumers for meat and eggs of birds.

2.1.3.2 The effect of avian influenza on human capital

Poultry products as a source of food are very important. They contribute to a well balanced diet for people, and they are especially important for children, the elderly and pregnant women. As poultry products contribute vitamin A, Iron, Zinc and vitamin B12, they are very significant for growth and development of humans (Iannotti, 2009). Iannotti, (2009) suggests that HPAI can have the negative impact on human health due to its influence on nutrition. For example, qualitative observations by Ahuja *et al.*, (2009) in West Bengal suggest that avian influenza outbreaks have a negative impact on protein consumption among children who missed eggs from their routine diet at home as well as from mid-day meals at school. Besides, the income loss for farmers and the price increase on other foods caused many farmers, especially poor households to decrease expenditure on animal source protein and buy cheaper, but less valuable vegetable proteins (Miers, 2008b).

Owners of affected flocks can mitigate direct disease loss by consuming or selling sick or dead poultry. According to a survey by Phan *et al.*, (2007) at 25 small-scale farms that experienced HPAI (H5N1) in Vietnam, they found that 68 percent of these sold and/or ate dead poultry. Allen, (2004) also showed that when 14000 layer flocks were infected HPAI in Pekalongan District of Indonesia in August 2003, 5000 birds died and another 7000 were still sold to contain losses. In Sukabumi district of Indonesia, a farm with 100000 birds, of which 80 percent of the quail were infected by HPAI, all were gotten rid of by boiling and selling in the market. In Nigeria, reportedly dead poultry were also sold to decrease losses (Nigeria, 2006). In Cambodia, the farmers ate infected poultry to reduce loss (Burgos *et al.*, No date). In many cases in Vietnam and Afghanistan, the poultry keepers have eaten their birds in anticipation of the arrival of government culling teams (FAO, 2006). Handling sick birds and meat in preparation carries high risks and it associated with a case of human death from HPAI (FAO, 2006).

This suggests that the people's awareness of the dangers of HPAI is very low. The confirmed number of human cases reported to the WHO since the end of 2003 has increased to 121 in Southeast Asian countries, of whom just over half have died. In Cambodia four people were infected, and all died. In Indonesia, there were seven cases with four deaths. In Thailand, 19 cases and 13 who died. Meanwhile, 91 people were infected, of whom 41 people died in Vietnam (Shocks, 2005).

HPAI outbreaks also caused unemployment for many laborers. For example, in Nigeria, on commercially-oriented farms that experienced HPAI outbreaks, 80 percent of the workers of these farms were still unemployed several months after HPAI was recorded (Nigeria, 2006). One farm reported that the number of workers was reduced because of lower revenue. Some poultry farms did not decrease the number of workers, but reduced the salaries (Obayelu, 2007). In Indonesia, the survey by Pratt & Falconi, (2007) reported that 23 percent of the permanent poultry worker- forces lost their job and 40 percent of families were unable to continue to work with poultry because the farms were shut down permanently. According to FAO, (2006) in Iraq, large commercial producers lost income from the reduced demand of consumers,

therefore unemployment occurred. Only 10 percent of the semi- commercial farms have continued the operation after HPAI outbreaks.

Alemu (No date) and Omiti & Okuthe, (No date), concluded that most of the people working in the poultry sector are likely to come from primary and secondary education. Avian influenza outbreaks can render them unemployment very quickly as the economy exhibits little employability for this group. Therefore, labor forces in this sector usually find the jobs which require little education and these jobs generate less income than poultry production (Miers, 2008a). For instance, in Cambodia, many workers, medium and large - scale farmers in poultry production were unemployed by HPAI. They changed their labor patterns to for example selling rice cakes in markets or doing construction work, or migrate to cities where they could find better paid employment (Burgos *et al.*, No date). In Lao, peoples' working day was lengthened as they turned to alternative income earning strategies such as fishing, collecting insects and vegetables from forests and gardens (Miers, 2008a). Women in Egypt, who are the main owners and managers of backyard poultry, are poorly integrated into the labor market, and are greatly dependent on poultry production and petty trade as income sources. These women found it difficult to find alternative employment after HPAI outbreaks. Only a few found other works such as selling milk and vegetables, seasonal labor and domestic work (Miers, 2008a).

2.1.3.3 The effect of avian influenza on social capital

Social capital, both family and non-family networks can help poor households to bear HPAI shocks. Burgos *et al.*, (No date) showed that in Cambodia, the poor farmers might receive one or two chickens from relatives or neighbors to help them in reinvesting poultry production after losing their flock to HPAI or culling. Large-scale farmers or better-off farmers who fell into debt after the HPAI crisis received assistance from relatives working abroad or in cities. Producers can also draw on social capital to get knowledge of new improved production techniques. In Cambodia, for example, relationships between new and experienced duck producers were found to be important. Experienced producers support technical to new producers, especially in areas of feed, vaccination and medicine (Burgos *et al.*, No date).

Many references illustrate the role of poultry, especially traditional breeds, in cultural and religious ceremonies and festivities. In Kenya, for example, local chickens and ducks play an integral role in the local religion and culture (Omiti & Okuthe, No date). In Egypt, eggs are a valued product during religious festivities such as the Islamic festivals of Ramadan and Sham El Nesim – Spring Day – when painted eggs represent the renewal of life and the Christian festival of Easter which Copts also celebrate with eggs. Research from Egypt also lists other ceremonies when poultry meat and eggs are used: weddings; births, deaths and for sickness (Miers, 2008a). In Vietnam, poultry products have cultural significance and are commonly used as gifts on special occasions and are particularly important during the Tet holiday (Weaver, 2009). Therefore, Weaver argues that poultry loss caused by avian influenza may lead to losses in social capital by families unable to adhere to social norms or to a perceived loss of face by the individual, either of which can in the worst cases, lead to problems of social exclusion.

2.1.3.4 The effect of avian influenza on gender equality

Poultry production has an important role for women, especially rural women in terms of income as well as employment. The research by Ahuja *et al.*, (2009) in West Bengal showed that women contribute 90 percent of the labor in poultry keeping. Through poultry keeping, the women can develop their entrepreneurial capacities. This enterprise strengthens the self-esteem and self-confidence among women poultry farmers. Many of them were also beginning to get market oriented and small income has ensured independence in taking decisions on its utilization. This has contributed to their position and status within the household and as a result, their husbands would pay attention to their opinions.

In Kenya, according to Omiti & Okuthe, (No date), the women are the main decision makers on poultry production by virtue of their control of poultry assets and they control most of the income from eggs and live poultry. Men mostly own other livestock including cattle, sheep, and goat. In Vietnam also, the women control decisions on the day-to-day maintenance of small flocks, sell poultry products in markets and control income from this but larger decisions involving larger capital investment, such as investment in caging, are normally made by the male head of household(Weaver, 2009). A study in West Bengal where avian influenza outbreaks caused the sudden loss of income and job of women, suggested that their self-confidence had taken a beating. The women poultry keepers lost their birds but also their bargaining power within the household (Ahuja *et al.*, 2009).

In sum, avian influenza outbreaks negatively affected poultry farmer's livelihoods, through the loss of bird, capital and income loss and loss of markets. Moreover, HPAI can increase loss of human capital in the future due to its influence on nutrition and being infected by avian influenza. In addition, it increased the rate of unemployment for many labours involved in poultry production especially women. Avian influenza outbreak affected the cultural character of countries where poultry products have an important role in cultural and religious ceremonies and festivities and so on. In other words, avian influenza outbreaks affected economy, society as well as human life.

In the vulnerability context by avian influenza shocks and threats, it is therefore important to review what policies of government in affected countries can help the farmers in HPAI mitigation.

2.2. The policies that mitigate avian influenza

Generally, the countries where have had avian influenza outbreaks have used culling, vaccine, compensation and credit as the control tools.

2.2.1. The compensation policy

According to Pratt & Falconi, (2007) avian influenza culling programs must be coupled with a compensation scheme to pay poultry farmers a specified sum for infected poultry in stock that died and had to be culled. If farmers received the compensation, they were more likely to report infected birds rather than sell them to cut their losses when influenza symptoms occur. Therefore, the compensation played a critical role in the control strategies for avian influenza, as it provided an incentive to the producers to report suspected disease outbreaks and comply with culling actions. This will reduce the time lag between an outbreak and containment actions (Delgado *et al.*, 2006).

The question though has been raised as to what percentage of a bird's market price farmers should be paid? According to Delgado *et al.*, (2006) the compensation rates should be no less than 50 percent of the reference market value at farm gate and no more than 100 percent. In dealing with small farmers in developing countries, the compensation should be paid within 24 hours of culling cash. If there are any delays, this is likely to have an important effect on reporting. Moreover, the Government prestige is another main issue in the successful implementation of compensation policies. In some countries the government's inability to effectively operate the program lead to that many farmers were uncompensated, and the plan did not succeed (Pratt & Falconi, 2007).

Thailand represents a situation of high disease incidence where they have had a strong policy response (Otte *et al.*, 2008). The Governmental of Thailand had paid producers 75 percent of the market value of their poultry loss (stocks that died or have been culled). Particularly, during the first HPAI outbreak the producers received the compensation with level as 100 percent of the market value. In all, 400,000 producers received compensation for 60 million birds (Pratt & Falconi, 2007). Japan's HPAI control and containment system were very efficient in terms of avoiding avian influenza outbreaks during the 2003-2004 outbreaks. The government paid farmers 80 percent of the estimated commercial value of the 275,000 birds that died or were culled and 50 percent of the cost of contaminant disposal at the infected premises. It also paid 50 percent of the lost revenues from and/or storage costs for eggs that could not be shipped from farms in the infection zone (Pratt & Falconi, 2007).

Laos and Cambodia illustrate the case of low incidence, and these countries have constrained budgets. So, these countries did not have any compensation scheme. However, Cambodia explicitly announced that there was no government policy provision for such a mechanism; instead the government provided veterinary support and technical to poultry farmers (Burgos *et al.*, No date). Indonesia may illustrate the case of high incident, but whose compensation system targeted only small farmers and the authorities delivered such aid to only 1,068 producers between February and August 2004. Those who received aid, got only 18 percent of the market price of their lost stock (Delgado *et al.*, 2006). This is similar to what happened in Vietnam, where at the begging, producers received just a small percentage of their lost stock's market value, and small farmers had major difficulties to access to the compensation (Delgado *et al.*, 2006).

2.2.2. Vaccination supporting policy

Experience in Asian and other regions show that vaccines can be employed successfully to assist in mitigating HPAI virus (Dolberg *et al.*, 2005). Therefore, vaccination support policies also have been carried out in many countries in the world to control HPAI.

Indonesia was one of the countries that choose vaccination as an avian influenza control strategy. The government purchased the vaccine and distributed it free to small- scale production and they have small cost to large-scale production (Delgado *et al.*,2006). However, small- scale production had difficulties to access this (Sumiarto & Arifin, no date). Besides, some small – scale farmers expressed scepticism concerning the free vaccination and asked who would be responsible if inappropriate vaccine was used and thus there

were farmers, who refused to use vaccine offered by the government and they decided not to vaccinate their chickens (Dolberg *et al.*, 2005).

Vietnam did not use vaccination in the early months of the outbreaks, but then changed course when the virus proved difficult to contain. The Vietnamese Government had free vaccination policy for small scale farmers (Delgado *et al.*, 2006). Tuan Dinh *et al.* (2005 cited in Pratt & Falconi, 2007) related that the Vietnamese government purchased 380 million doses of vaccine at an estimated cost of US\$ 22 million for an entire year. China was one of the countries in the region that selected mass vaccination as a control strategy (Delgado *et al.*, 2006).

Thailand is an exporting country, therefore it had prohibited the vaccination use. Japan did not use vaccination for HPAI control, although there were provisions for strategic vaccination in case the prompt destruction of birds had become difficult due to continuous avian influenza outbreaks. A total of 320 million doses of vaccine were immediately imported, in case of emergency, during the outbreak examined here (Pratt & Falconi, 2007). Vaccination is still considered as a potential future option in Cambodia (Dolberg *et al.*, 2005).

2.2.3. Access to credit

The access to credit of poultry farmers is also one of the tools which help poultry farmers to alleviate the impact of avian influenza. A study by Dolberg *et al.*, (2005) in southeast asian countries such as Vietnam, Indonesia, Lao PRD and Cambodia, had a focus on the access to credit of poultry farmers who experienced avian influenza outbreak in order to re-start poultry production. This study showed that in Vietnam, the government and the State Bank of Vietnam decided on special conditions for Agriculture and Rural Development to apply to avian influenza - affected farms. That decision included short terms loans to be rescheduled to 12 months and medium and long term loans to be extended by a period comparable to half of their terms. The amount of loan without collaterals increased from the US \$ 2000 to US \$ 3300. According to Dolberge *et al.*, however, there was a gap between these decisions and what the farmers actually experienced as the reduction in access to loans of formal sector was quite marked. Thus, poultry farmers were pushed to use private money lenders to a greater degree than before the crisis. In fact, all categories of poultry farms had to resort to private lending to some degree.

Meanwhile, in Indonesia the government prepared two credit schemes including the Food Security Credit. For poultry farmers, it was estimated about Rupia 15,000,000 (UD\$ 1,667) and the Credit for Micro and Business Enterprises, equivalent to Rupia 50,000,000 (US\$ 5,556). The interest rates are 10 and 15 percents, respectively (Dolberg *et al.*, 2005). In contrast, the access to credit through a modern banking system is scarce in Cambodia. There were 88 percent of the village and backyard farmers and 42% of the commercial farmers who did not use credit for poultry production. For some poultry farmers who did obtain credit, the neighbors and relatives were important sources of loan for the village and backyard farmers. The neighbors were also important for the commercial farmers (Dolberg *et al.*, 2005). Moreover, In Lao PDR, the poultry farmers in the village did not access credit, but the commercial farms could access credit and loans through banks, neighbors and companies. Due to debts, it will be difficult for many broiler farms to re-start

production after the avian influenza. In other words, the report implies that the government did not apply any debt cancellation policy in Lao PDR (Dolberg *et al.*, 2005).

Dolberg *et al.*, (2005) gave two conclusions in their study as follows: the first, the poultry farmers have a strong demand for credit on subsidized interest rates. The second, the poultry farmers is difficult to access credit and loan through the bank channels and they depend much on private money market for restarting poultry production.

In summary, most countries with avian influenza outbreaks have the policies to help poultry farmers mitigating HPAI. The country has either compensation policy or vaccination policy or both in order to control avian influenza. As mentioned above, Thailand and Japan were evaluated to have the the most generous compensation implementation because the compensation level is high, about 50 – 100 percent of the market value. Vietnam and Indonesia are the most affected countries by avian influenza. Two these countries have both compensation and vaccination policies that control HPAI. Otte *et al* (2008) concluded that policy response of Indonesia is weak. Besides, Otte *et al* (2008) also indicated that policy response of Vietnam is strong, it is seen that their conclusion is contradictory to the above analyses. Laos and Cambodia have budget constraints, thus these two countries did not have policies to help poultry farmers in HPAI reduction. A study by Dolberg *et al.*, (2005) about the access to credit of poultry farmers in southern Asian countries showed that most poultry farmers had difficulties in finance access to restart poultry keeping after avian influenza outbreaks. Through this, it was clear that whether such policies implementation can help poultry farmers mitigating avian influenza outbreak, it depends greatly on the Government prestige.

To respond to the effects of avian influenza shocks and threats, what livelihood strategies did poultry farmers have in order to achieve more income, reduce vulnerability, reduce poverty and improve food security?

2.3. Livelihood strategies

According to Ellis, (2000) Livelihood strategies are composed of activities that create the means of household survival. Two salient challenges for the world's rural people are risk and vulnerability. In response to these, rural people have developed strategies for (ex ante) risk management, and (ex post) risk coping (Roland-Holst *et al.*, 2007a). Risk management is generally incorporated into long run production practices, while risk coping is a short run response to adversity (Roland-Holst *et al.*, 2007a).

2.3.1 Coping strategies

At present, the poultry farmers are vulnerable to losses caused by avian influenza outbreaks and threats. As shown in the discussion above, the HPAI virus results in high mortality to poultry flocks. Direct and immediate effect of HPAI outbreaks in poultry flocks result from the loss of current value of poultry which died or were culled and the loss of foregone income from poultry keeping during the stop of poultry production.

Under the direct and immediate phase of avian influenza outbreak, what coping strategies do poultry farmers have in order to ensure the survival during periods of intensive insecurity? The study by Ahuja *et*

al., (2009) in West Bengal suggests that the women in poultry production households tried to cope with the immediately reduction in ready cash due to avian influenza outbreaks through reducing expenditure on food items. For example, some households used substitutions of normal grain with poorer quality grain, and reduced the quantity of somewhat expensive food items such as pulses or potatoes. A review by Miers (2008a) shows that in Egypt, the female producers claimed that they removed their children from school. Meanwhile, other women accepted a low-income level and relied on husband's salaries or transfers. In Nigeria, the poultry farmers were forced to take loans to cover household expenditure after an HPAI outbreak. Ethiopian producers would cope with an HPAI outbreak by reducing non-essential expenditure whilst not foregoing staple food purchase.

In Vietnam, to cope with the loss by avian influenza, many households have reduced the expenditure on their children's education (Dolberg *et al.*, 2005). However, the study by Tamura & Sawada, (2008) in Vietnam showed that the poultry farmers have five ways of risk coping with avian influenza including: Firstly, households can decrease unnecessary consumption expenditure while maintaining a necessary consumption level, such as a minimum calorie or nutrition intake. Secondly, households may use credit to make consumption flexible by reallocating future resources to today's consumption. Thirdly, households can use financial and physical assets as a precautionary device to cope with unexpected income loss. Fourthly, additional adult or child labor incomes through labor market participation are often utilized as a risk-coping tool. In other words, the returns to human capital may be used as a risk-coping tool. Finally, getting emergency private and/or public transfers is a way of risk coping.

2.3.2 Risk management strategies

According to Roland-Holst *et al.*, (2007a) food security and income is main purpose for the poultry farmers. Thus, in order to ensure food security and have income in the future, what risk management strategies do the poultry farmers have? Risk management decisions can constitute longer term asset (dis)investments such as investment in bio-security, training in bio-secure poultry production, diversifying into other agricultural activities (e.g., crop production or other livestock rearing), or migration (Oparinde & Birol, No Date). Dolberg *et al.*, (2005) showed that after the avian influenza outbreak, in Indonesia, 59% of layer farmers and 91% of broiler farmers drew on their savings and some went into trade. In Lao PDR, the surveyed farms predominantly entered into fish farming, followed by cattle and pig production.

Roland-Holst *et al.*, (2007a) suggest that in rural areas in Vietnam, the poultry farmers can mix three risk management strategies: product diversification, investment in product quality (bio-safety), and development of non-farm income opportunities, to mitigate the adverse effects of significant animal disease risk. Besides, they also argued that the development of non-farmers income is an important component of risk management strategies. However, the development of non-farm income in rural areas is not easy because a large proportion of rural households are in a "corner alternative" with zero initial non-farm income. Therefore, agricultural diversification, which promotes a broader array of / increase in farm income source, is a higher priority. The farmers diversify in terms of variety and seasonality.

Moreover, Roland-Holst *et al.*, (2007a), discussed that the coping strategies and risk management have interaction. Since, risk management may offset the need for risk coping, and risk coping strategies can consist of adoption of new management practices. An example of the linkage between risk coping and risk management strategies was the lack of private as well as public risk management experiences in 2004 with disproportioned culling operations that led to risk coping was responses among farmers such as non-reporting, stock concealment, illicit marketing

The idea by Oparinde & Birol, (No Date) showed that the decisions of coping strategies and risk management strategies depend on many factors that including: the first, household specific characteristics consists of household asset portfolio, household's risk perceptions. The second, the institutional context is the disease control policy including surveillance in live bird markets, compensation schemes, bio-security requirements. The third, other public interventions include subsidies for strengthening of bio-security, extension services of training in bio-secure poultry production, and other alternative livelihoods activities. Finally, private sector services are availability of credit.

To summarize

As reviewed above, avian influenza occurred in many countries in the world and killed multimillions of poultry. Livelihoods of poultry farmers are negatively affected by avian influenza outbreaks. Under such effects of avian influenza, the government of affected countries have policies such as compensation, vaccination supporting or credit policies to help poultry farmers in HPAI mitigation. Whether the implementations of these policies help poultry farmers to mitigate avian influenza outbreaks depends greatly on the Government prestige. The great challenge of poultry farmers is disease risk especially avian influenza. To respond to this, poultry farmers have developed coping and risk management strategies. However, coping and risk management strategies decisions depend on many factors such as household specific characteristics, institutional context, public interventions and private sector services.

CHAPTER III. POULTRY PRODUCTION AND AVIAN INFLUENZA IN VIETNAM

This chapter introduces the background of poultry production in Vietnam. Poultry production has experienced many waves of avian influenza outbreaks. The outbreaks of avian influenza affected economy, society and humans as well.

3.1. Poultry production in Vietnam

3.1.1 Overview poultry production in Vietnam

Vietnam is an agricultural country with nearly 80 million people, of which 70% live in rural areas. At present, 8 million households in the whole country keep poultry. Poultry production is an integral part of the integrated crop-livestock farming system practiced by most rural households in Viet Nam (Desvaux *et al.*, 2008). In terms of the national level, poultry production was ranked the second after pig production (Desvaux & Vu, 2008). In terms of the global level, Vietnam chicken meat production was ranked in the 35th and its egg output is in the 31st in the global position¹.

Poultry population

The poultry industry in Vietnam has a large number of poultry heads. In 2003, poultry heads amounted to over 250 millions. Meanwhile, in 2005 poultry population was 219 million poultry, among them 73 percent of total poultry were chickens and 27 percent of total were ducks and other waterfowls (geese, Muscovy duck). Other poultry species include pigeons, quails, etc. However, Chicken and Duck are the main poultry species that were kept in Vietnam (Lung *et al.*, 2006). In 2006, the poultry population was estimated around 214 million (Desvaux & Vu, 2008).

