

THESIS

HIGHLY PATHOGENIC AVIAN INFLUENZA
KNOWLEDGE, ATTITUDES, AND PRACTICES STUDY
AMONG LIVE BIRD MARKET WORKERS IN JAKARTA – INDONESIA

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ABSTRACT

HIGHLY PATHOGENIC AVIAN INFLUENZA KNOWLEDGE, ATTITUDES, AND PRACTICES STUDY AMONG LIVE BIRD MARKET WORKERS IN JAKARTA – INDONESIA

Throughout the world, Indonesia is one of the countries most affected by the outbreak of the highly pathogenic avian influenza (HPAI) subtype H5N1. The outbreak has killed 160 out of 192 human cases during 2005 to 2012, the fatality rate being especially high in children and young adults (WHO, 2013), caused over 470 million USD in economic losses (KOMNAS, 2008a) and disrupted the lives of more than 20 million people who depend on the poultry industry (BPS, 2003) for their livelihood. Indonesia received from the international community the largest financial commitment to fight HPAI, totaling to more than 128 million USD (FAO, 2008a).

Highly pathogenic avian influenza also affected the capital city of Jakarta. In an effort to minimize disruption to public health from the outbreak of HPAI, Jakarta provincial government has issued a local regulation (*Peraturan Daerah*) Number 4/2007 on the Control, Raising, and Distribution of Poultry in Jakarta. Despite the fact that Jakarta has a high risk of public health problems due to HPAI, there is no effective enforcement of the local HPAI control regulation in the city, thus the poultry collection sites and traditional slaughter houses continue to conduct unsafe practices of poultry slaughter.

To overcome this problem, information is needed to know how much the poultry industry, especially the Live Bird Markets (LBMs), in Jakarta knows about the risk of HPAI in their community. The level of knowledge and perception of safe poultry handling practices

regarding the risk of highly pathogenic avian influenza among workers in LBM can be assessed using a Knowledge, Attitudes, and Practices (KAP) Study.

The results of this study illustrate that, despite being given information, LBM workers had no detailed understanding of avian influenza, had a less perceived risk of experiencing avian influenza, and had a low compliance with precautionary behaviors. As a result, biosecurity in the LBMs is woefully inadequate, increasing the threat of another serious outbreak of HPAI in poultry and perhaps in humans as well.

Encouragingly, workers' interest in learning more about avian influenza was high in this survey. Therefore, designing and implementing avian influenza educational programs and measuring their effectiveness should be priorities to encourage the population to take a more active role.

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DEDICATIONS

This work is dedicated to my wife, Ega, and my children, Nanda and Ghassan, for their years of support and understanding. Without them, this accomplishment would not have been possible.

- We judge ourselves of what we think we can do, while others judge us from what we've done -

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
DEDICATIONS	v
LIST OF TABLES	vii
LIST OF FIGURES	xi
Chapter 1	
INTRODUCTION	1
Chapter 2	
LITERATURE REVIEW AND BACKGROUND.....	7
Chapter 3	
MATERIALS AND METHODS	27
Chapter 4	
RESULTS AND DISCUSSION	55
Chapter 5	
CONCLUSIONS AND RECOMMENDATIONS	109
BIBLIOGRAPHY	112
APPENDICES	
A. Recruitment of Survey Respondents	117
B. Survey Consent for Respondents	118
C. Highly Pathogenic Avian Influenza Knowledge, Attitudes and Practices Among Live Bird Market Workers in Jakarta – Indonesia Survey Questionnaire	119
D. Respondent’s Answer on Knowledge Questions	130

LIST OF TABLES

Table	Page
1. Proportional sample size calculation based on region in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.....	39
2. Operational definition of each variable in the questionnaire for HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.	40
3. Questions and codes for the subset of general information for HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	41
4. Questions, answers, and scoring criteria for the worker’s knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	43
5. Questions, answers and scoring criteria for worker’s attitude in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	49
6. Questions, answers and scoring criteria for worker’s practices in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	52
7. Questions and answers regarding perceived barriers to preventative practices in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	53
8. Key points, answers and scoring criteria for direct observations at LBM in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	54
9. General characteristics of the live bird market workers in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (categorical variables)	90

10. General characteristics of the live bird market workers in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continuous variables)	90
11. A summary of knowledge, attitudes and practices survey results towards highly pathogenic avian influenza among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)	91
12. Correctly answered knowledge questions towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)	92
13. A summary of results of knowledge in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	93
14. Workers' response to statements towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100).....	94
15. A summary of results of attitudes in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	96
16. Workers' response to practice questions towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100).....	97
17. A summary of results of practices in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	99
18. Workers' response to barrier to preventative practice questions in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)	100

19.	A summary of level of practices results in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	102
20.	Re-categorized of the independent and dependent variables for the inferential statistics for the highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	103
21.	Chi-square and Fisher's Exact Test results of knowledge towards highly pathogenic avian influenza among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	104
22.	A two-by-two table of workers' knowledge and age group in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	105
23.	A two-by-two table of workers' knowledge and education level in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	105
24.	A two-by-two table of workers' knowledge and job experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	105
25.	Univariate analysis of negative attitude in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)	106
26.	Chi-square Test result between workers' age group and experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)	106

27. Final model of 'negative' attitude with daily sales and age group in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	107
28. Final model of 'negative' attitude with daily sales and job experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012	107
29. Relationship between worker's knowledge and attitude with level of practice in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)	108

LIST OF FIGURES

Figure	Page
1. Market Chain of Poultry Trade in Jakarta - Indonesia.....	25
2. Attitudes and Practices Relationship Model (Pavlou and Fygenson, 2006)	26
3. Research Framework	38
4. Jakarta Special Capital Region Map	38
5. The Elaboration Likelihood Model of Persuasion based on Petty and Cacioppo (1986) in Aiken (2002).	89

Chapter 1

INTRODUCTION

“Tek kotek kotek, anak ayam berkotek

Anak ayam turun sepuluh.....Mati satu, tinggal sembilan...”

“Cheep-cheep, cheep-cheep, cheep-cheep, sound of baby chicken

Ten baby chickens hatched...then one dies, and nine survive...(to be repeated, and counting down)”

This is a popular nursery rhyme for Javanese children in Indonesia where historically people have considered the chicken as an important part of their life and culture. For centuries Indonesians have viewed the chicken as a symbol of virility and, for the men, a symbol of prestige. The chicken has also had an important use in traditional and religious ceremonies. Among the many Indonesian traditions that involve chickens, cockfighting is one of them. A man is not called a man if he does not love cockfighting, akin to the modern metaphor of a man is not being manly if he does not love football. Historically cockfighting was displayed to honor the nobles and kings and was also used to resolve problems that could not be solved by traditional laws. Cockfighting was considered a wiser, simpler and more dignified way to resolve problems than through traditional laws.

Native chicken (*Gallus gallus*), or *ayam kampung* in the Indonesian language (*ayam* means chicken, *kampung* means rural), is the term for birds that are not raised in commercial farms and do not originate from strains or races which are produced for commercial purposes. Native chickens play a major role in the family economy in rural areas as most families there raise chickens and consider them as savings. They will sell the chickens if they need money to

pay for their child's school or to pay for medical treatment. People generally raise native chickens free-ranging in the family backyard, making this type of farming vulnerable to infection and the spread of deadly diseases such as highly pathogenic avian influenza (HPAI).

Avian influenza, an infectious disease of birds caused by strains of influenza virus type A, was identified first in Italy in 1878 (Lupiani & Reddy, 2009). Based on its ability to cause disease in poultry, avian influenza virus is further subdivided into low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI). Outbreaks of the highly pathogenic forms of this virus have been limited to subtypes H5 and H7 (Ligon, 2005). Some variants of these two subtypes are capable of causing highly lethal disease, but an intermediate step is required. Highly pathogenic viruses have no natural reservoir, instead emerging by mutation when the virus carried in its mild form by a wild bird is introduced into poultry.