Distribution of poultry population

In Vietnam, poultry are concentrated in the rural areas and the regions near urban centres (Lung *et al.*, 2006). In 2005, 68 percent of the whole herd size was found in the North and 32 percent of total flock size was found in the South (Lung *et al.*, 2006). Tung & Costales, (2007) showed that a higher proportion of households were engaged in poultry production in the northern than in the southern regions of Viet Nam. In the North, between 75 and 90 percent of households in many communes keep poultry, some communes even have more than 90 percent of poultry keeping households. Besides, the two large delta regions of the Red River delta in the North and Mekong River delta in the South are the agro- ecological regions with the highest population of poultry in the country (Desvaux & Vu, 2008). In 2006, the average poultry density of Vietnam was around 650 heads per square kilometer. While, in Red River Delta region, the poultry density was about 4000 heads per square kilometer however, the Mekong River Delta region, poultry density was about 900 heads per square kilometer. The Northwest and Central highland regions have the lowest poultry density, standing at 218 and 148 heads per square kilometer respectively(Desvaux & Vu, 2008)

¹ http://agro.gov.vn/news/newsDetail.asp?targetID=3044&CAT_ID= accessed 15/3/2010

Poultry production systems

The criteria for identifying poultry production systems in Vietnam have not been established by the Vietnamese Ministry of Agriculture and Rural Development (MARD). However, the definition sectors presented below is all formed from the following references: Sonaiya, (2007), the Food and Agriculture Organization of the United Nations (FAO,2004 cited in Hanh *et al.*, 2007) and Hanh *et al.*, (2007). Poultry production systems can be divided into groups according to scale, market access, income contribution of poultry production as follows:

Sector 1: Large- scale production

Large- scale productions in Viet Nam are modeled on modern industrial poultry systems found in OECD countries. They have emerged over the last 10 years in Viet Nam and there are now 2,837 large-scale farms. The breeds kept in this production system are exotic breeds or local breeds or crossbreeds with herd sizes of 2000 birds or above. The producers in this sector have strong economic associations with the supermarkets, other large distribution points, and the intermediaries for selling their birds/products. With flock sizes of 2000 birds and above, they not only use household labour but also employ labour outside the farm. The purpose of this production system is to sell and it contributes to approximately 80-100 percent of the total household income. The breeding stocks are supplied by breeding plants or formal breed centers. This sector currently produces 10 percent of Vietnam's poultry.

Sector 2: Medium- scale production

The flock size in this sector is 200 – below 2000 birds. This system combines traditional practices with improved technology. Market outlet in this includes farm gate sales to the intermediaries, the local markets, and the central markets, and sometimes they contact with larger trading firms such as supermarket. Poultry production often provides employment for farm labour. The major purpose of poultry production is to sell. Therefore, it shares 50 – 100 percent of the total household income. The breeds were raised in this system such as local breed, exotic imported breeds, and crossbreeds. The breeding stock is provided by breed plants, formal breed centre or locally.

This sector has expanded since the onset of the economic reform period, particularly in the late 1990's. There were 25 percent of farm households involving in this mode of poultry production in 2006. Together 20 percent of Vietnam's poultry was kept under this production system.

Sector 3: Small- scale production

This sector is the most common production system in Vietnam. Small- scale productions have flock size of below 200. Market outlet of this production system includes farm gate sales and the local market sales. The main purpose of this system is both sale and home consumption. Therefore, poultry production shares 5 – 10 percent of total household income; even it can also contribute 25 percent of total household income. The breeds kept in this system are local breeds and the breeding stock is provided by on-farm. Women, children, the elderly and the disable take care of poultry in this system. Overall, 65 percent of households are engaged in traditional extensive poultry production. A high 70 – 75 percent of the country poultry population is kept under this production system.

3.1.2 The socio economic role of poultry in Vietnam

Poultry production in Vietnam has strong potential for development particularly due to continuing increase in domestic demand for poultry products. Producers have proved in the last few years that they could strongly develop their activity to comply with the market's needs (Delquigny *et al.*, 2004). In the three years before the avian influenza outbreaks began in late 2003, poultry population's growth rate of Vietnam was 8.6% per year, with the chicken population increasing by 8.3%, and the duck and waterfowl population increasing by 9.4%. Poultry production met 286 thousand metric ton of meat in 2000; 322.6 thousand metric ton in 2001; and 388.4 thousand metric ton in 2002 for domestic demand. It also provided 3.7 billion eggs in 2000; 4.16 billion eggs in 2001 and 4.53 billion eggs in 2002 for domestic consumer (Nguyen, 2006). Besides, Vietnam also exported a small quantity of live poultry to neighboring countries such as Laos, Cambodia and Myanmar (Table 3.1)

Table 3.1: Vietnam's live poultry export value

Item		2000	2001	2002	2003	2004	2005
Live poultry (HS 0105)	In USD	117,792	0	3,841	79,388	34,536	0

Source: MARD as in cited in Nguyen, (2006).

(A metric ton = 1000 kilograms)

Therefore, in terms of national level, this sector contributes to national economy is in the order of 0,3 - 0,8 percent of the total GDP (Delquigny *et al.*, 2004). At household level, poultry production plays an important role in the household economy through contributing to 5- 10 percent of the household income, or 50-100 percent of household income if their livelihood depends on much poultry production (Hanh, et al 2007; Weaver, 2009).

Poultry product is one of the most consumed foods in Viet Nam. Poultry products include meat and eggs that are a relatively rich source of well-absorbable minerals and vitamins. They are also a source of protein to improve the nutrition of children and adults. The consumption of poultry-derived protein has grown from 5.5 g to 6.9 g/ person/day over the last decade (Burgos *et al.*, 2008). The population's dietary intakes have clearly improved in both quality and quantity. The prevalence of undernutrition in children under 5 years old, and of chronic energy deficiency (CED) in women of reproductive age, has been considerably reduced since 2000³.

Moreover, poultry production has also an important significance in sustaining social relations, cultural traditions, religious events, children's wellbeing (as poultry derived income is often spent on food, medicine, clothes, education), and women's economic empowerment and sense of ownership (Burgos *et al.*, 2008). Avian influenza occurred in Viet Nam in mid 2003, and until now, it still occurs in many communes in the country. Avian influenza outbreaks caused a great loss for Vietnam in terms of economy, society, as well as human life

³ <http://jn.nutrition.org/cgi/reprint/133/11/4006S.pdf> accessed 14/3/2010

3.2. History of avian influenza

Vietnam is one of the countries that have been the most affected by avian influenza outbreaks. The HPAI (H5N1) source in Vietnam is unknown. Nevertheless, it is speculated that the infection can have originated from reservoirs of HPAI virus in the wild-birds or illegal imports of infected poultry from the neighbouring countries (Burgos et al., 2008). According to Lung et al (2006), the outbreaks of avian influenza in Vietnam were divided into the main waves as follows:

The first wave (December 2003-March 2004)

Between December 2003 and March 2004, 57 of 64 provinces and cities were affected and 58.66 millions birds died or were culled, of these 30.4 millions were chickens, 13.5 millions were ducks, and 14.76 millions were other poultry species and waterfowls. The case of Vietnam was reported to the World organization for animal health (OIE) on January 8th, 2004. At the end of this wave, 57 provinces, 382 districts and 2592 communes in the whole country have been infected. In this period, there were 27 cases of infected humans, 16 of whom died⁴.

The second wave (April 2004-November 2004)

The second period of HPAI was characterized by a much smaller extent with 80,080 heads of culled domestic poultry; of these 55,999 heads were chickens, 8,132 heads were ducks, and 19,947 heads were other poultry species and waterfowls. This period was shown to be less than 1% of the first outbreak in terms of the culled poultry heads. During this phase, the avian influenza was remained largely confined to Mekong River Delta where allocated the southern part of the country. The number of infected humans were 64 and 21 of whom died⁴.

The third wave (December 2004-September 2005)

The third wave caused dead and culled 2'158'526 heads of poultry, of which 478,841 heads were chickens, 831,656 heads were ducks, and 851,029 heads were other poultry species and waterfowls within 186 districts of 36 provinces. At the end of this wave, 36 provinces and 186 districts have been infected. The characteristic of the outbreaks in this period occur mostly on small- scale farms. The number of infected humans was 2⁴.

4. <http://www.avianinfluenza.org.vn> accessed 14/3/2010

Vu, (2009) shows that there were six waves of outbreaks have struck Vietnam from 2003 to 2008, a total of died human were 52, and 59.3 million poultry died and were culled. The three countries most affected by the epidemic since 2004 included Vietnam, Indonesia and Egypt. In terms of human loss, the number of dead humans in Vietnam is surpassed only by Indonesia (122), and is two times more than the number of that in Egypt (22), the country that ranks third. In terms of overall economic damage from AI, Vietnam easily tops the list. According to the OIE, about 2,500 outbreaks were reported in Vietnam from 2004 to 2008, it is estimated to be ten times more than in Indonesia (261) and two times more than the number of that in Egypt (1,084) in the same period. The question raised here is why is there the number of the outbreaks so much more in Vietnam? The following reasons are given: the livestock production practice of rural farmers, the knowledge and awareness of farmers in controlling avian influenza was low; the responsibility of authorities at some communes in epidemic control was bad; illegal imports of infected poultry from the neighbouring countries⁵.

However, the control measures of Vietnamese government (preventive culling around the main cities, stopping the commercialization of live birds, vaccination) have helped to limit the spread of HPAI throughout the country (Lung *et al.*, 2006). Vietnam's efforts to control avian influenza have been successful in recent years. Nevertheless, the risk remains that the H5N1 virus could return to poultry and threaten human. The virus is still circulating in bird population within Vietnam especially in wild birds and waterfowls, which may maintain virus without showing symptoms. It is also suspected that the environment still contains with H5N1 virus (Burgos *et al.*, 2008).

5. <http://scvnlive.net/vbb/archive/index.php/t-6397.html> accessed 21/4/2010

Outbreak is a classification used to describe a small, localized group of people or organisms infected with a disease. Such groups are often confined to a village or a small area. Two linked cases of an infectious disease are usually sufficient to constitute an outbreak. Outbreaks may also refer to epidemics, which affect a region in a country or a group of countries, or pandemics, which describe global disease outbreaks. <http://encyclopedia.thefreedictionary.com/Disease+outbreak> accessed 20/4/2010

CHAPTER IV. METHODOLOGY

This chapter describes the methods used in data collection and analysis in this study. A clear explanation is made as to what information was gathered in the research and how the data was analyzed.

4.1. Analytical framework

The purpose of this study is to identify and understand the effects of avian influenza on the livelihoods of rural poultry keeping farmers. The livelihoods framework of DFID (1999) was found to be suitable for this study in order to analyse both impact on the livelihoods and responses in the institutional context. The framework is also suitable for identifying opportunities and constraints that people face.

A vulnerability context is defined as the external environment of risk in which households/ individuals exists (DFID, 1999). The vulnerability context includes seasonality (price, production and employment opportunity); trends (national/ international, economic trend and technology trend), and shocks (natural disaster, ill health, economic shock, livestock health shock). In the case study site, the poultry farmers are exposed to avian influenza outbreaks in 2004, 2005, 2007 and 2008. The vulnerability of farmers to this and other shocks related to the avian influenza outbreak will be discussed in this thesis. Related shocks include price fluctuations of poultry production, food and inputs.

Findings from the preliminary survey suggested that the avian influenza shock and other shocks relating to avian influenza had effects on all poultry farmers' livelihood asset status, including Financial assets, Human assets, Social assets, Physical assets, and Natural assets. At first, the study intended to discuss the effects of avian influenza outbreaks on all five livelihood assets. However, as the time of study was limited and the pre-survey showed that the avian influenza outbreaks mostly affected the Financial, Human and Social capital. Therefore, the study focused on the following:

- ❖ Firstly, the effects of avian influenza outbreak on Financial capital through the investment capital loss, income loss per AI- affected batch, and income loss after the outbreak before restarting poultry production, and the debt of poultry farmers by the outbreak of avian influenza.
- ❖ Secondly, the effects of the avian influenza outbreak on Human capital were examined by comparing the dietary intake of households before, during and after outbreak, employment of labor force in family of poultry farmers during delayed poultry production, and knowledge and awareness of poultry farmers about avian influenza.
- ❖ Thirdly, the effects of avian influenza outbreak on Social capital was investigated through the effect of avian influenza on cultural significance, and the importance of social relations for coping with avian influenza.

The importance in a vulnerability context such as avian influenza shocks and threats is what policies, at national and local levels, pertain to help the poultry farmers in HPAI mitigation? These policies were identified by the poultry farmers themselves and by authorities in the case study site. In addition, the study also discusses the access of poultry farmers to such policies and their ideas in the implementation of those policies.

To accommodate avian influenza shocks and threats, the poultry farmers in the case study site must have coping strategies in the short run as well as risk management strategies in the long term in order to achieve outcomes such as increased income, food security, and reduced vulnerability.

4.2. The approach periods in fieldwork

The objective of this study is to understand the effects of avian influenza on rural poultry farmers' livelihood. Thus, the study concentrates on investigating how avian influenza affects poultry farmers' livelihood assets, what policies help the poultry farmers mitigating avian influenza outbreak at national and local level, and what strategies livelihood do poultry farmers have to accommodate and outcome by avian influenza in terms of both the short and long run. Both quantitative and qualitative approaches are applied and are designed to engage stakeholders in the approaches. The stakeholders include poultry farmers, commune authorities, veterinary authority, local people, the bank agent, concentrated feed company's agency and the middleman. The periods carried out to collect data and information as follows:

Period 1: Pre- survey in the case study site

After developing the research ideas, a pre- survey was done in Yen Son and Tan Binh commune – Tam Diep town – Ninh Binh province for the following reasons: The first, it helped the researcher to understand the overall situation of the case study site and collect some secondary data to fill the gap between the ideas and practices. The second, the pre-survey tested the case study site regarding the information such as: (i) the number of poultry farmers who were affected directly by avian influenza through poultry deaths, culled poultry; (ii) the effects of avian influenza on their livelihood capital; (iii) the polices that helped poultry farmers controlling and mitigating avian influenza; (iv) production activities which generated the income before, during and after, avian influenza outbreak. The results of this period were the basis for the researcher to develop the study ideas and methods to collect the information and data in next period.

Period 2: Main survey in case study site

The information and data of the study were collected in during two months from December of 2009 to early of February of 2010 through methods and tools described below. The stakeholders were interviewed mainly in this period. However, the study focused much on discussions with different poultry production groups. The results of this period helped the researcher get a comprehensive picture of issues.

Period 3: Completion

This period was carried out for purpose as filling the missing information after the author synthesized the information and data in previous periods. The end of this period, the preliminary findings were presented to poultry farmers and in order to receive feedback from them.

4.3. Methods

4.3.1 Site selection

Yen Son and Tan Binh commune in Tam Diep town – Ninh Binh province were selected as the study site. These two communes have similar characteristics, natural conditions and poultry production scale. According to an assessment by veterinary authority in Tam Diep town, poultry production including duck keeping is relatively developed in these two communes. Besides, Yen Son and Tan Binh communes were the epicenter of avian influenza outbreaks in Tam Diep town in 2004, 2005, 2007 and early 2008. The term ‘epicenter’ applied to described the number of poultry died and were culled by avian influenza in two communes was more than other communes did.

4.3.2 Data collection

4.3.2.1 Literature review

A literature review was carried out during the study process. The study started with a review of the literature concerning the topic in order to understand and show how this research is associated with former research in the field. After that, the study selected and reviewed documents relating to the avian influenza situation, the effect of AI on rural farmer livelihoods, assessing the socio-economic impact of AI on rural people in Vietnam as well as the world. After reviewing, synthesizing and analyzing the data and information from these papers, a framework for analysis was developed and the questions formulated to collect field data.

4.3.2.2. Data collection

Secondary data on the avian influenza outbreak situation and other related issues were collected from some sources such as provincial statistics office, provincial veterinary department, the annual report of commune.

Primary data: were collected using both quantitative and qualitative methods. For this study, qualitative methods included group discussions and in-depth interviews and a quantitative method was used to survey poultry production households by questionnaires.

Group discussions: a series of different group discussions were performed with different participants. These participants consisted of commune authorities, women and men in different groups of poultry production.

For the group discussions with commune authorities, the researcher organized two group discussions with authorities in Yen Son and Tan Binh commune. The authorities that took part in the group discussions included Women’s union, Farmers’ union, Extension staff, Veterinary staff, and around 5 - 7 Village leaders and commune People’s Committee staff

The purpose of study did not focus on the effects of avian influenza on gender. However, for the group discussions with the poultry farmers, the researcher held separate group discussions with women and men in the different poultry production groups in order to get the opinions among them and reduce possible gender related bias. With the help of village leaders and veterinary staff in the two communes, the researcher invited around 10 - 12 poultry farmers (including 5 or 6 poultry farmers in Yen Son commune and 5- 6 poultry farmers in Tan Binh commune) in each group discussion. A total of six group discussions with the

poultry farmers were conducted including three group discussions with men and three group discussions with women in different poultry production groups.

The tools that were applied for collecting data included:

- ❖ Mapping: Although a land survey map of two communes was provided by commune authorities, another map was also drawn by commune authorities. This map was simple and it helped the researcher to imagine quickly the household allocation in terms of economy and production, the regional loss by avian influenza, and which region had the heaviest loss by AI in the case study site.
- ❖ Wealth ranking: was done with commune authorities in the case study site to identify indicators for selecting household into different group (Table 4.1). The result of the wealth ranking exercise helped the researcher to select three poultry categories consisting of large, medium and small- scale farmers for group discussions and the household survey.
- ❖ A timeline was developed with the commune authorities and some large, medium and small –scale farmers. This was used to (i) identify production activities of farmers before, during and after AI outbreaks, (ii) identify policies that helped the farmers to mitigate AI, and (iii) identify effect of avian influenza on cultural significance and the importance of social relation for coping with avian influenza.
- ❖ A seasonal calendar was developed with large, medium and small- scale farmers. With this tool, the researcher discussed with them about production activities, income sources of farmer as well as the employment of men and women in each group before, during and after AI outbreak.
- ❖ An institutional map was used to identify community regulations, laws, or policies that helped poultry farmers mitigate avian influenza outbreaks and to identify the access of poultry farmers to such institutions. This tool was conducted with large, medium and small- scale farmers.

In-depth interviews: were used to get detailed information and understand deeply about the effects of avian influenza on poultry farmers' livelihoods in case study site. The researcher interviewed two veterinary staffs in two communes; one veterinary authority in Tam Diep town; two commune leaders, two local people; 10 poultry farmers who were affected directly by avian influenza in the three production groups; two women union in the two communes; one middleman; one bank agent and one concentrated feed company's agent with open questions. These were carried out after group discussion and before household survey.

Household survey: After getting information from group discussions and in-depth interviews, a household survey was conducted in the case study site. Based on avian influenza- affected households, a list was taken from the wealth-ranking tool including large scale, medium sale and small- scale farmers of the two communes. The study selected randomly 43 of the 90 households that were affected directly by avian influenza outbreak through mortality and culling in the four-year period. In the selected group, there were 12 large- scale households, 18 medium - scale households and 13 small- scale households. The questionnaires were designed based on the livelihood frame to collect data with focusing on four main parts related to thesis topic: (i) General information of households; (ii) The effects of avian influenza on poultry

farmers' Financial capital, Human capital, and Social capital; (iii) the access of poultry farmers to institutions controlling and reducing avian influenza; (iv) coping strategies with avian influenza in the short term and as well as risk management in the long term.

Table 4.1: Indicators for classifying households by poultry production scale

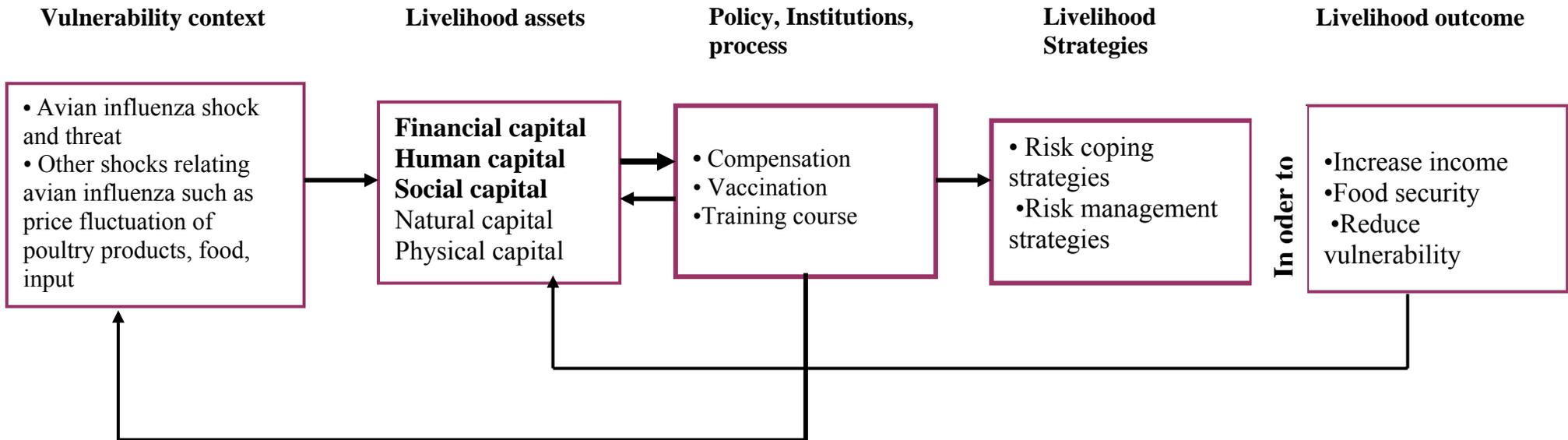
Indicators	Large-scale production	Medium-scale production	Small-scale production
Flock size per production cycle	1000 to 7000 birds	200 - below 1000 birds	20 - below 200 birds
Time	Keeping this flock size from the past and until now or at least in the recent five years	Keeping this flock size from the past and until now or at least in the recent five years	

4.4. Data analysis

The survey data were used mainly for the analysis. The quantitative data from the questionnaire survey were entered into Microsoft Excel and analyzed by SPSS statistical packages. The qualitative information from group discussions and in-depth interviews was analyzed by constructing displays. Moreover, the information from group discussions, in-depth interviews and the literature review was used for discussion and interpretation of the findings from quantitative data.

The objective of this study was to investigate the effect of avian influenza on the livelihood of rural poultry farmers in different groups (large- scale production, medium- scale production and small- scale production). This study selected two communes that had similar characteristics, natural conditions and poultry production scale. These communes used to be one commune before 1984. Both of them were selected in order to provide a larger sample.

Figure 3.1: Analysis Framework (Modified DFID Sustainable Livelihood Framework)



CHAPTER V. CASE STUDY SITE

This study has been carried out in Tam Diep town of Ninh Binh province. This area had large losses in avian influenza outbreaks. Tan Binh and Yen Son communes of Tam Diep town were selected to understand the effects on rural poultry farmers' livelihood, as these two communes were the most seriously affected. This chapter summarizes the main general socioeconomic characteristics of these sites focusing on livestock production including poultry production and avian influenza outbreaks.

5.1. Socio- economic characteristics of the case study site

Ninh Binh province is located in the south of Northern Vietnam and has one city, one town and six districts. The total natural area of Ninh Binh is 1400 km² and the population density is 664 per km². There are 950 thousand people in total, with 480,300 people in working age (Ninh Binh statistic office, 2009). Ninh Binh province has 6.9% of poor households in 2008⁶.

Production activities of Ninh Binh province include mining and quarrying industry, manufacturing industry, cottage industry, tourism and agricultural production and so on. However, agriculture is still main production activity with 75 percent of the labour force involved in this sector in 2007. In the agricultural sector, cultivation occupies 68 % of the output value of agriculture, livestock production occupies 30 % of the output value of agriculture, and other services occupy 2.2% of the output value of agriculture. The livestock sector comprises cattle, goats, pig and poultry (Table 5.1). Poultry production is important for livelihoods in terms of income, jobs, food security, “insurance” and as “saving accounts” for 80 % of the rural people in the province, who participate in poultry production (Ninh Binh statistics office, 2009). Livestock products not only meet food demand for people in this province but are also exported to Ha Noi capital and nearby provinces.

Table 5.1 The number of animals and poultry in recent years

Unit: Thousand - head

Year \ Item	2000	2005	2006	2007	2008
Cattle	51	69	76	77	66
Pig	283	368	360	368	372
Goat	18	23	23	23	22
Poultry	3012	3035	2883	2932	3394

Source: Ninh Binh statistics office, 2009

⁶ <http://baoninhbinh.org.vn/news/26/2DC9A8> accessed 15/3/2020

Tam Diep is a mountainous town located in the south of Ninh Binh province with five precincts and four communes. The total natural area is 110.9 km². The total population is 53,649. Production activities of Tam Diep province are relatively variety such as building industry, cottage industry, other services and agriculture. Although Tam Diep is a town, agricultural production is still the main income generating activity for 60 percent of the population. The agricultural sector consists of rice cultivation, other crops (maize, cassava, peanuts, pineapples, and vegetables) and livestock production. Within livestock production, poultry and pigs are popular in households. Besides, cattle and goats are also kept but not as commonly (Table 5.2).

Table 5.2: The number of animals and poultry by year, in Tam Diep

Unit: Thousand - head

Item \ Year	2000	2005	2006	2007	2008
Poultry	150	90	119	120	125
Pig	11	19	20	19	21
Cattle	3	4	5	5	4
Goat	2	2	2	2	2

Source: Ninh Binh statistics office, 2009

Tan Binh and Yen Son are two communes of Tam Diep town. Tan Binh is located in the north and Yen Son in northeast of Tam Diep town. In terms of the natural condition and characteristics, Tan Binh and Yen Son are similar. Before 1984, Tan Binh and Yen Son were one commune. Due to the population density, Tan Binh and Yen Son were separated from each other from 1984 for easier administration (Group discussion with authorities in 2009). The poverty rate of two communes is high as compared to the average poverty rate of Ninh Binh province with 6.9 percent.

General information of two communes can be found in the following table

Table 5.3: General information about the two communes in 2008

Studied commune	Total of natural area	Population (No of people)	Total of households	The number of village	The rate of poverty in percent
Yen Son	816.34(ha)	5,373	1,423	10	15
Tan Binh	750.82 (ha)	5,605	1,398	12	10

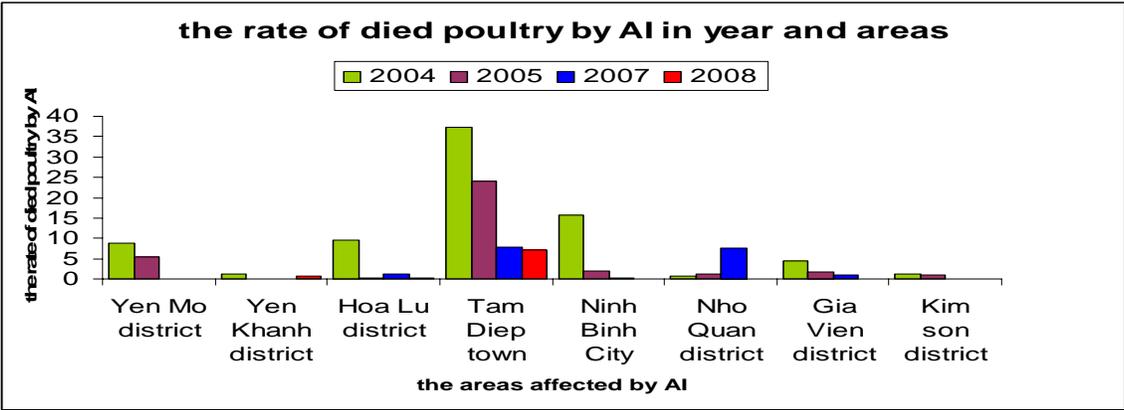
Source: communal report, 2008

At present, approximately 80 percent of the households of each commune have agricultural production as their main income generating activity. Agricultural production includes mainly rice cultivation, cash crops and livestock production (cattle, pig, goat and poultry, rabbit). Around 58 % of the households in Tan Binh commune and 65% of households in Yen Son commune are involved in poultry production (the commune report in 2008). According to the veterinary authority in Tam Diep town, poultry production, especially duck keeping has developed strongly in these communes. The natural condition of two communes is very convenient for duck keeping as compare to other communes with three reasons: firstly, because the total water surface area in the two communes is relatively large, namely as 60 ha and 100 ha in Tan Binh and Yen Son respectively. Secondly, the total of rice land size is 225.52, and 384.51 ha in Tan Binh and Yen Son respectively and after harvesting, free ranging ducks in the rice fields eat the remaining rice. Thirdly, snails, especially “Bieu vang” snails have expanded highly in these two communes and this is a good feed source for ducks and chicken. These three factors help the poultry farmers in the two communes to reduce input investment in poultry production and they get high profit from poultry production particularly duck keeping. Besides, the poultry production scale in the two communes is also the same (In-depth interview with veterinary authority in Tam Diep town).

5.2. The avian influenza outbreak in the case study site

As Vu (2009) shows, it is estimated that there were six waves of avian influenza outbreaks from 2003 to 2008 and about 2,500 outbreaks were reported from 2004 to 2008 in Vietnam. Ninh Binh is one of the provinces in the whole country where was affected by the avian influenza in 2004, 2005, 2007, and 2008. Avian influenza killed a great population of poultry and brought out a high economic loss for the poultry industry and farmers’ livelihoods in the province. Mainly, in 2004, the number of poultry in the province which died and was culled by AI was the highest, about 152 583 heads. In 2005 and 2007, around 71 520 and 59 899 heads died and were culled respectively in the province. However, in 2008, avian influenza only affected four regions in Ninh Binh province, those of Yen Khanh district, Hoa Lu district, Nho Quan district and Tam Diep town. The total of dead and culled poultry was 4.980 heads (provincial veterinary report). The poultry industry of Tam Diep town lost more by avian influenza outbreaks than other regions in Ninh Binh province (Figure 5.1).

Figure 5.1: The rate of dead poultry and culled poultry by AI by year and area

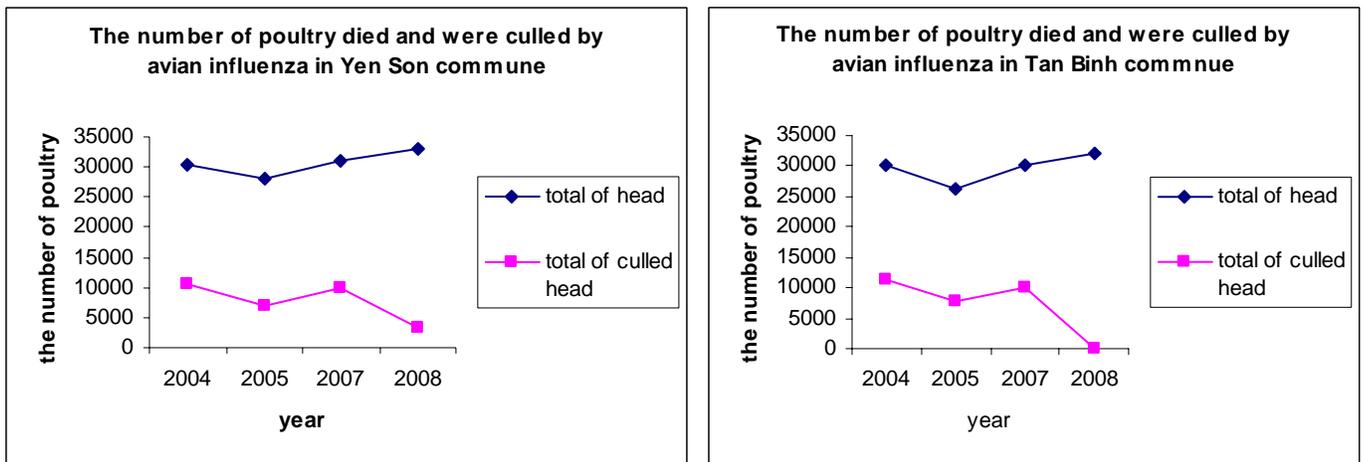


Source: Ninh Binh veterinary department

In Tam Diep town, the total number of poultry that died by AI in four years was more than 80 thousand heads (the report of Tam Diep town) and had negative effects on rural livelihoods

According to an assessment by the veterinary authorities in Tam Diep town, Yen Son and Tan Binh communes were the epicenter of avian influenza outbreaks in Tam Diep town 2004, 2005, and 2007 and early 2008. It killed a high number of poultry in the two communes, estimated to about 60 thousand poultry in the four years (Figure 5.2). Clearly, this infectious disease caused a large economic loss for the rural poultry farmers in these two communes. Although, avian influenza outbreaks repeatedly in four years, however, households were only affected directly one by avian influenza through dead and culled poultry.

Figure 5.2: The number of poultry that died and were culled by years in Tan Binh and Yen Son commune



Source: commune veterinary office

CHAPTER VI. FINDING AND DISCUSSION

The second chapter has discussed theory indicating that the poultry farmers are vulnerable to avian influenza shocks and threats. These vulnerability affected poultry farmers' livelihood. This chapter, using the data and information from Yen Son and Tan Binh communes in Ninh Binh province aim to get more understanding on how were the livelihoods of poultry farmers affected by pathogenic avian influenza (HPAI). This study argues that avian influenza affected both negatively and positively poultry farmers' livelihood, however, avian influenza have negative effect rather than positive effect. Households whose livelihoods depend much on poultry production are the most vulnerable. Under the negative effect of avian influenza on poultry farmers' livelihood, Ninh Binh province have had the policies such as compensation, vaccination supporting and the training courses to help the poultry farmers mitigate avian influenza. The study finds that the compensation and vaccination-supporting policies can be considered as helping poultry farmers in HPAI mitigation, but it appears that training courses have not contributed much.

6.1. Overview of poultry raising households

In this study, the author focused deeply on poultry production households who were directly affected by avian influenza through poultry deaths and culled poultry. Poultry production households were classified into three categories according to scale through group discussion with authorities. This section presents the characteristics of households, and the relation to the scale of production. The information was provided by heads (or their spouse) through the surveys in study site.

6.1.1 General information

The data from the surveyed households (Table 6.1) reveal that the household size in the large- scale production and medium - scale production is larger than household in small - scale production (with 5.3, 5.4 and 4.5 members respectively). The difference in number of labour is not significant, but the medium and large- scale households seem to have a higher number of dependents as compared to small- scale households. Why do large and medium scale households have higher amount of dependents than small-scale household? This was because large-scale farmers are middle age or young age with 2-3 children at schooling age. Medium- scale farmers are often at middle age with 2-3 children at schooling age. Among small- scale farmers, the majorities are either old couples, whose children have gotten married or old couples with 1-2 children at schooling age and with their parents

The average age of household heads is about 51 years, the youngest is 33 and the oldest is 75 years. The age of household heads implies that they have had a wide experience in poultry production, namely 36 years for small- scale farmers, 26 and 21 years for medium and large- scale farmers respectively (Table 6.1).

Table 6.1: The mean of human resource of different poultry production households

Household structure	Unit	Total households N= 43	Large - scale farmers N= 12	Medium- sale farmers N=18	Small- scale farmers N=13
Household size	Person	5.1	5.3	5.4	4.5
Main labors	Person	2.3	2.2	2.3	2.4
Dependants	Person	2.9	3.2	3.1	2.2
Age of household heads	Years	51.8	47.2	47.0	62.8
Production experience	Years	27.9	21.4	26.2	36.2

Source: Household survey, January 2010

Overall, women and men in households of different poultry production groups are likely to come with primary and secondary education. No one had higher education or college/ university training. There is only a slight proportion of small – scale farmers who are illiterate with 7.7 for both men and women farmers, as they are old couples with 70 year olds. The education levels of households in different poultry production groups do not differ much. (Figure 6.1)

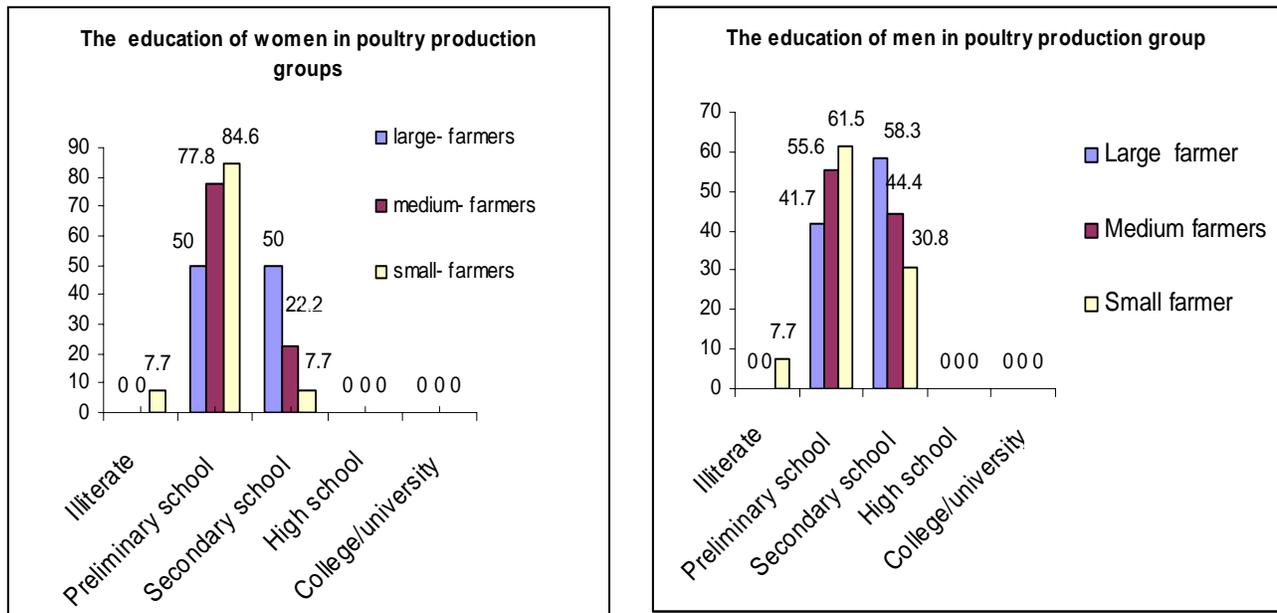


Figure 6.1: Education of women and men in different poultry production scale source: Household survey, January, 2010

Figure 6.1 illustrates that the education of men and women in poultry production households is very low. Results from this study illustrates that the poultry sector provides employment to a large proportion of farmers in the case study site. The commune authorities indicate that the low education of poultry farmers is also one of the reasons that led to avian influenza breaks out continuously from 2004, 2005, 2007 and 2008 in the research site.

Cultivated land is important for local farmers in general in rural areas as Yen Son and Tan Binh commune where agricultural production is the main means of their living. In terms of the rice land, the two communes are divided into two regions; inside the dam and outside the dam. Rice land inside the dam provides two crops per year (winter- spring crop and summer- autumn crop), while rice land outside the dam only provides one crop per year (winter – spring crop) because the floods come in the late summer and autumn season. Table 6.2 shows that large and medium –scale farmers all have rice land both outside and inside the dam, while small- scale farmers only have rice land inside the dam. In general, the total size of rice land of large and medium scale farmers is greater than that of small – scale farmers. However, large and medium-scale farmers said regarding rice productivity, that they planted only to meet food requirements for them around year. For small- scale farmers, the rice not only provides enough food for them around the year but also provides fodder for poultry production. In terms of the land size for cash crop and garden land size, the small- scale farmers have larger land size than large and medium - scale farmers (Table 6.2). The crop products of small producers include vegetables, cash crop products that could provide home consumption, livestock production including poultry keeping, and sometimes they can sell them for getting income.

It is clear that in the research site, the small- scale farmers can use the crop products to invest in poultry production, and thus investment in buying feed for poultry may not be noticeable. Besides, small- producers have large size of cash crop and garden land; they only expand therefore poultry production with small scale. Meanwhile, large- scale farmers without land for cash crop production and medium –scale farmers have cash crop land with small size. Consequently, they have invested in poultry production with large and medium scale in order to increase income for their families. The feed for poultry in large and medium- scale production groups with 70 percent is brought in the market and 30 percent come from by-products of rice cultivation and other.

Table 6.2: Natural resources of households in different poultry production groups

Production resource	Unit	Total households N= 43	Large - scale farmers N= 12	Medium- scale farmers N=18	Small- scale farmers N=13
Land size for rice cultivation inside the dam	Sao	5.4	5.0	5.6	5.4
Land size for rice cultivation outside the dam	Sao	1.2	1.5	1.8	0
Land size for cash crop	Sao	0.9	0	0.9	1.8
Garden land size	Sao	1.8	1.3	1.4	2.6

Source: Household survey, January 2010

1 sao = 500 m²

6.1.2. Poultry production

In the research site, the poultry species that were raised only ducks and chicken. The duck breeds include Xiem, Co, Bau breed, and three duck breeds are local. The chicken breeds consist of Dong Tao, Mia, Ri, Tam Hoang, Logo breed, of which local breeds include Dong Tao, Mia, and Ri; and Tam Hoang, Logo breed are imported (Group discussion with authorities, December of 2009). The interesting result from the household survey shows that all households in large- scale production have kept ducks. Chickens were kept in all of the households in small – scale production. In medium - scale production there were 61 percent of

households that raised duck, 5.6 percent of households that kept chickens and 33.3 percent of households raised both chicken and ducks (Annex 2).

There were clear differences between production categories as to how they kept their poultry. Annex 3 shows that the ducks of all of large – scale farmers are often free to range on rice fields during day and overnight. Duck flock size of medium producers is smaller than that of large producers, as the result, the ducks of 61 % of surveyed medium- scale farmers are usually free to range on the field rice during day and brought back to housing in the evenings. One third of the medium- scale farmers who kept chicken and duck, their ducks were kept like medium- scale farmers above, but chickens were kept in the backyards or gardens during the day and brought back to housing in the evenings. Only 5.6 percent of households in medium- scale production kept chickens in special coops as they kept imported breeds. In contrast, all small- scale farmers still raised their chickens according to traditional practices and the chickens were usually kept in backyards, gardens/ courtyards/ orchards and the poultry were often free to range on neighboring land during day and kept in the houses in the evenings. Thus, it is clear that poultry production in the case study site still follows traditional production. In other words, there is no industrial production in the research site

According to poultry farmers’ opinion, the poultry is reared for several purposes such as home consumption, selling, family gifts and traditional festivals. However, the question is which purpose will be the most important for households in different poultry production groups? For large and medium- scale farmers, duck production for selling was the main purpose (97%) and followed by home consumption (1.4- 1.7%), traditional festivals (1.0- 1.3) and the least important purpose was as family gifts (0.4-0.6%). For small-scale farmers, chicken production for home consumption was the main purpose (61.5%) and subsequently selling (23.5%), traditional festivals (15.2%) and making gifts for friends and the relatives was the least important purpose (4.3 %) (Figure 6.2). It is clear here that, the main duck production purpose of larger and medium – scale farmers is to sell for getting income. In contrast, the main chicken production purpose of small- scale farmers is the provision of animal food for their family (home consumption) and chicken keeping for selling is the second purpose.

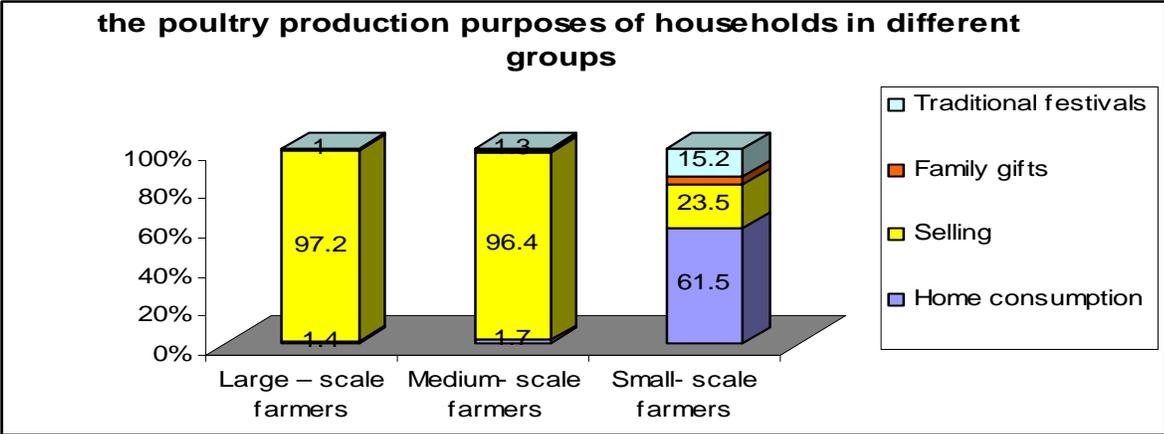


Figure 6.2: The poultry production purposes of households in different groups - Source: Household survey, January 2010

6.1.3. The labour distribution in poultry production

In terms of labour in poultry production, in large - scale production group, poultry production generates the employment for both wife and husband in 58.3 % of the surveyed households. About one third of the surveyed households used both their own labor (wife and husband) and outside labor due to having a large flock size with from 3000 heads or above. Normally a farm hired 2-3 labors. In 8.3 percent of the households, the husbands and their parents or relatives were involved in poultry production (Annex12).

However, the medium and small- scale farmers confirmed that they only use family labor for raising poultry. For medium –scale production, most households had both wife and husband involved in taking care of poultry. In one case, the children helped their parents or their mother to take care of the poultry. In one case, only the husband was involved in poultry keeping. For small - scale production, the women always played a key role in the daily care of poultry in all the interviewed households. In over two - third (69%) of the households, the wife alone was involved in poultry production and in 23 percent of the households the children together with their mother took care of the poultry. In only one case, both wife and husband took part in raising the poultry (Annex 12).

Discussions with the large- scale farmers showed that husbands often take up the tasks including feeding, watching and herding the flock, the husbands are thus more likely to be engaged full time in poultry work, and the women only spend 5- 6 hours together with their husband to take care of the poultry. Although the poultry flock size of medium producers is smaller than that of large producers, the men and women in medium- scale production spend similar time for poultry keeping as large- scale farmers did (Group discussion with medium- scale farmers, December of 2009). The women in small- scale production only used 1- 3 hours for taking care of the poultry. In addition, the women in the three groups spend their remaining time on other activities such as working in crop production, raising other livestock (pig, dogs, and rabbits), bringing up their children and doing daily housework (Group discussion women in three poultry production group, December of 2009).

Furthermore, in large and medium- scale production groups, the women control the income from poultry production. In contrast, men usually make greater decisions involving in larger capital investment such as big flock size or small flock size maintenance. For small- scale production group, the women have the decision on both the income control from this and flock size maintenance (Group discussion with poultry farmers, December of 2009).

It should be noticed here that the labor distribution for poultry production has depended greatly on the availability of labor in family and the poultry flock size of a household. In a poultry production household has both wife and husband, either women or men as main labor for poultry keeping. In other words, poultry production generated employment for the members in family of the poultry farmers.

6.1.4. The access market of poultry production households

Poultry production is an integral part of the mixed crop-livestock farming system practiced by most rural households in Ninh Binh province in general and Yen son and Tan Binh commune in particular, where

poultry products were perceived to have important functions through the provision of meat and eggs for home consumption and for the generation of cash income. Therefore, how poultry farmers sell their poultry products for income is interesting to understand. The results of group discussions with poultry farmers indicate that poultry producers use three main market outlets for selling their poultry products. They sell them at the farm gate to intermediaries, take their products to the local commune market, or sell to other farmers in the village. As Table 6.3 shows that all the large-scale producers, and all but of the medium-scale producers sold their duck products to intermediaries. However, the small-scale producers have small flock sizes, and they took their chicken products to the local commune market or sold directly to other farmers in the village. Looking at the field research undertaken by Tung and Costales (2007) in some regions in Northern Vietnam, they find that the selling price of poultry products that farmers received from intermediaries at the farm gate was higher than that received from buyers in the commune market. Their result is contrary to the finding of this study. According to the poultry farmers in the Tam Diep research site, the poultry products were sold in the local commune market at a higher price than selling to intermediaries. However, this way of marketing requires much time of the poultry farmers.

Table 6.3: The ways of selling poultry production by households in different groups

The ways for selling poultry products	Large –scale farmers		Medium- scale farmers		Small- scale farmers	
	N = 12		N= 18		N= 13	
	No of hh	% of total	No of hh	% of total	No of hh	% of total
Through middleman	12	100	17	94.4	-	-
Through middleman and take their products to the local commune market	-	-	1	5.6	-	-
Taking their products to the local commune market	-	-	-	-	6	46.2
Selling to other farmers in the village	-	-	-	-	7	53.8

Source: Household survey, January 2010

6.1.5 The role of poultry production to household economy

As other local farmers in the integral farming system, the livelihood of poultry farmers in the research site combines on- farm, non-farm and off - farm activities. Nevertheless, poultry production contributes most to total income of the large and medium- scale farmers at 70 percent. For the small- scale farmers, poultry production has a share 15 percent of total income of households (Figure 6.3). The poultry farmers can get 30 - 50 thousand VND per a live duck or 100- 150 thousand VND per a live local chicken when they sell them in the market depending on the weigh, time of selling, market prices and buyers. Production cost was estimated about 60-70 percent. With such benefits, according to poultry farmers' opinions, poultry production brought out the high economic benefit compared to other agricultural activities. However, how much income they could get from poultry production depended on how many poultry they kept and how they sold them in the market (Group discussion with poultry farmers, December of 2009).

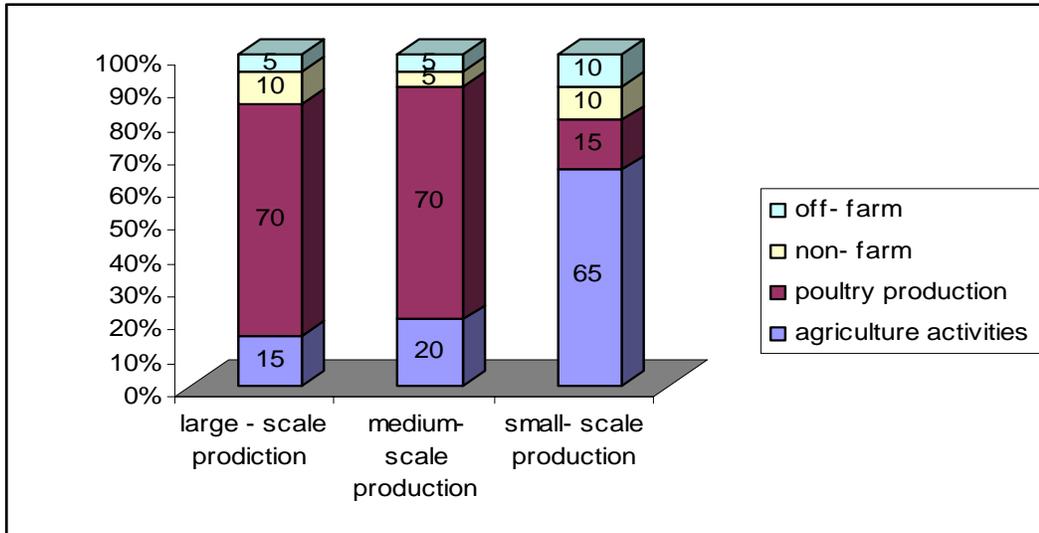


Figure 6.3: Sharing the income of poultry production to the total income in households in different groups prior to avian influenza *Source: Group discussion, December 2009*

It is interesting to know how important poultry production is in the economy of poultry production households in the different groups. The result of household survey (Annex 4) indicates that all large producers consider poultry production to be the most important for their economy. A high 61.1 percent of medium producers have the opinion that poultry production is very important for their living and poultry production is the most important for 38.9 percent of medium producers. Also 81.6 % of the small- scale farmers said that poultry production was important for their economy and for 15.5 % of the small producers, poultry production was very important.

In short, the results in this section show us the characteristics of poultry farmers and how it relates to the scale of poultry production. It can be seen that large-scale farmers are young and middle age people who without land for cash crop cultivation, while medium- scale farmers are middle age people with small land size for crash crop production. With such production scales, it generates the employment for the members in their families and contributes a major part of the total income of the family. Consequently, large and medium - scale farmers consider poultry production to be the most or very important for their livelihoods. On the other hand, small- scale farmers are old couples who have large size of land for crop production, they only expand poultry production with small scale in order to provide mainly home consumption and they consider poultry production as important for their livelihood. How these different groups of producers were affected by avian influenza will be discussed in the next section.

6.2. The effects of avian influenza on poultry farmers' livelihood

This sub-section discusses the vulnerability of poultry farmers to shocks caused by avian influenza and its effects on poultry farmers' livelihood capital, mainly on financial-, human- and social capital

6.2.1 The vulnerability of poultry farmers

A review by Miers (2008a) showed that the avian influenza caused a big shock for poultry production households, which had direct effects through poultry deaths, culled poultry and indirect effects through price fluctuations of poultry products, inputs and other foods. This is similar to what the author found in the research site. The results of group discussion and in - depth interview suggest that:

Poultry farmers were more vulnerable to the direct effect of poultry deaths from disease or culling in relation to how much capital they had invested in poultry production. According to the commune reports of the two communes, a total of 90 households lost directly by AI in the four years and the number of bird which died and were culled was about 60 thousand birds with an estimated loss of hundreds of millions VND. In terms of the household level, the household has poultry deaths, culled to be the largest standing at 4 thousand, and the loss estimation was 70 million VND (about four thousand USD). The household had the lowest culling of poultry standing at 35 heads, and estimated the loss to 250 thousand VND (about 12 USD).

According to one large- scale farmer comment *“Our poultry products always have to depend on the price of market. At the time of the avian influenza outbreak, I do not understand the reasons why the concentrated feed companies raced against each other to increase the price of their products. Meanwhile, the price of live weight of a duck is 10 thousand-13 thousand VND/kg, which is lower than before avian influenza outbreak”*. This comment illustrates that price fluctuations resulting from HPAI affect poultry farmers in several ways. Also farmers who did not lose their poultry by culling were affected through the price reductions.

Firstly, a dramatic drop in prices of the poultry produce immediately after an outbreak particularly that affected large and medium producers in the short-term, because they were at risk of losing part of their invested capital. For example, in 2005 the price of duck was continuously in fluctuation. Mainly as from January to June, the price of a live duck was 14 – 17 thousand VND per a live weight kg. From July to October, due to the avian influenza outbreak, the price of duck reduced to about 10 thousand VND per kg or eventually to 10 thousand VND per duck. However, the price of duck increased again to 18 thousand VND per kg in December (Group discussion with large and medium scale farmers, December of 2009).

Secondly, at the time poultry products reduced in price, there were corresponding rises in other food prices. For instance, pork meat was the common meat used to replace poultry, so this increased in price from 40 thousand VND per kg in early 2005, to 60 thousand VND per kg in the middle and end of 2005 (Group discussion with poultry farmers in three groups, December of 2009). This price increase affected all the larger, medium and small- scale farmers in the case study site. They could not afford to substitute a decrease in poultry products consumption by buying non-poultry alternatives because they were short of money.

Thirdly, there were price increases of inputs following an HPAI outbreak, mainly poultry feed. The price increase of poultry feed affects large and medium – scale farmers who usually buy these inputs for poultry production. During group discussions, the large and medium - scale farmers recalled that one concentrated feedbag of 25kg, which the poultry farmers usually used for poultry production, was 80 thousand VND in 2004. In 2005, its price increased to 123 thousand VND and 128 thousand VND at the end of 2005. At the

time of the survey in 2009, its price was 180 thousand VND. Thus, poultry feed has doubled the price as compared to before the avian influenza outbreak. This caused difficulties for large and medium- scale farmers to re-stock after poultry losses.

Through the above evidence, we can find that the large, medium and small- scale farmers experienced the serious vulnerability related to avian influenza as multiple shocks. The question of interest is how vulnerability in an HPAI context affected Financial, Human and Social capital of poultry production households. This is discussed in the next sections.

6.2.2. The effect of avian influenza on Financial capital

Financial capital refers to stocks of money to which the household has access (Ellis, 2000). As mentioned above, poultry production generates an important role in the household economy of poultry production households in the research site. Thus, the outbreak of avian influenza resulted in major blows to the poultry producers, as it caused them immediate financial loss, income loss and income reduction during poultry production stopped, and many households fell into debt.

6.2.2.1 The investment capital and income loss

The immediate financial loss due to avian influenza outbreaks on producers was estimated by taking into account the number of birds died, culled, financial investments and the total of compensation. As mentioned in Chapter V, poultry production size in Ninh Binh in general and the research site in particular is to develop strongly. Thus, the result of household survey (Table 6.4) indicates that the loss suffered by poultry producers in the research site was on average close to 10 million VND per farm, and this loss is rather high compared to other farms in the North of Vietnam with the losses suffered around 1.416 thousand VND per farm (Delquigny *et al.*, 2004). Large - scale farmers lost on average 26.800 thousand VND and medium-scale farmers lost on average 4.280 thousand VND per farm. The loss of small –scale farmers was the lowest, standing at on average of 638 thousand VND per farm. It can be noted that avian influenza outbreak caused great financial loss especially for large and medium- scale poultry farmers in the case study site.

Table 6. 4: Financial loss of poultry farmers due to avian flu outbreak in four years

Particulars	Unit	Total	Large - scale	Medium-	Small- scale
		household N= 43	farmers N =12	sale farmers N= 18	farmers N= 13
Average no of dead poultry per household	Bird	126	305	85	19
Average no of culled poultry per household	Bird	653	1770	355	34
Average investments per household	1000VND	15,000	38,446	9,608	1,130
Average total of compensation per household	1000VND	8,918	19,560	7,921	477
Average loss suffered per household	1000VND	9,466	26,800	4,286	638

Source: Household survey, January 2010

Discussions with the large and medium scale - farmers indicated that prior to avian influenza they could get a profit of 4 – 10 thousand VND per a live duck. The large –scale farmers got profit from 4 – 10 million VND per batch with at least 1 thousand ducks. The medium - scale farmers could get profits of 800

thousand - 2 million VND per batch with at least 200 ducks depending on a live weight, the time of selling, and buyers. Discussions with the small- scale farmers show that they could get profits of 10- 20 thousand VND per hen per clutch from selling eggs or 15-20 thousand VND per local chicken for selling at live weight. Poultry production not only meets food for the family of small-scale farmers but also provides a monthly income of 150 - 200 thousand VND to their total income. As discussed in Chapter V, the natural condition of the research site is suitable for poultry production especially ducks raising and it helps the farmers to reduce input investment in poultry production. Hence, the poultry farmers in the case study site could get a profit per a bird of an average of 8 thousand VND (Table 6.6) and that is rather high compared to other regions in North Vietnam with between of 1- 4 thousand VND per a bird (Hanh, *et al.*,2007).

Avian influenza outbreaks hit the poultry farmers in the case study site hard, as it caused them large income losses from AI- affect batch. The study base on the profit per a bird that poultry farmers got prior to the avian influenza outbreak in order to calculate the income loss for AI- affected batch. Table 6.5 indicates that the large producers lost an income average to be more than 8 million VND per AI- affected batch. The medium- scale farmers had suffered income average loss of more than 2 million VND per AI - affected batch. The small producers lost an income average of 180 thousand VND per AI-affected batch.

Table 6.5: The income loss of poultry farmers due to avian influenza outbreaks in four years

Particulars	Unit	Total households N= 43	Large – scale farmers N= 12	Medium- sale farmers N=18	Small- scale farmers N=13
Profit per bird prior to AI	1000 VND	8	7	6	13
Income loss per AI –affected batch	1000 VND	3,600	8,683	2,626	180

Source: Household survey, January 2010

The poultry farmers also affirmed that after an outbreak of avian influenza, poultry production was usually interrupted for several months. Consequently, the large and medium - scale farmers had a 70 percent reduction of their total income. The small-scale farmers experienced a 15- 20 percent decrease of their total income during these months (Group discussion with the poultry farmers in three groups, December of 2009).

A hen typically lies about 10 - 15 eggs/clutch and averaged four clutches per year. 50- 60 percent of total egg per hen per clutch was used for home consumption and 40 – 50 percent of total egg per clutch was sold. The price of an egg is about 2 – 2.5 thousand VND (group discussion, small-scale farmers, December, 2009)

An interesting finding of the fieldwork was also that although avian influenza did not break out in the case study site in 2009, the poultry farmers still had financial losses, because the bird price were very low. According to the large and medium producers, they invested about 47 thousand VND in a live duck but had to sell at a price of 35 thousand VND in the market and thus estimated a financial loss as more than 10 thousand VND per duck. Also small producers said that, while the chicken price was from 75 to 80 thousand VND per kg in the end of 2008, its prices in the early and middle of 2009 was reduced to 65 thousand VND per kg. Because of the price reduction, the poultry farmers did not get benefit from poultry production and had income loss from poultry production in 2009. Accordingly, the question was raised why the price of birds was reduced to such low level. To answer this question, in- depth interview was done with Mr. Q, as he is an intermediary who often buys poultry products in the case study site. He said “*when television or the paper reports avian influenza outbreaks anywhere in the country, immediately the demand of consumers in urban areas for poultry products decreases and the price of poultry products is reduced. Not only producers lost income, I myself got reduced income also.*”

Thus, we can see that avian influenza not only caused direct financial loss and income loss for poultry farmers in the research site through mortality but also affected indirectly through the decrease in demand from consumers for poultry products.

6.2.2.2 The debt of poultry farmers

An in- depth interview with the Women Union shows that the local people in the research site could access to credit for agricultural production and other activities through the formal and informal channel. The formal channels include Vietnam Bank Social Policies (VBSP), People’ Credit Funds (PCFs) and Vietnam Bank for Agricultural Rural Development (VBARD).The informal channels include relatives, friends, neighbours, and private moneylenders. However, the local people often accessed credit for purposes such as building clean water- environmental sanitation, resolving employment, migration for finding job, investing in children for studying university. With such purposes, they often access VBSP, VBARD. For livestock production purposes, local people usually access PCFs. It is interesting to know for what reason livestock farmers like access to PCFs rather than VBSP, VBARDS (Box 6.1)

Box 6.1: Poultry farmers views about the access to credit

The interest rates of banks differ from each other. The interest rate of VBSP is 0.23 to 0.95% depending on credit purpose. VBARD has 1.3% interest and the interest of PCFs is 1.25%. The administrative formalities requirement to access to loan of VBSP, VBARD, and PCFs are similar to each other. However, we like access to PCFs rather than VBSP, VBARD due to the reasons as in order to access the loans in the VBSP or VBARD, we have to spend 10 days filling in the application forms to submit to the bank and then waiting for another 10 days before, we can get the loan. Meanwhile, to get access to credit of PCFs, we only spend two to three days doing application forms and two days after we can get the loan.

Source: Group discussion with large and medium scale farmers, December 2009

The result of this study shows that all poultry production households in the case study site have land. However, according to the Women Union, some of them do not have the “red certificate” of land use rights.

It is difficult for them to access loan of the formal channels due to no collateral. Therefore, they often borrow from informal channels such as relatives, friends, neighbours, and private moneylenders to invest in poultry production. The poultry farmers (especially large and medium producers) usually take loans to invest in buying breed or poultry feed and veterinary service. Other poultry farmers who have capital for buying breed, but poultry feed was bought on credit from concentrated feed agencies.

The study result by Delquigny et al., (2004) in many regions in Northern Vietnam shows that the economic impact of avian influenza on the poultry sector seems to be heavy, at all levels such as poultry producers, feedstuff manufacturers, the pharmaceutical industry, distributors and collectors. However, the poultry farmers were the worst affected as they represented a heavy individual investment in poultry production, sometimes associated with heavy borrowing. The avian influenza outbreak brought about many poultry production households to fall into debt. This seems to be similar to what happened in the case study site. The result of the household survey (Table 6.6) suggests that a high 92 percent of large- scale farmers got into debt. Of these, 50 percent of the households were in debt to the PCFs, 25 percent to the concentrated feed agency and 16.7 percent to the lenders. Also 78 percent of households in medium- scale production were in debt, of which 55 percent of the households fell into debt with the concentrated feed agency and 22 percent to the PCFs. No households from the small-scale production group fell into debt.

Table 6.6: The debt of poultry farmers in different groups due to avian influenza outbreak

Particulars	Large - scale farmers		Medium- scale farmers		Small- scale farmers	
	N= 12		N=18		N=13	
	No of households	% of total	No of households	% of total	No of households	% of total
<i>Don't fall into debt</i>	1	8.0	4	22	13	100
<i>Falling into debt</i>	11	92	14	78	-	-
<i>Source of credit</i>						
The PCFs	6	50.2	4	22.2	-	-
The lender	2	16.7	-	-	-	-
Concentrated feed agency	3	25.0	10	55.6	-	-

Source: Household survey, January 2010

Another issue of interest here is how the size of debt of medium and large – scale farmers with the bank and concentrated feed agents due to the loss by avian influenza outbreaks. In-depth interviews were thus carried out with a bank agent and concentrated feed agent to understand deeply the debt situation of poultry farmers in the research site (Box 6.2).

Box6.2: What the bank and concentrated feed agents say about the debt of poultry farmers.

Mrs. A- has been an agent of the People' Credit Funds for 15 years. She responded that, in 2004 and 2005, the loan of the bank kept by households was more than 500 million VND, of which two - third of this amount was kept in poultry production households. Normally, poultry production households repay on time. The avian influenza outbreak caused great losses for their economy and this lead to delayed repayment of poultry farmers. The bank agent came to each household many times to ask for the money back but got answers from household head as ''when I get compensation, I will repay''. Eventually some household heads evade meeting us.

Mr. Q - is concentrated feed company's agent. He responded: Mr. H is poultry farmers in Lang Ca village-Yen Son commune. His duck flock with 3 thousand heads died and were culled due to AI early in 2008; he was in debt to me 18 million VND for buying concentrated feed. I came to his household no less than ten times to ask for the money back but he often dodged. I also called him and got his answer that "I will repay when getting compensation". At the end of 2008 and in the middle of 2009, he repaid 17 million VND. Until now, he still owes me one million VND

Source: In- depth interview, January 2010

The qualitative survey data further highlights that avian influenza caused the poultry farmers in the case study site hardship such as financial loss, income loss and the debt ([Box 6.3](#))

Box 6.3: The story of a poultry farmer about the loss to them due to avian influenza

Mrs. A – has three children at schooling age and her husband is often sick by stomachache. Her duck flock with 700 head died and was culled by avian influenza in 2007. She says:

'' I cried and did not know how to cope when looking at the duck flock that died in abundance in the field rice. I was both very tired due to driving the duck flock for culling and worried about all the money that we had borrowed from the bank (30 million VND), friends(4 million VND), and together with my own small capital invested in duck production. Avian influenza took off. After some days, the bank came and asked for the money back repeatedly. At that time, I felt very stressed and only wanted to run away. Then I thought of my three children and, as a result, I stopped the intention to run away from home ''.

What happened then with Mrs. A? She says:

During the poultry production stop, my husband and I worked with many alternative jobs to earn money for daily expenditure and repay the loan interest for example working for the tea farm and apple pie farm, doing construction work, cashing snails and fish. Six months after the avian influenza outbreak, I got compensation, more than 9 million VND and all the money was repaid to the CPFs. In the middle of 2008, my mother- in-law sold land and she lent us 25 million. We used 20 million to repay the bank and the remaining 5 million was used to invest again in poultry production. Until now, I have still not repaid a debt to my friend.

Source: In -depth interview, January 2010

6.2.3 The effects of avian influenza on Human capital

According to Ellis (2000) at household level, human capital is a factor of the quantity and quality of labour available with its education, skills, knowledge and health. In other words, the term "Human capital" at

household level includes the employment of labour force, knowledge and awareness, health, education, nutrition, skills etc. The vulnerability in avian influenza context affected much human capitals of households in different poultry production groups in case study site. However, in this study, the author focused on discussing the effect of avian influenza on the dietary intake of poultry production households, the employment of labour in their family and their knowledge and awareness.

6.2.3.1 The dietary intake of poultry production households

Vietnamese diet includes rice, vegetable and animal protein food. Rice is the most common food and animal protein food is a part of the average Vietnamese diet. In recent years, the Vietnamese diets have an improved dietary intake, mainly as total animal protein consumption has increased from 50 g/person/day in 1990-1992 to 63 g/person/day in 2001- 2003 (Burgos et al., 2008). Popular animal protein food is pork, poultry meat, egg and fish and others.

The group discussion with poultry farmers in this case study indicated that they have two main meals in the day including lunch, and dinner. Breakfast is a smaller meal. Poultry farmers frequently eat instant-noodles, or fried, or cooked rice with fish sauce for the small meal. Meanwhile, the main meals include cooked rice, vegetables and either non- poultry meat/ poultry meat or fish/ tofu. Prior to the avian influenza outbreaks, large – scale farmers had pork meat and poultry meat or eggs three and four times per week, poultry meat was used one or twice per week. They also eat fish and tofu five or six times per week. Vegetables were usually included in all major weekly meals. The number of times that the medium- scale farmers use different foods in their weekly meals is similar to the large - scale farmers. In contrast, the small- scale farmers usually ate non- poultry meat and eggs 2- 4 times per week, poultry meat was eaten once weekly, and they ate tofu from 1- 7 times per week and fish 3- 4 times per week (Group discussion with poultry farmers in three group, December of 2009).

However, the avian influenza outbreak caused a sudden drop in ready cash, main income loss and debt for households in large and medium- scale production. Besides, the avian influenza also caused a loss of available food and a small income loss for the small- scale farmers. In addition, the price of other foods increased. This caused a change in the dietary intake of poultry keeping households because women in poultry production households decreased the expenditure on animal source protein and bought cheaper food for their family. Annex 2 indicates that the majority of poultry production households did not use poultry meat and eggs during avian influenza outbreak. At that time, tofu, fish and vegetables were substituted for poultry products in their routine diets, and pork was also used regularly but mainly once per week as the price is two times higher than prior to avian influenza outbreaks. Only 25 percent of the large producers and 7.6 percent of the small producers still ate poultry eggs. According to them, eating eggs is not as dangerous as eating poultry meat, and the price of egg is lower than other animal meat, for example pork meat. In comparison, 15% of the small producers still ate poultry meat in their weekly meals and they said that poultry meat was cheaper than other food and they always processed it carefully.

Moreover, the group discussions and further in-depth interview indicated that, they used fish in their weekly meals during avian influenza outbreaks depending mainly on catching natural fish, and that fish was processed and stored for future use (Box 6.4)

Box 6.4: Catching natural fish for home consumption during poultry production stop

Mr. P- a medium- sale farmer with 450 bird culled by avian influenza in 2007. He said, “after my duck flock died by avian influenza, I stopped keeping poultry for 7 months. During that time, I did construction work near my home but the money earned from construction work was not enough for daily expenditure. Meanwhile, the commodities and food increased in price. To reduce expenditure on food items, I usually spent two or three hours a day catching natural fish. With each time of such fish catching, I could catch one kg or more depending on the weather and my health. My wife cooked the fish with much salt, and it is easy to store for a long time and to use for our meals”.

Source: In- depth interview, December 2009

Iannotti, (2009) discussed in his research that poultry products as a source of food are very important. They contribute to a well balanced diet, as they are important bio-available sources of vitamin A, iron, and zinc - micronutrients that are crucial for both health and development. In addition, Burgos et al., (2008) also argued that poultry meat and eggs are a rather rich source of well-absorbable minerals (especially Iron) and improve absorption of iron from other foods. The amino acid composition complements that of many plant foods, and it is a concentrated source of B vitamins, such as vitamin B12 that is absent from plant foods, as well as folic acid, thiamin, riboflavin, phosphorus, and zinc. On the other hand, the study did not investigate whether micronutrient deficiencies occurred in the diets of the majority of poultry farmers during the avian influenza outbreaks. However, it should be noted that the poultry farmers reduced their consumption of a food source with many essential nutrients that are difficult to compensate for other products during avian influenza outbreak.

After avian influenza outbreak from 5- 7 months, their living become a little more stable as compared to during avian influenza outbreak for several reasons: the first, large and medium – scale farmers respond that the compensation helped them repay the bank, or the lender, or concentrated feed agents. It also reduced monthly spending on interest for the bank or the lenders. The households in large, medium – scale production, and small- scale production who did not fall into debt, they used the compensation to re-invest in poultry keeping or for other jobs. The second, the prices of some food and commodities reverted to their normal levels and the perception of health risk was improved. From these reasons, the consumption of poultry farmers reverted to the pre- outbreak level (Annex 3). At this time, the consumption of both poultry meat and eggs were resumed in all poultry production households, and dietary intake in weekly meals of them have had food diversification such as non-poultry meat, poultry meat, eggs, tofu, fish and vegetable (Annex3).

time of an avian influenza outbreak can be one or more than one month depending on the happening level of avian influenza. (Interview with veterinary authority, April of 2010)

6.2.3.2 The employment of labor force in poultry production households

There were many studies in the world as well as in Vietnam such as Alemu *et al.*, (No date), Omiti & Okuthe, (No date) and Otte, (2006) suggest that poultry production plays the significant role in creating the employment for rural labour force. As discussed above, poultry production also has an important meaning for generating the employment and income to the labor force in families of poultry production households, especially for the large and medium- scale farmers in the research site. However, after avian influenza outbreaks, poultry production stopped for several months. Therefore, the question came up as to what did women and men in poultry production households do for earning income during the stop of poultry production.

The data from Table 6.7 shows that during the stop of poultry production, women in poultry production households usually combined on- farm, off-farm and non-farm activities to earn an income.

Table 6.7: Type of work of women during poultry production stop

Particulars	Large- scale farmers N= 12		Medium- scale farmers N=18		Small- scale farmers N=18	
	No of hh	% of total	No of hh	% of total	No of hh	% of total
	<i>On-farm</i>					
Crop production	-	-	1	5.6	2	15.4
Crop and livestock production (excl. poultry production)	3	25	8	44.4	8	61.5
Livestock production (excl. poultry production)	1	8.3	-	-	-	-
<i>Off-farm</i>						
Catching snail	-	-	1	5.6	-	-
Catching snail and working for tea and pie farm	-	-	2	11.1	2	15.4
Working for Dong Giao Tea and Apple pie Farm	6	50	9	50.0	3	23.1
<i>Non-farm</i>						
Doing construction work	2	16.7	3	16.7	-	-
Trade	6	50.0	2	11.1	1	8
Selling vegetable	-	-	6	33.3	7	54
Migration	1	8.3	-	-	-	-

Source: *Household survey, January 2010*

The income earnings by the women in large- scale production depended much on non-farm and off- farm activities which came from employments such as working for Dong Giao Tea and Apple pie Farm and trade with around 50 percent of women respectively. Such trade includes scrap iron activities, dry goods or pork meat sale in village markets.

The income-earnings of the women in medium- scale production was also relied much on off- farm, on-farm, and non- farm activities including working for Dong Giao Tea and Apple pie Farm, crop and livestock

production (excluding poultry production), and selling vegetables which accounted for about 50; 44 ; 33 percent of surveyed women respectively. The group discussion with medium- scale farmers showed that women in this group often bought vegetables from intermediaries in the big market in the Ninh Binh city and then sold them to consumers in the market of other communes or Ninh Binh city. The employment constraint for the women in small- scale production was not much as compared to women in large and medium- scale production during the poultry production stop, because poultry production was not a main activity for generating income. However, it also is interesting to know what women in small- scale production did for several months during the interrupted poultry production in order to get income for buying food that substituted for poultry products. Table 6.7 shows that these women were involved mainly in on-farm and non- farm activities that include crop and livestock production (exclude poultry production), and selling vegetables in the market of the village, standing at 61 and 54 percent of households respectively. In comparison with prior to the avian influenza outbreak, they frequently spent time in crop production and livestock (exclude poultry production). In contrast to women in medium- scale production, the vegetables that women in small – scale production sold in the market was the produce from their own production

A question of interest is then whether the income earned from these employments was higher or lower than from poultry production.

According to the women in large – scale production, the income from working for tea and apple pie farm was 25 thousand VND and the income from trade 30 – 35 thousand VND per day. These incomes were unstable and lower than poultry production. In addition, they said that, they spent a full day (10 or 12 hours in day) working compared to poultry production with 5- 6 hours in day.

The result of the group discussion with women in medium - scale production indicated that crop and livestock production (excl. poultry production) including rice production and keeping 1-2 pigs or from one to two sows did not provide daily income. The income from working for the tea and apple pie farm was 25 thousand per day, and the income from selling vegetables 35 – 40 thousand VND per day. Moreover, they spent a full day for such works and spent more time than in poultry production. Thus, they had little time to take care of their children and family.

The women in small- scale production responded that the livestock production did not provide daily income and the income from selling vegetables was 20 -35 thousand VND per day. They also said that it was difficult to compare the income from non -farm and on- farm (exclude poultry keeping) with poultry keeping, because poultry production was not main income source but a source of food for their family.

The research also looked at the employment of men in poultry production households during poultry production stops. As discussed above, the men in large and medium –scale production were more likely to be engaged full time in poultry keeping prior to avian influenza outbreaks. What they did when poultry production stopped is presented in Table 6.8

Table 6.8: The jobs of men during poultry production stop

Particulars	Large- scale farmers N= 12		Medium- scale farmers N=18		Small- scale farmers N=13	
	No of hh	% of total	No of hh	% of total	No of hh	% of total
	<i>On- farm</i>					
Crop production	-	-	-	-	1	7.7
Crop and livestock production (excl. poultry production)	-	-	1	5.6	4	30.8
<i>Off- farm</i>						
Catching snail and fish	1	8.3	7	38.9	5	38.5
<i>Non-farm</i>						
Construction work	3	25.0	11	61.1	6	46.2
Construction and Others	-	-	1	5.6	-	-
Trade	7	58.3	2	22.2	1	7.7
Migration	-	-	2	11.1	-	-
Others	2	16.7	-	-	-	-

Source: *Household survey, January 2010*

Earning income of the men in large – scale production came mainly from non- farm activities, 58 percent men of the surveyed households did trade that consisted of selling pork meat in the market of other communes and grocery vending in the village and other communes. About 25 percent of men in the survey did construction work. Other activities included being assistant drivers or running motorbike taxi (17 men percent of surveyed households).

The men in medium- scale production were usually involved in off –farm and non- farm activities such as catching snails and fish and doing construction work (38.9 and 61 percent respectively).

Differing from the men in large and medium- scale production, the men in small – scale production had limited involvement in poultry production. Yet the research also had an interest in what men in this production scale did in order to get income for the daily expenditure in their family when poultry production stopped. Table 6.8 shows that they earned income from on- farm, off farm, and non- farm activities comprised of crop and livestock production (excl. poultry production), catching snails and fish, and doing construction work (31; 38; 46 percent of households respectively). In general, these jobs of men in small-scale production did not differ from prior to avian influenza outbreak.

Dong Giao Tea and Apple pie Farm has 2180 hectares land for apple pie and tea cultivation with 100 main workers. These numbers of workers do not fill the labour demand of the farm, so it has to rent more outside labours

The group discussion with authorities indicated that men in poultry production households have non- farm employments both near home and far from home. The non- farm employments that are far from home included motorbike taxi, assistant driver and construction work. These jobs were in Ha Noi city, Nam Dinh city and some regions of southern Vietnam. The non- farm employments near home such as trade, construction work were in the village or other communes in Ninh Binh province.

The income from these employments was sometimes higher, sometimes lower than the income from poultry production. This issue was also discussed with men in the poultry production groups.

According to the men in large – scale production, the income from selling pork meat was about 45 to 50 thousand per day and the income from grocery vending in the village or outside the village was around 25- 30 thousand VND per day. They said that these jobs were not stable due to the weather, for example, if it rained heavily they had to stay at home and had no income. The income from motorbike taxi employment was unstable, because one day, they could earn income from 20 – 100 thousand VND but the next day, they may have no income from this. This depended much on the number of customers. For the income as assistant driver, they could get rather high incomes, about 100 – 150 thousand VND per day. However, in this job, they had to be far from home about 20- 25 day per month. Moreover, they had to spend money on their living such as renting a house, transportation and others. The savings for their family was not too much, around 300 – 400 thousand VND. Therefore, the men in large- scale production responded that these jobs that they did during the poultry production stop were unstable in terms of income, and they had to live far from their family.

The men in medium - scale production indicated that the income from doing construction work was 45 thousand VND per day if they worked near home. The income from doing construction work far from home was 80 - 100 thousand per day. However, with such the employment far from home, they had to spend money for transportation and their living, and the savings send to their family were insignificant. The income from catching snails and fish was about 30- 50 thousand VND per day depending on the weather condition and their health. Moreover, they said that, these were seasonal employments and they were not stable as compared to poultry production.

Discussion with the men in small- scale production, they did not give clear evidence for their income. However, they responded that it was difficult to compare their jobs with poultry production, as poultry production was not a main income source.

An interesting finding from fieldwork was that avian influenza outbreaks affected indirectly the education quality of children in poultry production households, as their parents were very busy earning money for the daily expenditure and repayment for the bank and others (Box 6.5).

Box 6.5: Why avian influenza affected indirectly the quality of education of children in poultry production households

Mr. Q- a large- scale farmer, his duck flock with 2500 head died and were culled by AI in 2007. He has three sons at schooling age, his oldest son studies at high school and the second son and third son study at secondary school. He says: ‘‘I went to work in construction in Ha Noi for three months in order to earn income for daily expenditure in my family and repaying the bank. My wife worked for the tea and apple pie farm, she left home at 6.30 am and was back home at 5.30 pm. She was also busy with her work all day. In general, both my wife and I were very busy with our jobs. We didn’t have time to take interest in the study of my three sons, thus the oldest son often dropped out of school in order to play game and he failed in high school finals. The second son and third son were bad at math and literature’’.

Source: In-depth interview, January 2010

It was clear that the avian influenza outbreak caused a poultry production stop for several months. As the education of poultry farmers is low and as a result, the poultry farmers (especially large and medium scale farmers) came to work with temporary on- farm, off- farm and non- farm employments that required little education. These employments are seasonal activities and unstable in terms of income. They spend much time in these employments as compare to poultry production and they have thus little time for taking care of their families

6.2.3.3 The knowledge and awareness of poultry farmers

Jacob et al cited in Beach *et al.*, (2007) discussed that there are two key factors can lead to the spread of HPAI. The first, poultry may be infected HPAI through direct contact with infected birds or through contact with contaminated carcasses, manure or poultry by products. People (eg shoes, clothing) and equipment (eg. poultry house, vehicles) or other agent contaminated with the virus can also spread HPAI. The second, market in practices especially marketing of live birds are an important factor for the spread of HPAI as the movement of sick animal, people or infected material among the regions. The questions raised here is what knowledge and awareness about dangers of HPAI did poultry farmers in the research site have? In addition, did they know how avian influenza could spread?

Some indication is given by listening to the stories from local people in the case study site ‘‘*I have lived in this commune for 30 years, I can not forget avian influenza outbreak in my commune in 2004 and 2005. Many households threw away dead ducks and chickens into the waste dump behind the village temple and many households disposed dead ducks in rice fields. The body of dead birds remained in waste dumps and rice fields for many days; nobody came to collect birds for culling. These attracted many flies and made bad smell. This leads to the polluted environment for people in the village*’’. The result of in-depth interviews with the veterinary staff in the research site told that: early in the outbreaks, poultry farmers still ate sick birds and even gave these sick birds their neighbors for eating. Nobody died by avian influenza because the poultry meat was properly cooked. However, they threw poultry feather and water that used to clean poultry in slaughtering step into water outlet or disposal area in the village. These illustrations are reasons leading to

spread widely HPAI to surrounding regions. It also shows that the knowledge and awareness of poultry farmers about avian influenza in the case study was very low early in the avian influenza outbreak.

During group discussions with the poultry farmers, the author found that they had a fairly clear picture of how to act in relation to AI, as follows:

Firstly, they mentioned that the avian influenza is an epidemic and very dangerous not only for poultry but also for humans. They also often followed the guidelines of veterinary staff such as wearing mask, boots, gloves and hat during the poultry work. They also used gloves or a plastic bag to pick up dead birds and washed their hands with soap after picking up dead birds. Moreover, they knew the symptoms of sick birds. They also knew how to detect AI in sick birds, how to dispose of dead birds, and how to protect themselves and their family from the risks. They got the information from the television, public voice and the district veterinary staff.

Secondly, preventing disease:

Prior to avian influenza outbreak, the large- scale farmers and medium scale farmers did not care to use vaccination for their ducks. After avian influenza outbreaks, they had the vaccination schedule for their ducks for the purpose of improving poultry health and fighting against avian influenza. (**Box 6.6**)

Box 6.6: The vaccination schedule for preventing bird disease

<p>The vaccination schedule for duck</p> <ul style="list-style-type: none"> - Duck with 7 days old: using Duck hepatitis (DH) vaccine - Duck with 1 month old: using Duck Cholera (DC) vaccine <p>Using avian influenza vaccine for duck on May and December yearly</p>	<p>The vaccination schedule for chicken</p> <ul style="list-style-type: none"> - Chicken with three days old: using Gum vaccine - Chicken with 13 days old: using Lasota vaccine - Chicken with 21 days olds: using Newcastle vaccine <p>Using avian influenza vaccine for chicken on May and December yearly</p>
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Source: Group discussion, December 2009

Differing from the large and medium - scale farmers, the small- scale farmers did not have specific vaccination schedules for their chicken. However, they have carried out prevention on their own, as follows: separating chicken houses far from the main house and using bactericide for the chicken house once a month. When they see chicken have unusual symptoms, they often report to the veterinary staff in order to get guidance from them.

Thirdly, preparing poultry breed:

According to large and medium-scale farmers, prior to avian influenza outbreak, they usually bought breed from intermediaries or breed producing centers without government’s certification. Poultry breeds that were bought from intermediaries and these centers did not ensure the breed quality or disease safety. Therefore, after the avian influenza outbreak, they have usually bought duck breed from the breed producing centers with certification of the government such as Thuy Phuong Centre, Dai Xuyen Duck Centre, or private centres with certification of government for purposes such as ensuring the quality of breeds and disease safety, especially avian influenza.

The small- scale farmers responded that: before avian influenza outbreaks, they usually bought breed from the local market or traders to complement or replace their flock. Nevertheless, experiencing avian influenza outbreaks, they are afraid of new outbreak. Thus, chick replacements or complements are generally hatched from own-stock eggs. Sometimes they buy chickens from their neighbors who have good healthy chicken flocks for replacements or complements.

Through the above evidences, it was seen that the poultry farmers who experienced avian influenza outbreaks have improved their knowledge and awareness in controlling avian influenza and other diseases. Therefore, in 2008 Tan Binh commune did not have any avian influenza outbreaks and in Yen Son commune, the number of poultry were infected by avian influenza was three times less as compared to 2004, 2005, 2007 (Chapter V), and especially there were not any avian influenza outbreaks in these two communes in 2009.

6.2.4 The effects of avian influenza on Social capital

Social capital as “reciprocity within communities and between households base on trust deriving from social ties” (Moser, 1998 as cited in Ellis, 2000). In many societies, the livestock especially the poultry serve as a mechanism for establishing relationships of trust within social relationships (Perry *et al.*, 2003). The avian influenza affected social capitals of households in different poultry production groups in the research site. The research is interested in how avian influenza outbreak affected culture significance and how did social relations help the poultry farmers to cope avian influenza in the research site.

6.2.4.1 The effect of avian influenza on culture

In rural areas of Vietnam in general and rural area in the case study site in particular, poultry products have social roles and are given in the social fabric in the form of cultural events, religious ceremonies, and local festivities. Moreover, poultry makes prestige to the owners when poultry products is offered as meal for special guests, as gifts on special occasions and are especially important in the Tet holidays. The poultry also make dowry for young couples. In other words, the poultry products have cultural significance in Vietnam (Weaver, 2009). The concern here is how avian influenza outbreaks affected cultural significance. Thus, the household survey results are presented in Annex 7 all households in large and medium- scale production and almost all (92 percent) of surveyed households in small - scale production did not use poultry products as a gift, special food in meal for special guests, in special holiday, and other social purposes during avian influenza outbreak period. Only a slightly proportion of small – scale farmers that used poultry products for above purposes and standing at 7.7 percent.

So, what food was used to substitute for poultry products for the above purposes? According to poultry farmers’ opinions, rabbit meat, fish, pork meat, others including goat meat or sheep meat were substituted for poultry products. Meanwhile, rabbit meat and pork meat was used mainly in substitution for poultry products in meal for special guests, in special holiday or other social purposes during avian influenza outbreak period (Annex 7).

Weaver (2009) discussed in his research that poultry products have cultural significance in Vietnam. Thus, poultry loss caused by avian influenza may lead to losses in social capital by families unable to adhere to social norms or a perceived loss of face by the individual, either of which can lead to problems of social exclusion. However, the result of the fieldwork in the case study site shows that the avian influenza outbreaks affected cultural significance through the other products substitution for poultry products in cultural events and social purposes. The study did not have the any evidences for problems of social exclusion.

6.2.4.2 The importance of social relations for coping with avian influenza

According to DFID (1999) in the guidance sheets on sustainable livelihoods show that, importance of social capital seems to be considered as “resource of last resort” – a buffer is able to help households coping with the shocks and ‘a safety net to ensure survival during periods of intensive insecurity’. Thus, an issue of interest in the case study site was how social capital can help poultry production households to bear avian influenza shock and to ensure survival during intensive insecurity.

Social relation in economy assistance

During and after avian influenza outbreak, poultry production households (especially large producers and medium producers) had difficulties in economy and moral stress. Social capital, both family and non-family networks can help them to bear HPAI shocks through money assistances from the formal and informal sectors for purposes including daily expenditure, buying pesticides, artificial fertilizer for cultivation, or school fees, wedding costs and funerals, or doing other activities (Group discussion with large and medium scale farmers, December of 2009). Formal sector includes assistance of Women Union, Farmer Union or access to credit of the bank. The informal sector consists of the assistance of relatives, fiends, neighbours, and moneylender. The result of the households survey (Table 6.9) indicates that most surveyed households in the large- and medium - scale production got the assistance from the informal sector. On the other hand, only 23 percent of households in small–scale production received the assistance from the informal sector. Besides, there were about 33 and 50 percent of households in large and medium - scale production respectively who received from the formal sector. The proportion of households in small – scale production who received the assistance from formal sectors was only 7.7 percent (Table 6.9). This table also shows that the numbers of households in poultry production groups who received assistance from the formal sector is lower than that from the informal sector.

Table 6.9: The support of informal and formal sector to poultry farmers in different group after avian influenza outbreak

Particulars	Large- scale farmers N = 12		Medium- scale farmers N = 18		Small- scale farmers N = 13	
	No of Households	% of total	No of households	% of Total	No of Households	% of total
<i>Getting assistance from informal sectors</i>						
Yes	9	75	17	94.4	3	23.1
No	3	25	1	5.6	10	76.9
<i>Getting assistance from formal sectors</i>						
Yes	4	33.3	9	50	1	7.7
No	8	66.7	9	50	12	92.3

Source: Household survey, January 2010

Moreover, the poultry farmers who experienced avian influenza outbreaks also received the sympathy and encouragements from family and non- family networks during crisis time.

Social relation in sharing technical production

Fieldwork findings in case study site show that after avian influenza outbreaks, there were 91.7; 100 ; 84.6 percent of the surveyed households in large – production, medium- scale production, and small- scale production respectively that changed in technical production. The change in technical production was through the way of preventing disease and buying poultry breed (as discussed in section human capital). The change in technical production of poultry farmers is for purposes of getting high productivity in poultry production and mitigating the avian influenza outbreak. The concern raised here is who helped poultry farmers to change technical production. Annex 8 shows that poultry farmers can learn new technical production from friends, women union, farmer union, and training courses. They also learn new technical production from other sources including breed centers, veterinary staff of commune or other communes, television, and book. However, the numbers of poultry farmers in three groups learn new technical production from friends and others source rather than learning from the training courses, women union and farmers union.

It appears that social capital can help poultry production households for learning new technology in order to improve poultry production productivity and mitigate avian influenza.

Social relation in market access

In the in- depth interview with Mr. Q - a large- scale farmers, he said, “After avian influenza, I have many relationships with middlemen for selling my birds”. Why does he say that? He continues, “Prior to avian influenza outbreak, I only sell my poultry to middlemen A. after the avian influenza outbreaks, the demand of consumers for poultry products often changed. This leads to intermediary A not buying all the birds in my poultry flock. Therefore, I must contact with others to sell my birds. My friends help me contact with many other intermediaries and Mr. A himself also helped me contact others. The prices for buying poultry

between Mr. A and other intermediaries did not differ’. Do other poultry farmers have the same ideas as Mr. Q that they had many relations with intermediaries after the avian influenza outbreaks? The results in Annex 9 indicates that all households in large- scale production claimed that after avian influenza outbreaks they have many the relationships with intermediaries. A high 94 percent of households in medium- scale production also have the idea that increased relationships with intermediaries after avian influenza outbreaks. However, nobody in small -scale production responded that relationship with intermediaries increased after the avian influenza outbreaks. This is likely to be because they usually sell their chicken products to other farmers in the village or they take them to local market for selling.

The study was also interested in who helped the large and medium-scale farmers in the case study site to contact with the intermediaries for selling their poultry products. The result of the household survey (Annex 9) reveals that the large and medium- scale farmers received more help from friends and old intermediaries, as compared to from the relatives, women union, and farmer union.

In short, during and after avian influenza outbreaks, social capital, both family network and non- family network helps economy for poultry production households to bear avian influenza shock and ensure survival during intensive insecurity. Also at that time, the poultry farmers in three groups can improve their technical production through sharing experience production among poultry farmers, or between poultry farmers and others. The large and medium- scale farmers increase the relation with many intermediaries for marketing their poultry when the demand for poultry products is fluctuating.

6.2.5 Discussion and interpretation on the effects of avian influenza on poultry farmers’ livelihood

McLeod, et al (2004) discussed in their study that in Vietnam the small- scale farmers with a flock size of 51 –150 chicken were the largest losers by avian influenza because of their limited number of other livestock. Many households had borrowed loans to fund poultry production and they fell into debt when their poultry died or were culled. This is contrary to what the author found in the case study site, the result of this study suggests that the large –scale farmers with flock size of 1000-7000 ducks, and the medium-scale farmers with flock size of 200 – 1000 ducks were the greatest losers by avian influenza. Many of them got into debt with the PCFs, and concentrated feed agency companies. Meanwhile, the small- scale farmers who kept chicken with flock size of 20 – 200 have the lowest financial loss because they mainly use their own crop products to invest in poultry production. Overall, avian influenza outbreaks affected negatively financial capital of the poultry farmers.

Avian influenza outbreaks affected both negatively and positively human capital of poultry production households in the research site. In terms of the negative effects, the large, medium and small- scale farmers had the changes in their dietary intake in weekly meals during and after the avian influenza outbreak in several months due to the increase in the price of food and drop in ready cash. Avian influenza outbreaks also have negative effects on the employment of women and men in large and medium - scale production. On the other hand, avian influenza outbreaks did not affect much the employment of small- scale farmers, as poultry production is not the main income generation activity. Experiencing the avian influenza outbreaks,

the poultry farmers in three groups in the case study site have an improved knowledge and awareness in disease prevention and control for poultry; this is positive effect of the avian influenza outbreak.

The social capital of poultry production households was also affected both negatively and positively by the avian influenza outbreaks. Negatively, avian influenza outbreaks affected cultural significance of using poultry products in festivals, as gifts or for other social purposes in the case study site. Positively, after the avian influenza outbreaks, the poultry farmers especially large and medium- scale farmers increased social relations.

Through this, we find that avian influenza outbreaks affected both negatively and positively the poultry farmers' livelihood in Yen Son and Tan Binh communes. Nevertheless, the effects were more negative than positive. The large and medium - scale farmers are affected by avian influenza more than the small- scale farmers are, because the livelihoods of large and medium-scale farmers rely much more on poultry production. From these negative effects of the avian influenza outbreaks on the poultry farmers' livelihood, the question here is; What institutional help did the poultry farmers in the case study site get to mitigate HPAI from national and local level? This question was discussed and answered in next section

6.3. Institutions that help the poultry farmers to mitigate HPAI at national and local level

This sub-section discusses policies that help the farmers mitigating HPAI, the access of poultry farmers to such policies and respondents opinion about these policies implementation.

According to the result of group discussions with the poultry farmers and authorities in the case study site, the culling program, the compensation, the vaccination supporting and the training courses were policies that help them mitigating HPAI outbreak.

6.3.1 Compensation policy

Pratt & Falconi, (2007) argued that avian influenza culling programs must be coupled with a compensation scheme to pay poultry farmers a specified sum for infected poultry in stock that died and had to be culled. Besides, Delgado *et al.* (2006) discussed that the payment of compensation to farmers whose animals have been culled fills two purposes. The first is to increase in producer cooperation through better promotion to comply with reporting the disease and culling requirements of disease control packages. It declines the time lag between an outbreak and prevention actions, and reduce in the overall cost of control. It also decreases the risk of the virus mutating to becoming transmissible from human to human. The second objective may be to refund losses of private farmers who have complied with a disease control process for the public good. The concern here is how did the Ninh Binh province implement the compensation decisions to the poultry farmers.

6.3.1.1 Compensation policy implementation

According to the results of in- depth interview with veterinary authority shows that from 2004 to 2008, Ninh Binh province always has had compensation decision to the poultry farmers who are affected directly by avian influenza. The level and type of compensation were changed year by year as consequence of farmer complaints.

In 2004, the compensation level to affected farms by AI was 5000 VND per culled bird (according to the Decision No396/ QD- TTg, 20/4/2004).

In 2005, according to the Decision No 574/QD-TTg, 24/6/2005, the Ninh Binh province decided the compensation levels relating to age of poultry as follows:

- 5000 VND per a culled bird under one month old
- 15000 VND per a culled bird over one month old

In 2007, the decision of the province was based on the decision No 309/2005/QD-TTg, the compensation levels had changed that related to the weight of bird as follow:

- The culled birds with weight under 0,3 kilogram was compensated 5000 VND,
- The compensation level of 15000 VND per culled bird with from 0,4 to 1 kilogram,
- The culled bird with weight more than 1 kilogram was compensated 20000 VND

In 2008, Ninh Binh province have the decision No 2242/QD-UBND, the province has had the change in the compensation level that based on the Circular No 80/2008/TT-BTCg, the following compensation levels

- 5000 per a culled bird with weight under 0,5 kilogram
- 15000 per a culled bird with weight over 0,5 kilogram to 1 kilogram
- 25000 per a culled with weight above 1 to 2 kilograms
- 35000 per a culled weigh over 2 kilograms

It can seen that the compensation level of Ninh Binh for the poultry farmers who suffered the avian influenza outbreak had improved in each year, the payment of compensation levels of province to the poultry farmers was established in relation to either the age or the weight of poultry.

6.3.1.2 Access of poultry farmers to the compensation policy

Yen Son and Tan Binh commune was the epicenter of outbreak in Tam Diep town – Ninh Binh province. Complete culling was ordered in the villages within three km radius of in Tan Binh and Yen son communes in 2004. However, reducing the loss for the farmers and the economic cost of nation, the culling was only carried out for households who had AI-positive poultry in 2005, 2007 and 2008. The culling was done at a predetermined spot in the village where farmers had to bring their birds. The farmers who had poultry culled by avian influenza were promised the compensation from Ninh Binh province. The compensation for poultry farmers in Ninh Binh province was done as follows:

In general, all surveyed households in large, medium and small- scale production received the compensation from the province. Ninh Binh province implemented the compensation promise to the poultry farmers who have dead and culled poultry by avian influenza. It appears that the poultry farmers who experienced avian influenza outbreaks had access to the compensation (Annex 10).

6.3.1.3 The ideas of poultry farmers in implementing policy

The compensation policy decision of Ninh Binh province for poultry farmers is positive in order to enhance early reporting, complete culling of disease, decrease the spread of avian influenza outbreak, and reimburse the losses for poultry farmers. However, there were several problems at implementation level are highlighted through the interviews with poultry farmers in case study site.

Compensation rate

When discussing with the large-scale farmers, the author got many complaints that the compensation rate of the province was too low in 2004. According to them, at the farm gate, they could get around 30 thousand VND for per a live duck in 2004. Meanwhile, they received only 5000 VND per a culled duck from the compensation. This compensation worked out to be 17 percent compared to market value. In addition, they did not accept the compensation rate based on the age of bird in 2005 as the compensation was established in relation to the age of poultry, gives inequality among the poultry farmers. An in- depth interview with a large- scale farmer explains further (Box 6).

Box 6.7: Why the poultry farmers said that they do not accept with the compensation base on the age of poultry

AI infected Mr. B- his duck flock in 2005, he responds

“I kept 2000 ducks with more than two months of age and in only one more week, my ducks would be sold. Unluckily, my duck flock was infected by AI. At that time, on average the weights of ducks were from 2, 2- 2, 5 kg per a live duck. If avian influenza did not break out, a live duck could be sold at a price of 40 – 45 thousand VND. In fact, I only got compensation of 15 thousand VND per a culled duck. In contrast, Mr. X, my neighbor, had a duck flock, one month and 20 days of age and an average weight of duck of 1,5 kg per live duck. Their price in the market was around 20-22 thousand VND per a live duck, if no avian influenza outbreak. However, he also got compensation level of 15000 per culled duck. Similarly, Mr. Q- he is son of village leader, his AI- affected duck flock was a month old and he got compensation of 15 thousand VND per a culled duck too”.

Mr. B also said that “ I find the compensation decision based on the age of bird was unequal for producers in terms of selling price as well as production cost”.

Source: In-depth interview with large – scale farmer, December 2009

Ninh Binh province had changed the compensation in response to local conditions, which established in relation to the bird weight in 2007. However, large - scale farmers responded, “*Poultry farmers always get difficulties in production such as the price in fluctuation of poultry products, lack of credit, and the effect of infectious disease like avian influenza. We know that the province have supported the compensation for us that is positive and the compensation level in 2007 was improved compared to 2005, however, it was still low. If comparing with the market value, the compensation rate worked out to be one- third of the market value. Because normally a live duck could be sold at price of 45- 47 thousand VND event, reach 50 thousand VND before AI outbreak. In fact, the province only paid 5 thousand VND for a culled bird with weight under 0, 3 kilogram heavy, and 15 thousand VND per culled bird with weight from 0.4 to 1 kilogram, and 20 thousand VND per a culled bird with weight more than 1kilogram. Moreover, this compensation rate is approximately one- second of the production cost*”. At least in terms of what farmers perceived as equitable the compensation rate in 2007 has improved compared to in 2005. Nevertheless, it was still low which worked out to be 30 percent of the market value and approximately 50 percent of the production cost.

However, Ninh Binh province has a great improvement in the compensation level in 2008. Did the poultry farmers in case study site accept this compensation level? An in-depth interview was been done with a poultry farmer in large –scale production who have avian influenza- affected duck flock in 2008 (Box 6.8).

Box 6.8: How poultry farmer say about the compensation rate in 2008

Mr. Q: he raised 2500 Bau ducks with age of 2.5 months that were infected by AI in 2008

“ I have many friends who also have kept duck like me. Many of them got large loss by AI in 2005 and 2007. At that time, avian influenza did not affect my duck flock. As I live in ravine region far from central village. Unlucky, my duck flock was infected by avian influenza in 2008, and I got the compensation rate for a culled duck to be 35 thousand VND. I was unlucky by avian influenza outbreak in my duck flock, but I was luckier than my friends were. Because, I got the compensation rate two times higher than they got in past years. I think that this compensation rate can be accepted, as it worked out to be 70 percent of the market value. Prior to AI outbreak, the price of a live duck was 47 thousand VND”.

Source: In-depth interview with large –scale farmers, December 2009

The result of group discussion with the medium -scale farmers shows that the ideas of them are similar with large- scale farmers. They said that the compensation rate was low in 2004, 2005, and 2007. Although in the research site, medium - scale farmers did not loose birds by avian influenza in 2008, the author also discussed with them about the compensation rate in 2008. The medium producers expressed that this could be accepted. However, the author did not get the complaints of medium-scale farmers around the compensation establishment relate to the age of bird in 2005.

Discussion with the small-scale farmers showed that the poultry breeds which they usually kept were local chicken breeds such as RI, Mia, and Dong Tao. The quality of the chicken meat is delicious. The characteristics of the local chicken are yellow-orange, feathering and dark skin colour features which are favoured by consumers in both rural and urban areas. The local chicken were used in particularly in traditional festivals, as gifts, for marriages and wedding parties. The price of these chickens was three times higher than imported chicken breeds and the ducks. Prior to the avian influenza outbreaks, they could sell their chicken at a price of 55000 – 70000 VND per kilogram and get 10000 – 150000 VND per live chicken. In fact, they only got the compensation of 5000 VND in 2004; 15000VND in 2005 and 20000VND in 2007 per AI- culled chicken. They said that the compensation rate was only 5 percent of the market value in 2004 and 20 percent of the market value in 2005, and 2007. In the research site, no poultry flocks of small- scale farmers that were contaminated by avian influenza in 2008. Yet in discussion, the small-scale farmers were of the opinion that the compensation rates in 2008 were estimated to 20 percent of the market value. The small –scale farmers affirmed that these compensation rates were not suitable for their chicken breeds. In their opinions, the compensation establishment of the province should relate to both the species and weight of poultry. This will give equity among producers

In summary, the large and medium-scale farmers usually kept duck. According to them, the compensation rates in 2004, 2005, and 2007 were low and it was worked to be 17 percent of the market value in 2004 and

30 percent of the market value in 2005, 2007. However, the large and medium-scale farmers agree with the compensation level in 2008 because it was worked to be 70 percent of the market value. In contrast, the small-scale farmers usually kept local chicken. They affirmed that the compensation rates of Ninh Binh province were too low and unsuitable for local chicken, as it was estimated to 5 percent of the market value in 2004 and 20 percent of the market value in 2005, 2007, and 2008. It can conclude that the large and medium-scale farmers were able to influence the compensation levels, but the small-scale farmers were not.

Time of payment

From the result of group discussion with three groups and in-depth interview with commune authorities, the author has known that the poultry farmers got money from the compensation of Ninh Binh province after 6 months as from their poultry was culled. The poultry farmers respond that payment time of the province is too late. According to their ideas, the compensation should pay within one to four weeks as from their poultry was culled.

The large and medium-scale farmers said that getting the compensation soon is very important for them with the following reasons: the first, it helps them to repay early money to the CPFs and the lenders. The second, it also reduces time to pay interest to the CPFs and the lenders. Some households did not get in debt to the bank and the lenders, but to concentrated feed agencies. Getting the compensation soon helps them to repay to concentrate feed agencies on schedule. This will make good trust with these agencies and the poultry farmers can borrow money from these agencies next time when they continue poultry keeping.

For small-scale farmers, getting the compensation early would have helped them to buy concentrated feed to invest in pig or rabbit production for getting some benefits instead of loss by avian influenza because the prices of pig and rabbit were very high in that time(Box 6.9).

Box 6.9: Why the compensation should pay soon

Mrs. H- is a small producer, she responded
“I have 70 local chickens. They died or were culled by avian influenza in 5/ 2007. Nevertheless, it was not until in 11/ 2007, that I got the compensation. If the province paid the compensation to me around one or two weeks after culling, it would have been very useful for me. If getting money soon, I could use this money to buy concentrated feed for fattening two porkers in order to get benefit instead of the loss by avian influenza. The price of porkers during outbreak was 45 thousand per a live weight kg, while prior to avian influenza outbreaks the price was 30 thousand VND of a live weight kg”.

Source: In-depth interview with small – scale farmers, December 2009

The responsibility of authorities in epidemic control

Beach *et al.*, (2007) discussed in their study that public disease control is one of important factors for overcoming avian influenza outbreak. Therefore, the responsibility of authorities in epidemic control is very important. If authorities delay in controlling epidemic, it will affect the amount of money from compensation of poultry farmers as the compensation only performs for culled poultry and it will increase

the spread of the epidemic among households. In the case study site, what responsibility do the authorities have in controlling epidemic?

According to commune authorities, they always have high responsibility in preventing and controlling avian influenza. The interaction between the farmers and veterinary is very good. When the poultry flock of farmers have unusual symptom or died a lot, they must report to the village leader and veterinary staff of commune. The veterinary staffs and village leader will be present at the spot where poultry died after 20 minutes when getting the reporting of farmers. If the poultry flock of farmers have specific symptom of avian influenza, veterinary staffs will make report and cull that flock immediately and guiding the farmers to do sanitation in the surroundings of their house. If poultry of the farmers do not have specific symptom of avian influenza, the veterinary staff have to carry out two the following ways: the first, veterinary staff will get blood sample of sick poultry and send to laboratory and the second, they will surround epidemic area (Group discussion with authorities, December of 2009).

In fact, the author gets many comments from respondents about the delay of authorities in controlling disease, and small - scale farmers said that when their poultry died, they report to village leader and veterinary staff. Nevertheless, they did not come to visit their sick poultry immediately on that time. Only the following day, the veterinary staff came to households that have sick poultry (Group discussion with small-scale farmers, December of 2009). The following evidence of medium- scale farmers also responds the delay of authorities in epidemic controlling. The consequence of delay of authorities in epidemic controlling can lead to the spread of avian influenza to surrounding regions as the farmers exposed dead poultry into refuse tip. (Box 6.10).

Box 6.10 The complaint of poultry farmers about responsibility of authorities in controlling epidemic

Mrs. H- a medium – scale farmers, she says:
“I raised 350 duck meat. In the morning of 5/2007, my duck flock was died 10 heads. As three days before, the next village, there were two duck flocks of two poultry-keeping households that were infected by AI and they were culled. I also was afraid of that my ducks infected avian influenza. I report immediately to village leader. However, until in the afternoon, I do not find veterinary staff come to visit my duck. I recall village leader and got answer that the veterinary staff is meeting in district. Tomorrow morning she will come. However, until the next afternoon, she comes to visit my duck flock. The numbers of dead ducks increase 30 heads, I throw them out refuse tip that back village temple”.

Source: In-depth interview, December 2009

After getting above information from the poultry farmers, the researcher also crosschecked information with the village leader, veterinary staff and commune leader. They explained that there is only one veterinary staff in the commune. She was very busy in that period with district meetings and visiting many livestock production households to inoculate against an epidemic. Therefore, there was a delay in controlling the epidemic. The explanation of authorities seems to be unreasonable, as according to the Decision No 2242/QĐ/ UBND, each commune should have from 3 to 5 agents to participate in controlling epidemics when there is an avian influenza outbreak and the province will support for each agent to get 50 thousand per work day from Monday to Friday. If agents have to work on Saturdays and Sundays, they will receive

100 thousand per day. The response of authorities in the case study site was not logical that only one agent should control the epidemics. Furthermore, the author also questioned authorities in the research site “why does the commune have only one agent in controlling epidemic” but the answers of the authorities are unclear. Although, the large- scale farmers did not respond about the responsibility of authorities in controlling epidemics, one can conclude that the responsibility of authorities in epidemic control in the case study site was not handled correctly.

6.3.2. Vaccination supporting policy

Vaccination of poultry against avian influenza is a control tool, which may be implemented in two different ways depending on the objectives. The first objective, it may be used as an eradication programme to avoid culling of a large number of flocks. The second is to decrease the number of outbreaks and the amount of circulating virus in regions where avian influenza is endemic. In other words, vaccination is “insurance” for poultry farmers against losses from HPAI outbreaks (Otte *et al.*, 2008). Vietnam did not use vaccination in the early months of the outbreaks, but then changed course when the virus proved difficult to contain (Delgado *et al.*, 2006). The early 2005, the Vietnamese government deployed using vaccination for poultry production households in the whole country. Ninh Binh province is one of the provinces also used avian influenza vaccination for poultry households from 2005 to until now as they still have outbreaks every year. So, how vaccination supporting policy was implemented in the Ninh Binh province ?

6.3.2.1 Implementing vaccination supporting policy

According to Decision No 08/2005/QD/BTC, 20/1/2005 and Decision No 2242/2008/ UBND, 11/12/2008, Vaccination was supported free of charge for all poultry production households. The poultry of households will get inoculation against avian influenza 2 times per year. The first time is on May and second time is on December.

6.3.2.2. The access of poultry farmers to vaccination supporting policy.

The result of household survey shows that, in 2005 until June of 2009, all of surveyed households in large, medium and small – scale production were supported vaccination with free of charge (Annex 11). The research got other interesting finding is that the poultry of large and medium-scale farmers got inoculation against avian influenza on second time of 2009 (December of 2009). Poultry of small producers were not inoculated against avian influenza on second time of 2009 (December of 2009). The reason why small-scale farmers were not supported vaccination, the author has crosschecked with veterinary authority about this issue. The explanation of veterinary authority as follows: The Ninh Binh province has the experiment programme about vaccination supporting beneficiary for purpose of reducing in vaccination cost. Vaccination only support for duck farms and large-commercial chicken farms. According to authorities’ opinion show that duck farms and large-commercial chicken farms get to be the higher risk of avian influenza than backyard farms and they have informed to communes. According to the result by Otte *et al.*, (2006) in Thailand indicate that backyard flocks are at significantly lower risk of HPA infection compared to commercial scale operations of broiler or layer chicken or quail. In Ninh Binh province context, the questions raised here is what criteria was used by province to identify that duck and large - commercial

chicken farms are at higher avian influenza risk than backyard farms?.The answer of province is unsatisfactory. It appears that the large and medium-scale farmers have prioritised access to vaccination supporting policy rather than the small –scale farmers in 2009.

6.3.2.3 The the ideas of poultry farmers about vaccination supporting policy.

According to the ideas of poultry farmers in the case study show that the vaccination supporting policy of government is positive, it helps them mitigating avian influenza outbreaks in 2008 and 2009. Besides, they argue that the vaccination should be used every month instead of using every 6 months in a year. As the life cycle of poultry is short, the poultry with 2.5 - 3 months of age can be slaughtered. If carrying out like this, the poultry at every age get inoculation against avian influenza that reduce the maximum avian influenza outbreak and the economic loss for them.

6.3.3 Training course

According to the result of group discussion with authorities in the research site, there was little opportunity of getting training courses for the farmers prior to avian influenza outbreak. Because Yen Son and Tan Binh communes were the epicenter of outbreaks in Tam Diep town - Ninh Binh province in 2004, 2005, 2007 and 2008, after avian influenza outbreaks, Ninh Binh province supported many training courses in order to help poultry farmers building and expanding their capacity and mitigating avian influenza outbreak through improvements in their livelihood. The training courses include the ways of goat production in 2004; the ways of poultry production in 2006; the ways of preventing avian influenza in 2007; and ways of fishing, cow, and frog production in 2009. The concern here is how these training courses were implemented.

6.3.3.1 Training course implementation

According to the ideas of authorities, training courses were organized in meeting room of commune. The extension staff of commune will send invitation to five or ten farmers in each village to come and participant in these. The village leaders will select the participants in a training course. Training courses were organized about 5- 7 days to transfer production techniques to farmers. After short training courses, the farmers who participated in the primary training courses will transfer these production techniques to other farmers in their village at cultural house of village. The budget of primary training courses was supported by province and extension staffs are teacher in university, or extension center of province, or agricultural engineer in production center.

6.3.3.2 The access of poultry farmers to training course

The data from Table 6.10 shows that half of the surveyed large –scale farmers participated in the primary training courses. While, there were about 29.4 and 7.7 percent of surveyed households in medium - scale production and small- scale production respectively who was took part in these. Moreover, Table 6.10 also shows that among poultry production groups, a larger number of large and medium–scale farmers got access to the primary training courses rather than the small – scale farmers.

Table 6.10: The access of poultry farmers to training course

	Large -scale farmers N = 12	Medium- scale farmers N =18	Small- scale farmers N = 13
Poultry group			
Proportion (%)	50	29.4	7.7

Source: *Household survey, January 2010*

6.3.3.3 The ideas of poultry farmers in implementing training course

In terms of the participants in the training courses, the results from group discussions with the poultry farmers in three groups indicate that there were not technical production transfer between the farmers who took part in the primary training courses and other farmers in the village at the cultural house in the village. Besides, they responded that the farmers taking part in the primary training course are often the village leader's relatives or commune authorities' relative, or those who have good relationship with the village leader or the commune authorities, or the authorities themselves participated in the training courses.

In terms of the training course quality, the results of in- depth interviews with the poultry farmers who participated in the primary training course in the case study site indicate that the technical production, which poultry farmers learnt from this, was unsuitable in terms of production cost and the content of technical production (Box6.11).

Box 6.11: The ideas of poultry farmers about technical production of training course

Mrs. H- she is a medium producer, she says, “After my duck flock was died by avian influenza in 2007, seven months later I restart keeping poultry. I combine poultry production with big and fishing production. I participated in the training source on fishing production in early 2009. From this course, I have learnt the ways of using water and the way of preventing disease for fish. I also apply these ways in my fishing production system. I find that, these ways help my fish production reducing death as compared to prior to that, but the economic cost for these ways is too high. Therefore, the benefit from this is still low”

Mr. Q - He is large producer with 2000 duck that were died by avian influenza in 2005. he says

“I participated in the training courses on the ways of poultry production in 2006 and fishing production in 2009, I find that, the technical production of training courses were mainly about theory, it is very difficult to apply into production practice”

Source: *In – interview, January of 2010*

6.3.4 Discussion and interpretation about institutions, which help the farmers mitigating HPAI

From the negative effects of avian influenza on poultry farmers' livelihood, Ninh Binh province had the following policies that help poultry farmers mitigating avian influenza

Compensation policy:

The compensation could play a critical role in the early detection and limitation of outbreaks. If producers know that they will be compensated for lost stock, they are more likely to report contaminated birds rather than selling them to cut their losses when influenza symptoms present (Pratt & Falconi, 2007). According to the result of study by Delquigny *et al.*, (2004) in some regions in Northern Vietnam showed that many interviewed poultry farmers have not received compensation from the state. Indeed, these poultry farmers suffered heavy losses due to avian influenza outbreaks, and farmers carried out the slaughter of birds. On the contrary, in Yen Son and Tan Binh communes, all interviewed poultry farmers who suffered avian influenza got compensation from the Ninh Binh province. As Ninh Binh province is a famous tourism zone attracting many domestic and foreign tourists, in order to reduce the spread of avian influenza, promote reporting early, and reduce the effects of avian influenza on tourism development, Ninh Binh province always performed the compensation promise for the poultry farmers who have culled poultry.

Looking back at the argument by Riviere-Cinnamond,(2005) that compensation policy should be established in relation to all species, type of production and weight or age. In fact, the compensation establishment of Ninh Binh province only related to either age or weight of poultry. Therefore, large and small producers in the research site told that these establishments of Ninh Binh province gave inequality among producers.

However, Beach *et al.*, (2007) argue that the key lever of this policy is the compensation level that provides for culling poultry. If the compensation levels are too low, it presents a main barrier to the surveillance and quick disease reporting as well as to producer's cooperation with the depopulation of contaminated and exposed birds. Farmers can hide the information about sick animals due to the concern about their economic losses that lead to the spread of disease. Delgado *et al.*, (2006) discussed that using the market prices pre-outbreak to adjust down to the farm-gate level, are the most efficient basis for setting compensation levels and setting compensation levels relied on production costs promotes inefficiencies, and should be avoided. The compensation rates should pay no less than 50 percent of reference at farm-gate market value of healthy birds prior to avian influenza outbreak, and no more than 100 percent. The recommended range should be between 75 percent and 90 percent of the reference prices. Turning to the compensation levels of Ninh Binh province, large and medium –scale farmers show that compensation levels that they received from Ninh Binh it was worked to be 17 percent of the market value in 2004, 30 percent of the market value in 2005, 2007 and 70 percent of the market value in 2008. They respond that the compensation levels in 2004, 2005 and 2007 were low and the compensation level in 2008 can be accepted. On the other hand, small- scale farmers said that the compensation levels of Ninh Binh province were estimated as 5 percent of the market value in 2004, and 20 percent of the market value in 2005, 2007, and 2008. They said that the compensation levels in 2004, 2005, 2007 and 2008 were low. The concern comes back with what criteria are used to set the compensation level by Ninh Binh; the market value or production cost? The answer of province is not clear.

Timely payment is a factor in ensuring that a share of poultry will be presented for culling. Timely payment replaces promptly the loss of an important livelihood support (Delgado *et al.*, 2006). The compensation should immediately be paid within 24 hours of the culling in Southeast Asian countries and delay is likely to have an important effect on reporting (Delgado *et al.*, 2006). In fact, in Yen Son and Tan Binh communes, the poultry farmers who suffered avian influenza outbreaks, they received the compensation of Ninh Binh province after 6 months as from their poultry culled. For large and medium - scale farmers, getting compensation early, it will help them to repay for the bank, company concentrated feed' agents, and the lenders. Whereas, the small- scale farmers told that if getting compensation early, they would use this money in pig and rabbit production in order to get benefit instead of losses by avian influenza as the price of pig and rabbit were very high in that time.

Although, the compensation levels of Ninh Binh province were low and the payment time was late, but all interviewed poultry farmers who experienced avian influenza outbreaks received the compensation. Besides, the research did not get evidences for hiding information about sick or dead poultry because of reasons such as getting low compensation levels, time of payment was late, or that the compensation establishment only related to either age or weight of poultry. Therefore, the compensation policy can be considered as help to the poultry farmers in case study site mitigating avian influenza outbreak.

Vaccination supporting policy

Burgos *et al.*, (2008) discussed that Vietnam's efforts to control avian influenza have been successful in recent years. Vaccination is "insurance" for the poultry farmers against losses from HPAI outbreaks. The study by Lung *et al.*, (2006) in some regions in Vietnam show that all interviewed poultry production households were supported vaccination and they used avian influenza vaccination in their farm. Vaccination brought out good consequences on their production. The finding of this study also shows that in the case study site, most surveyed households were supported avian influenza vaccination. Consequently, in 2008, Tan Binh commune have not had any avian influenza outbreaks, and in Yen Son, the number of dead poultry and culled poultry by avian influenza was one third compared with 2004, 2005, and 2007. Especially avian influenza did not break out in 2009 in these two communes. In other words, it appears that vaccination-supporting policy also has helped poultry farmers mitigating avian influenza outbreak in two recent years.

However, Burgos *et al.*, (2008) also states that risk remains that the H5N1 virus could return to poultry and become a threat to humans. The virus is still circulating in the bird population within Vietnam especially in wild bird and waterfowl, which can maintain virus without showing symptom. It also suspected that the environment is still contaminated with H5N1 virus. Gilber *et al* cited in Beach *et al.*, (2007) discussed that rice field are a particularly important source of contact between wild birds and poultry, especially free-range domestic ducks, which have been identified as main risk factor in spreading HPAI in duck keeping regions of Asia. As discussed in section I, the poultry farmers in Yen Son and Tan Binh communes usually keep their poultry in the rice field, the garden and backyard. According to the discussion of Gilber *et al*, with such bird keeping ways it is very easy to result in avian influenza outbreak. As a result, the poultry farmers argue

that the vaccination should be used every month instead of every 6 months, as the life cycle of poultry is short. If so, the poultry at any age would have inoculation against avian influenza that reduce the maximum avian influenza outbreak, and the economic loss for them.

Training course

Roland-Holst, et al. (2007b) argued that training course programmes could be more effective when they help farmers building their own capacity and securing the basis for more sustainable improvements in their livelihoods. In the case study site, according to the poultry farmers' opinion indicate that training courses are not conformable to poultry farmers' wishes in terms of the technical production including production cost and the content of technical production as well as the participants in the training courses. Through literature review and the poultry farmers' ideas, it appears that the training courses that were organized in the case study site have not contributed much in helping the poultry farmers mitigate avian influenza through their production improvement.

In summary, according to the poultry farmers and authorities in case study site show that the compensation policy, the vaccination supporting policy and the training courses help poultry farmers mitigating avian influenza. However, the above analyses suggest that the compensation and vaccination supporting policies can be considered as helping poultry farmers in avian influenza mitigation, while training courses have not contributed much.

The analyses of above sections show that avian influenza outbreak affected livelihood capitals of poultry farmers and under these effects, the compensation and vaccination supporting policies can be considered as helping poultry farmers in avian influenza mitigation. From these two issues, what livelihood strategies did the poultry farmers who experienced avian influenza outbreak have in order to achieve outcome such as increase income, food security, reduce vulnerability?

6.4. Livelihood strategies

The discussion in this section is to answer the question what livelihood strategies do the poultry farmers have to cope with avian influenza outbreaks in terms of the short run and accommodate avian influenza threats in terms of the long run.

6.4.1. Coping strategies

The risk coping is a short-term response to adversity (Roland-Holst *et al.*, 2007a). Avian influenza outbreak affected directly the poultry farmers in the case study site through immediate capital and income loss, reducing available food and many households fell into debt, and it affected indirectly through the prices increase of input and food. Consequently, the economy of poultry production households faced the difficulty during and following avian influenza outbreak in several months. Thus, what coping strategies did poultry farmers have with avian influenza shock, in order to survive during the intensive insecurity?

Table 6.11: The coping strategies of poultry farmers with avian influenza shock

Particulars	Large –scale farmers N = 12		Medium- scale farmers N = 18		Small- scale farmers N = 13	
	No of hh	% of total	No of hh	% of total	No of hh	% of total
	Reduce expenditure on essential goods	12	100	18	100	13
Eat sick or death poultry	6	50	5	27.8	4	30.8

Source: *Household survey, January of 2010*

Poultry farmers had shortage of money during the intensive insecurity. Thus, they cope with shortage of money as follows: the first, all of the surveyed households in large, medium and small–scale productions reduce expenditure on the essential goods, such as buying book for children, private school fees for children, clothes, mobile phone or telephone, clean water, electricity (Table 6.11). The second, poultry farmers in three groups changed their dietary intake in weekly meals (human capital section). The third, large and medium - scale farmers got money assistances from the social capital including both family and non-family networks to cope with avian influenza shock(social capital section), while small – scale farmers did not need money assistances from the social capital, and they used crop products to cope with the avian influenza shock.

To reduce the financial loss, the large, medium and small-scale farmers ate sick or death poultry. However, the highest percent of households eating sick or death poultry is in medium- scale production group (50%) (Table 6.11). There were not any households in three groups using savings or selling off poultry rapidly to cope with avian influenza shock.

Avian influenza outbreaks caused the poultry farmers (especially large and medium–scale farmers) to stop poultry production during several months, as the result, large and medium - scale farmers came to alternative income earning strategies through temporary on- farm, off- farm and non- farm employments that required little education (human capital section)

In summary, in order to ensure survival during the intensive insecurity, the large, medium, small – scale farmers have some the same coping strategies with avian influenza such as reducing their expenditure on the essential goods, or even eating sick or dead poultry or change intake dietary in weekly meals. However, there was a difference as households in large- scale production, medium- scale production received money assistance from family or non- family network, or came with temporary employments for coping with the avian influenza shock, while the small - scale farmers used their crop products for coping with the avian influenza shock. It can be seen that the coping strategies decisions depend on household specific characteristics.

6.4.2 Risk management strategies

Risk management is generally incorporated into long run production practices (Roland-Holst *et al.*, 2007a). Experiencing avian influenza outbreaks, the poultry farmers who were affected directly by avian influenza outbreak have developed risk management strategies to accommodate avian influenza threats and have a stable living in the future. The concern here is what and how did they do to ensure food security and increase income for their family?

The data from table 6.13 shows that 20 percent of households in large- scale production and 5.6 percent of households in medium-scale production have stopped keeping poultry and changed to other activities. Those employments are dairy cow and non- farm activities including selling rice, doing service (Box 6.12)

Box 6.12: What the farmers did instead of poultry production

Mrs. H – she had kept poultry from 1998 until 2005. Her duck flock with 2 thousand heads died and was culled by AI in 2005. She says:

Avian influenza outbreak caused financial loss for my family about 12 million VND. After this loss, I am afraid of poultry keeping. My brother recommends me to raise dairy cow and I borrowed money from him to invest in keeping two dairy cows. Now, I get income about 200.000 VND per day through selling milk.

Mr. V- medium producer with 500 ducks died and was culled by AI in 2007, he says:

After avian influenza outbreak, the price of poultry often drops low and I find that poultry production do not give high benefit. I do not like poultry keeping continuously. I change into doing service with renting weeding equipments such as tables, chairs, cooker ... and selling rice.

Source: In- depth interview with large and medium- scale farmers, January 2010

However, almost households in large and medium - scale production continue poultry production and all small- scale farmers restart poultry production (Table 6. 12).

As Table 6.12 shows the majority of households in large, medium and small - scale production restarts poultry production after five months or more than five months as from avian influenza outbreak. A slight percentage of households in three groups restart poultry production after one year as from avian influenza outbreak. In general, the delay in poultry production of poultry farmers in the case study site is relatively long time as compare to other regions with the stop of poultry production from 2 - 3 months (Dolberg *et al.*, 2005; McLeod *et al.*, 2004).

Table 6.12: Poultry production after avian influenza outbreaks

Particulars	Large- scale farmers N = 12		Medium- scale farmers N = 18		Small- scale farmers N = 13	
	No of hh	% of total	No of hh	% of Total	No of hh	% of total
	Non- continuing poultry production	2	16	1	5.6	-
Continuing poultry production	10	83.3	17	94.4	13	100
<i>Time for re-starting poultry production</i>						
Five months	5	50	11	64.7	5	38.5
More than five months	1	10	4	23.5	7	53.8

One year	2	20	2	11.8	1	7.7
More than one years	2	20	-	-	-	-

Source: Household survey, January 2010

The poultry farmers who restart poultry production have some ways in order to get food security, have income and accommodate the avian influenza threat in the future as follows:

Firstly, they have changed the ways of their production in order to improve the productivity of poultry production, get high income from poultry keeping, and mitigate the avian influenza threats. For example, large and medium-scale farmers have the vaccination schedule for preventing disease for bird, and buying poultry breed from the breed producing centers with the certification of government. While, small-scale farmers using bactericide for chicken house once a month and getting the guidance of veterinary staff when having poultry sick, chick replacements or complements are generally hatched from own-stock eggs (discussed in human capital section).

Secondly, households in three poultry production groups have a plan against risks that ensure their own food supply and increase income by combining poultry production with other activities. The result is presented in [Table 6.13](#)

Table 6.13: Production diversification of poultry farmers after avian influenza outbreak

Particulars	Large- scale farmers N = 10		Medium- scale farmers N = 18		Small-scale farmers N = 13	
	No of hh	% of total	No of hh	% of total	No of hh	% of total
	Combination of poultry keeping with other livestock	2	20	3	17.6	-
Combination of poultry with crop production	-	-	1	5.9	6	46.2
Combination of poultry with crop and livestock	-	-	5	29.4	6	46.2
Combination of poultry with livestock and fishing	3	30	7	41.2	-	-
Combination poultry production and non- farm activity	5	50	1	5.9	1	7.7

Household survey, January 2010

As mentioned above, households in large-scale production do not have land for crop production thus, the majority of large-scale farmers have combined poultry production with non - farm activities, standing at 50 percent. The numbers of households in this groups have combined the poultry production with other livestock production, or with fishing and other livestock production are 20; 30 percent respectively (Table 6.13).

Meanwhile, households in medium- scale production have land for crop production with small size. As the result, a high 29 percent of households combine poultry keeping with other livestock and crop production. The majority of medium-scale farmers have combined poultry production with other livestock and fishing and standing at 50 percent (Table 6.13).

Although, poultry production is not main income-generating activity for the small- scale farmers, it is interesting to understand what small- scale farmers do in order to ensure food security, income and

accommodate avian influenza. As discussed above, small- scale farmers in the research site have large land size for crop production. Consequently, the majority of households in this group have combined poultry production with crop production, or poultry production with crop and livestock production, standing at 46, 2 percent and 46, 2 percent respectively (Table 6.13).

According to the ideas of poultry farmers restarting poultry production indicated that other livestock production includes goat, pig and rabbit production. Non- farm activities consist of selling rice, selling concentrated feed, doing services for processing agricultural products, and trading building materials, and migration. For crop production, they usually combine rice with cash crop cultivation such as sweet potato, potato, soybean, or combine rice with pineapple cultivation, or combine rice cultivation and vegetable.

Through above evidences, it can be seen that risk management strategies decisions depend on household specific characteristics.

6.4.3. Discussion and interpretation about poultry farmers' livelihood strategies

Ellis, (2000) shows that livelihood strategies are composed of activities that create the means of household survival. In avian influenza shock context, the finding of many authors in their case study site show that the poultry farmers have coping strategies with avian influenza shock through decreasing unnecessary consumption expenditure, using credit to flexible consumption (Tamura & Sawada, 2008). Many households have reduced expenditure on children' education (Dolberg *et al.*, 2005). It seem to be similar to the findings of this study in Yen Son and Tan Binh commune, mainly the poultry farmers in three groups who experienced avian influenza, have activities such as reducing expenditure essential goods, or eating sick and dead birds, change in intake dietary in weekly meals. Nevertheless, households in large and medium scale production are the most affected by avian influenza, thus they got money assistance from social network in order to cope with the avian influenza shock and coming with temporary employment for earning income. The small- scale farmers use crop products coping with avian influenza shock. Furthermore, the study of Tamura & Sawada, (2008) also indicated that the poultry farmers can cope with the avian influenza shocks through using physical assets, using child labour, and getting emergency private and/or public transfers. The author of this study did not get such evidences in her research site.

The major objectives of poultry farmers is food security and income, so, what risk management strategies decision do poultry farmers have in order to ensure food security and have high income in the future. Roland-Holst, et al. (2007) discussed in their study that in rural Vietnam, the poultry farmers mix three risk management strategies: product diversification, investment in product quality and development of non- farm income opportunities to mitigate the negative effects of significant animal disease risk. However, the development of non-farm income is not easy in rural areas, thus the agricultural diversification is higher priority (Roland-Holst, at al 2007). In avian influenza context, the poultry farmer in Yen Son and Tan Binh communes have risk management strategies decisions to accommodate the avian influenza threats and outcome in the future as follows: some households in large and medium- scale production stopped poultry production and changed to dairy cow and non- farm activities. However, many poultry farmers in three groups restart poultry production, but they have the following ways to reduce the risk: the first, changing the

technical ways of poultry production. The second, combining poultry production with other activities, mainly as the large producers without land for crop production, the majority of them combine poultry production with non- farm activities. Whereas, small producers with large land size for crop production, they combine poultry production with on- farm activities such as crop production, other livestock. Medium producers with small land size for crop production, a high percent (29%) of them combine poultry with crop production and other livestock, but higher percent (50%) of them combine poultry production with other livestock and fishing.

In sum, the above analysis confirms the ideas by Roland-Holst *et al.*, (2007a) and Oparinde & Birol, (No Date) that in response to vulnerability context by avian influenza, poultry farmers have developed strategies for (ex ante) risk management, and (ex post) risk coping. However, coping and risk management strategies decisions depend on household specific characteristic.

CHAPTER VII. CONCLUSION

This study discusses how the livelihoods of poultry farmers were affected by pathogenic avian influenza (HPAI) in Yen Son and Tan Binh communes - Tam Diep town – Ninh Binh province where avian influenza broke out repeatedly in the four years of 2004, 2005, 2007 and early 2008.

The study used both quantitative and qualitative methods to collect information and data. The information and data relates to the effect of avian influenza on household financial capital, human capital and social capital, and the policies helping poultry farmers to mitigate avian influenza as well as livelihood strategies. A literature review also was done in order to understand other research and debates about these issues.

In general, poultry production can be considered as important for the livelihoods of rural people in Yen Son and Tan Binh communes. Avian influenza outbreaks caused a big shock for the poultry farmers' livelihood, this affected them both directly and indirectly, both negatively and positively, and however, the effects were more negative than positive. Households whose livelihoods are based much on poultry production were the most affected by avian influenza outbreaks.

Under the effects of avian influenza shocks and threats, the government at national and local levels has had a culling programme. This has been the first and immediate action to reduce the spread of avian influenza. Coupled with the culling programme is a compensation policy in order to enhance early reporting, decrease the spread of avian influenza outbreak, and reimburse the losses for poultry farmers. In addition, vaccination support policy has been implemented to help the poultry farmers mitigate avian influenza in the long term. It appears that the poultry farmers in the study site, who experienced avian influenza outbreaks, had access to the compensation and vaccination supporting policies. These policies can be considered as helping poultry farmers in avian influenza mitigation in two communes. According to Riviere-Cinnamond, (2005) the existing support levels should be increased. He argues that a higher level of support will help in containing the AI outbreak quicker, which will cut down the expenditure on AI from the 'disease prevention fund' in the longer term, allowing funds to be used to contain and monitor other diseases. The findings of this study agrees with Riviere-Cinnamond, (2005) that an increase of compensation levels should be carried out in order to reimburse the losses for the farmers and reduce the spread of avian influenza. Nevertheless, avian influenza risks remain in the environment and it may again affect poultry and human. Despite this, the farmers still restart poultry keeping after the crisis stop. Therefore, one should also not cut down vaccination supporting policy like Riviere-Cinnamond, (2005) discussed. Besides, the training courses have also been implemented in the two study communes to help the poultry farmers in HPAI mitigation in the long term through building and expanding their capacity in order to improve their livelihood. The study finds that the training courses have not contribute much for helping poultry farmers in avian influenza mitigation in terms of the access of farmers as well as the content of training courses.

The findings of this study show that the poultry farmers have developed risk coping strategies in the short term and risk management strategies in the long term in order to respond to the avian influenza shocks and threats. The poultry farmers in the case study site have used their financial, human, and social assets to cope

with this. The coping strategies are successful as their living can recover after more than 5-7 months as from avian influenza outbreak. Their risk management strategies decisions depend on household specific characteristics for example many households stop poultry production and change to other activities. Nevertheless, the majority of households restarts poultry production, but makes technical changes and combines poultry production with other activities. Whether the risk management strategies decisions will be successful or unsuccessful in the long term will be needed to explore in future studies.

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ANNEXES

Annex 1: the Map

The Map of Vietnam



Map of Tam Diep Town



Map of Ninh Binh



Annex 2 poultry types in households in different poultry groups

Poultry type	Large -scale farmers N = 12		Medium -scale farmers N = 18		Small - scale farmers N = 13	
	No of households	% of total	No of households	% of total	No of households	% of total
Duck	12	100	11	61.1	-	-
Chicken	-	-	1	5.6	13	100
Chicken and Duck	-	-	6	33.3	-	-
Others	-	-	-	-	-	-

Source: Household survey, January 2010

Annex 3: The ways poultry is kept in households in different groups

Types for keeping poultry	Large - scale farmers N= 12		Medium- scale farmers N=18		Small-scale farmers N=13	
	No of household	% of total	No of household	% of total	No of household	% of total
a	-	-	12	61.1	-	-
a,c	-	-	6	33.3	-	-
b	12	100	-	-	-	-
c	-	-	-	-	13	100
D	-	-	1	5.6	-	-

Source: Household survey, January 2010

a: Free range in the rice field with night housing

b: Free range in the rice field without night housing

c: Backyards/ gardens/, courtyards/, orchards and free to range on neighboring land

d: Special coop

e: Others

Annex 4: The role of poultry production to household economy in different groups

The role of poultry production	Large- scale farmers N =12		Medium- scale farmers N = 18		Small- scale farmers N =13	
	No of household	% of total	No of household	% of total	No of household	% of total
Not important	-	-	-	-	-	-
Important	-	-	-	-	11	84.6
Very important	-	-	11	61.1	2	15.4
Most important	12	100	7	38.9	-	-

Source: Household survey, January 2010

Annex 5: The dietary intake of household categories during AI outbreak

time per week	non- poultry meat		poultry meat		Egg		Fish		vegetable		Soya curd	
	No	%	No	%	No	%		%		%	No of	% of
	of	of	of	of	of	of	No of	of	No of	of	hhds	total
	hhs	total	hhs	total	hhs	total	hhs	total	hhs	total		
Large- scale farmers(N=12)												
Never	-	-	12	100	9	75	-	-	-	-	-	-
One time	-	-	-	-	3	25	-	-	-	-	-	-
Two times	8	66.7	-	-	-	-	-	-	-	-	-	-
Three times	3	25.0	-	-	-	-	2	16.7	-	-	1	8.3
Four times	1	8.3	-	-	-	-	9	75.0	-	-	3	25.0
Five time	-	-	-	-	-	-	1	8.3	-	-	8	66.7
More than five times	-	-	-	-	-	-	-	-	12	100	-	-
Medium- scale farmers(N=18)												
Never	-	-	18	100	18	100	-	-	-	-	-	-
One time	-	-	-	-	-	-	-	-	-	-	-	-
Two times	-	-	-	-	-	-	-	-	-	-	-	-
Three times	7	38.9	-	-	-	-	1	5.6	-	-	1	5.6
Four times	10	55.6	-	-	-	-	8	44.4	-	-	3	16.7
Five time	1	5.6	-	-	-	-	9	50.0	-	-	13	72.2
More than five times	-	-	-	-	-	-	-	-	18	100	1	5.6
Small- scale farmers(N=13)												
Never	-	-	11	84.6	12	92.31	-	-	-	-	-	-
One time	5	38.46	2	15.4	1	7.69	-	-	-	-	-	-
Two times	7	53.85	-	-	-	-	-	-	-	-	-	-
Three times	1	7.69	-	-	-	-	3	23.1	-	-	1	7.7
Four times	-	-	-	-	-	-	9	69.2	-	-	1	7.7
Five time	-	-	-	-	-	-	1	7.7	-	-	9	69.2
More than five times	-	-	-	-	-	-	-	-	13	100	2	15.4

Source: Household survey, January 2010

Annex 6: The dietary intake of households after AI outbreak

time per week	non-poultry meat		poultry meat		Egg		Fish		vegetable		soya curd	
	No of hhs	% of total	No of hhs	% of total	No of hhs	% of total	No of hhs	% of total	No of hhs	% of Total	No of hhs	% of total
Large-scale farmers(N =12)												
Never	-	-	-	-	-	-	-	-	-	-	-	-
One time	-	-	9	75	-	-	-	-	-	-	-	-
Two times	-	-	3	25	1	8.3	4	33.3	-	-	5	41.7
Three times	7	58	-	-	9	75.0	4	33.3	-	-	4	33.3
Four times	5	42	-	-	2	16.7	3	25.0	-	-	3	25.0
Five time	-	-	-	-	-	-	1	8.3	-	-	-	-
More than five times	-	-	-	-	-	-	-	-	12	100	-	-
Medium-scale farmers(N=18)												
Never	-	-	-	-	-	-	-	-	-	-	-	-
One time	-	-	18	100	-	-	-	-	-	-	-	-
Two times	-	-	-	-	1	5.6	3	16.7	-	-	1	5.6
Three times	3	16.7	-	-	10	55.6	10	55.6	-	-	7	38.9
Four times	15	83.3	-	-	7	38.9	4	22.2	-	-	7	38.9
Five time	-	-	-	-	-	-	1	5.6	-	-	3	16.7
More than five times	-	-	-	-	-	-	-	-	18	100	-	-
Small- scale farmers(N=13)												
Never	-	-	-	-	-	-	-	-	-	-	-	-
One time	-	-	13	100	-	-	-	-	-	-	-	-
Two times	5	38.5	-	-	1	7.7	-	-	-	-	1	7.7
Three times	6	46.2	-	-	2	15.4	11	84.6	-	-	3	23.1
Four times	1	7.7	-	-	9	69.2	2	15.4	-	-	4	30.8
Five time	1	7.7	-	-	1	7.7	-	-	-	-	3	23.1
More than five times	-	-	-	-	-	-	-	-	13	100	2	15.4

Source: Household survey, January 2010

Annex 7: The effect of avian influenza on cultural significance

particular	Large- scale farmers N = 12		Medium-scale farmers N = 18		Small- scale farmers N = 13	
	No of household	% of total	No of household	% of total	No of household	% of total
Poultry products use	-	-	-	-	1	7.7
Non- use	12	100	18	100	12	92.3
Food was used instead of poultry products						
Rabbit meat	2	16.7	3	16.7	-	-
Rabbit meat and Fish	1	8.3	-	-	-	-
Rabbit and Pork meat	5	41.7	5	27.8	5	38.5
Pork meat	3	25.5	10	55.6	7	53.8
Others	1	8.3	1	5.6	-	-

Source: Household survey, January 2010

Annex 8: The change of technical production after avian influenza outbreak

Particular	Large- scale farmers N = 12		Medium- scale farmers N = 18		Small- scale farmers N = 13	
	No of household	% of total	No of household	% of total	No of household	% of total
Changing technical production	11	91.7	18	100	11	84.6
Not change	1	8.3	-	-	2	15.4
Source help new technology change						
the friends	7	58.3	6	33	5	38.5
friends and training course	-	-	1	6	-	-
friends and women union	1	8.3	-	-	-	-
the friends and others	1	8.3	3	17	-	-
farmer union	-	-	-	-	1	7.7
Others	2	16.7	8	44	5	38.5

Source: Household survey, January 2010

Annex 9: The relationship with intermediary after avian influenza outbreaks

Particulars	Large- scale farmers N = 12		Medium- scale farmers N = 18		Small- scale farmers N = 13	
	No of household	% of total	No of household	% of total	No of household	% of total
Increasing relationship with middlemen						
Yes	12	100	17	94.4	-	-
No	-	-	1	5.6	13	100
Source helps to contact with new middlemen						
The friends	5	24.5	3	16.7	-	-
The friend and relatives	-	-	2	11.1	-	-
The friends, relatives and old middlemen	-	-	1	5.6	-	-
The friends and old middleman	6	50.0	7	38.9	-	-
The friends and women union	1	8.3	2	11.1	-	-
The farmer union	-	-	2	11.1	-	-

Source: Household survey, January 2010

Annex 10: The access of poultry farmers to compensation policy

Poultry groups	Large- scale farmers N = 12	Medium –scale farmers N = 18	Small- scale farmers N = 13
Proportion (%)	100	100	100

Source: Household survey, January 2010

Annex 11: The access of poultry farmers to vaccination supporting policy

Poultry group	Large- scale farmers N= 12	Medium- scale farmers N= 18	Small- scale farmers N= 13
Proportion (%)	100	100	100

Household survey 2009

Annex 12: Labor distribution in poultry production

work force	Large – scale farmers N = 12		Medium scale farmers N =18		Small- scale farmers N=13	
	No of household	% of total	No of household	% of total	No of household	% of total
	Husband	-	-	1	5.6	-
Husband and Others	1	8.3	-	-	-	-
Wife	-	-	-	-	9	69.2
Wife and Children	-	-	1	5.6	3	23.1
Wife and Husband, Children	-	-	1	5.6	-	-
Wife and Husband	7	58.3	15	83.3	1	7.7
Wife and Husband, Paid employee	4	33.3	-	-	-	-

Source: Households survey, January of 2010

Annex 13 Checklist for data need

I-checklist for first group discussion

Objective:

1. Identifying the general information about commune
2. Identifying avian influenza situation and related- HPAI
3. Identifying indicators for household classification and classifying household into three groups

Members:

Village leader, Farmer union, Women union, Veterinarian, commune People's Committee staff

1- Identifying the general information about commune

- a- what is the role of poultry production for the economy in the commune and household?
- b- What types of poultry are kept in the commune?
- c- Which natural resources (or natural condition) make advantage condition for poultry production?
- d- Which infrastructure systems make advantage for developing poultry production?
- e- Which regions were lost by HPAI outbreaks?
- f- Which regions had the greatest loss by HPAI outbreaks?

2- Identifying avian influenza situation and related –HPAI issues

- a- how much poultry died and were culled by HPAI in each year?
- b- How many households were affected by AI?
- c- How many households involved in poultry keeping before and after AI outbreaks?
- d- How many households got into debt and from which source?
- e- What did the farmers do during and after AI outbreaks? (Employment of labor in household during and after AI outbreaks)
- f- How do the farmers have knowledge and awareness about dangerous HPAI?
- h- What production activities or jobs did the farmers do after AI outbreaks in each year (2004, 2006, 2007, and 2008)?
- l. What policies helped the farmers to mitigate AI at local and national level?

3- Identifying indicators for household classification and classifying household into groups

- a- what indicators should be used? For example: income from poultry keeping, flock size, employment of labors from poultry production etc
- b- What group will be suitable for each household?
- c- How are production characteristics of each group?

II- Checklists for second group discussion

Objective:

- Understanding the contribution of poultry production to household economy before AI outbreaks;
- Understanding the effect of avian influenza on livelihood assets of farmers (focus deeply Financial and Human capital, Social capital)
- Identifying Institutions that help the poultry farmers mitigate HPAI at local and national level and the access of the farmers to such policies
- Understanding livelihood strategies, both short and long term, which accommodate threats and outcomes by HPAI

Members

Large-scale farmers, Medium- scale farmers and Small- scale farmers (Separately)

1. Understanding the contribution of poultry production and other to household economy

- a- What kind of annual income sources did the farmers get prior to avian influenza?
- b- How much percentage did the farmer get from each income source (including Poultry production)?

- c- How much benefit per bird did you get prior to AI outbreak?
- d- How much income per batch did you get from poultry production before AI outbreaks?
- e-How were the price fluctuations of inputs and other food in during and after AI outbreaks?
- d- How was the price fluctuation of poultry production during and after AI outbreaks?

2. *Understanding the effects of avian influenza on livelihood assets of farmers*

2.1 Financial capital

- a- how were the farmers lost the investment capital per AI- affected batch?
- b- How did farmer lost income per batch and income in during stopped poultry production in 2004, 2005, 2007, and 2008
- c- Did the farmers get into the debt? Which source?

2.2 Human capital

- a- How was the dietary intake change of households before and during and after AI outbreak?
- b- Labors
 - What were employment of labors in household (Men, women) in before, during and after AI outbreaks?
 - Are these income sources higher or lower than income from poultry keeping? Why?
- c- Knowledge and Awareness
 - What did the farmers invest in learning technical livestock production and poultry production?
 - Which ways of preventing diseases will the farmers adopt? Why?
 - How do the farmers have knowledge and awareness about dangerous AI?

2.3 Social capital

- Did you use poultry products in social purposes such as festival, gifts or others in during avian influenza outbreak?
- Did farmers get assistance of formal sector and informal sector during and after avian influenza outbreaks?
- What assistances did farmers get from them during and after avian influenza outbreaks for example technology production, money, access market and so on?

3. *Identifying Institutions help the farmers to mitigate AI at local and national level and the access of the farmers to such policies*

- a- What policies helped the poultry farmers mitigate HPAI?
- b- What ideas do the farmers have in implementing policy?

4- *Identifying livelihood strategies, both short term and long term*

4.1 Short term

- a. What did you do to cope with financial loss during avian influenza outbreaks?
- b. Did they find other jobs in crisis or other production activities? Which Job or which production activities?

4.2 Long term

- a-Did farmers continue poultry keeping after AI stopped?
 - Yes, why? And what do farmers do to avoid avian influenza and other disease?
 - No, why not? What did farmers do instead?
- b- Did farmers combine poultry and other animals?
 - Yes, why and which animal? How do you raise?
 - No, why not?
- c- Did farmers combine poultry and crop or poultry – other animal- crop?
 - Yes, why, which animal? Which crop and how have you done? And No, why not?

Annex 14
Questionnaires
Code.....

Communevillage

-Name of the household head

- AI outbreak time.....

I General information of household

1- Information human resource

a- Household size:

b- How many main labours are there in your family?

.....
c- How many dependents are there in your family?

.....

d- The age of household head?

.....

c- Experience poultry production?

.....

d- Formal education of women

- Illiterate

- Elementary school

- Secondary school

- High school

- College/university

e. Formal education of men

- Illiterate

- Elementary school

- Secondary school:

- High school

- College/university:

2- Information the natural resource

a- how many hectares for rice cultivation?

.....

b- How many hectares for cash crop?

.....

c- How many hectares for garden land?

3- Information of .poultry production of household

a-What types of poultry/fowl do you raise/own?

- Chicken

- Ri- breeds

- Dong Tao - breeds

- Mia - breeds

-Tam Hoang- breeds

- Logo Breeds

- others

.....

- Ducks
 - Co- breeds
 - Xiem breeds
 - Bau- Breeds
 - Others
-

- Other birds

.....

- b- Where and how do you keep your poultry?
- Free range in the rice field with night housing
 - Free range in the rice field without night housing
 - Backyards/ gardens/, courtyards/, orchards and free to range on neighbouring land
 - Special coop
 - Others
-

- c-Why / for what specific purposes do you raise them?
- Home consumption
 - How much (proportion)?
 - Selling
 - How much (proportion)?
 - Family gifts
 - How much (proportion)?.....
 - Traditional festivals
 - How much (proportion)?.....
 - Others
-

How much (proportion)?

- d- Who involve in poultry production
- Husband
 - Wife
 - Children
 - Husband and wife
 - paid employee
 - Others
-

- d- How do you sell poultry products?
- to middleman
 - taking them to local market
 - selling directly to other farmers in the village

- 4- The role of poultry production to household economy?
- How important is poultry–raising in your family livelihood and well being?
- Most important (4)
 - Very important (3)

- Important (2)
- Not important (1)

II - The effect of avian influenza on financial capital

1-The investment capital loss

a- the number of poultry which died?
.....

b- The number of poultry that were culled?
.....

c- How much money did you invest in dead and culled poultry by AI?
.....

d- How much total of money did you get from the compensation?
.....

C-How much money did you lose?
.....

2- The income loss per batch

a- How much benefit per bird did you get prior to AI?
.....

b- How much income per batch did you lose by AI?
.....

3- Did you get into the debt?

Yes No

If yes, what source did you get into the debt?

- The bank (CPFs)
- Lender
- Concentrate feed company

III - the effect of avian influenza on Human capital

A- the effect AI on dietary intake of household

1- The dietary intake of household during AI outbreak?

a- how many times per week did you eat non- poultry meat?

- Never One time Two times Three times - Four times
- five time - more than five times

b- How many times per week did you eat poultry meat?

- Never One time Two times Three times - Four times
- five time - more than five times

c- How many times per week did you eat egg?

- Never One time Two times Three times - Four times
- five time more than five times

d- How much times per week did you eat fish?

- Never One time Two times Three times - Four times
- five time more than five times

e- How much times per week did you eat vegetable?

- Never One time Two times Three times - Four times
- five time more than five times

2- The dietary intake of household after AI outbreak?

a- how many times per week did you eat non- poultry meat?

- Never One time Two times Three times - Four times
- five time more than five times

b- How many times per week did you eat poultry meat?

- Never One time Two times Three times - Four times
- five time more than five times

c- How many times per week did you eat egg?

- Never One time Two times Three times - Four times
- five time more than five times

d- How much times per week did you eat fish?

- Never One time Two times Three times - Four times five
- time more than five times

e- How much times per week did you eat vegetable?

- Never One time Two times Three times - Four times
- five time more than five times

B- The effect of AI on employment

1- What did the women do during crisis time?

1.1 On- farm activities

- Crop production
- livestock production excluding poultry production

1.2 Off- farm activities

- Cashing snail and fish
- Working for tea farm and apple pie farm
- Others

1.3 Non farm activities

- working in construction
- Trade
- sell vegetable
- Migration
- Other

2- What did the men do during crisis time?

2.1 On- farm activities

- Crop production
- livestock production excluding poultry production

2.2 Off- farm activities

- Cashing natural fish
- Working for tea farm and apple pie farm
- Other

2.3 Non activities

- working in construction
- Trade
- Migration

- Others

.....

IV the effect of AI on social capital

A-The effect of AI on cultural

1- Did you use poultry products to make as a as gift or in special holiday or other social purposes during AI outbreak period?

Yes No

2-If No, what kind of food did use instead of poultry products?

Goat meat Fish meat Pig meat Vegetable

Others

.....

3- If yes, why did you use it?

- Don't be afraid of AI cheap price Delicious food

- Others

.....

B-The effect of avian influenza on social relations

1- Did you receive money assistance from informal sectors (friends, relatives, lenders)?

Yes No

2- Did you get money assistance from formal sectors?

Yes No

3- Do you change technology livestock production after AI outbreak?

Yes No

4- Where did you learn new technology?

- Friends

- Training course

- Farmer union

- Women union

- Others

.....

5- Do you think that AI outbreaks that make increasing relationship with many middleman?

Yes No

6- Who did help you contact with new intermediary after AI outbreak?

- Friends

- Relatives

- Old middleman

- Farmer union

- Women union

- Others

.....

IV- access to Institutions

1- Did you get money from the compensation?

Yes No

2-How much money per bird did you get from the compensation?

- 5000 VND per one culled bird

- 10000 per poultry
- 15000 VND per one culled bird
- 20000 VND per one culled bird

3- Did you get support vaccine?

- Yes No

4- Did you participate in training course in livestock production and poultry production?

- Yes No

V- Livelihood strategies

*** Short term**

1- Did you have to reduce expenditure on essential goods?

- Yes No

a- If yes, which essential goods did you reduce?

- Book for children
- Private school fees
- Electricity
- Health
- Clothes
- Mobile phone or telephone
- Clean water
- Others

b- If No, why.....

2- Did you sell off poultry rapidly?

- Yes No

3-Did your family eat sick or death poultry?

- Yes No

4--Did you use savings until shock is reduced?

- Yes No

*** Long term**

1- Have you continued poultry keeping?

- Yes No

- If yes, Why.....

- would not find other jobs
- To get high income
- provide food for the family

2- When do you re-start poultry keeping after avian influenza outbreaks?

- Five month
- More than five month
- one year
- More than one year
- Please answer the next question

3- Do you combine poultry keeping with other livestock?

- Yes No

- Which livestock?

4- Did you combine poultry with crop production?

- Yes No

- Which crops?.....

5- Did you combine poultry with crop and livestock?

Yes No

- Which crops?

.....

- Which livestock?

.....

6- Did you combine poultry with livestock and fishing?

7- Did you combine poultry production and non- farm activity?

Yes No

8- If not, why did not you continue with poultry?.....

- What did you do instead?