Throughout the world, Indonesia is one of the countries most affected by the outbreak of the highly pathogenic avian influenza (HPAI) subtype H5N1. Since 2003, when it was first detected in Central Java, HPAI has spread to 31 out of 33 provinces, causing over 470 million USD in economic losses (KOMNAS, 2008a). The outbreak disrupted the lives of more than 20 million people who depend on the poultry industry (BPS, 2003) for their livelihood, and killed 160 out of 192 human case since 2005 to 2012, the fatality rate being especially high in children and young adults (WHO, 2013). Indonesia received from the international community the largest financial commitment to fight HPAI, totaling to more than 128 million USD (FAO, 2008a).

1.1 Study Background and Significance

In Indonesia HPAI also affected the capital city of Jakarta. Based on the results of the 2010 Census (BPS, 2010), Jakarta's population was 9,588,198 people consisting of

4,859,272 males and 4,728,926 females. The people of Jakarta live within approximately 662.33 square kilometers, making the average population density of Jakarta as high as 14,476 persons per square kilometer. This high population density paired with an outbreak of HPAI may cause serious problems.

The increased demand for chicken meat ready to cook has supported the development of slaughter houses for broilers, spent layers and native chickens. There are approximately 220 small- to medium-scale poultry collection sites in Jakarta with a total holding capacity of around 425,000 birds, and 1,150 small- to medium-scale poultry slaughter houses with a total slaughter capacity of 402,000 birds (Indonesia Poultry, 2007).

In general, most Indonesians still prefer to buy fresh carcasses (hot carcasses). This is because most Indonesians are Muslim, and a specific requirement for producing meat is that the animal or bird must be treated and slaughtered based on Islamic law (*hallalan thoyiban*). As a result, almost every traditional market still has a poultry collecting facility and a small- to medium-scale poultry slaughterhouse; these are generally known as live bird markets (LBM).

A live bird market is a specific location where only live bird transactions take place and can include pet bird markets and poultry markets. Live bird markets usually operate on a temporary basis. Often their operating schedules follow a specific religious calendar but in big cities like Jakarta they are open almost every day. Poultry are usually traded beginning early morning until noon and typically are not separated by species. Biosecurity in the LBM is poor, as most do not have sufficient water, the air circulation is poor, and there are unhygienic and/or unsanitary conditions. No personal protective equipment is used by LBM workers and there is no disinfection of birds, crates, pens, or other facilities. Lack of sanitation as well as poor air circulation make the LBM a good place for amplification and dissemination of avian influenza virus.

In an effort to minimize the public health impact of the HPAI outbreak, the Jakarta provincial government issued a local regulation (*Peraturan Daerah* Number 4/2007) on the Control, Raising, and Distribution of Poultry. In this regulation live poultry trade is prohibited in the territory of Jakarta. Live poultry may not be transported into or out of Jakarta, and all poultry must be marketed within the city as carcasses or poultry parts. The regulation states that officials in Jakarta will close most of the poultry collecting sites, live bird markets and slaughterhouses in Jakarta and relocate them outside the city within a period of not more than three years.

Enforcement of Jakarta's local regulation No. 4/2007 was to begin April 1, 2010 but was postponed several times, finally to start on December 31, 2010. Nevertheless, as of September 2012 field observations showed that in Jakarta live poultry trading in traditional markets was still running as usual. Despite the fact that Jakarta has a high risk of public health problems due to HPAI, there is no effective enforcement of the local HPAI control regulation in the city, thus the poultry collection sites and traditional slaughter houses continue to conduct unsafe practices of poultry slaughter. Why has the regulation to overcome HPAI problems been ineffective in Jakarta, and why is the poultry industry resisting its implementation? Several possible answers include inadequate infrastructure at the new locations, and the high cost required to relocate all of the collecting sites and slaughter houses away from Jakarta. Based on field observations, it is also apparent that one of the main reasons is the lack of communication between the government and the poultry industry. This is despite the fact the Jakarta government has been disseminating information about the regulation since before it come into place in April 2010.

To overcome this problem, information is needed to know how much the poultry industry (especially the LBM) in Jakarta knows about the risk of HPAI in their community. The level of knowledge and perception of safe poultry handling practices regarding the risk of avian

influenza among workers in LBM can be assessed using a Knowledge, Attitudes, and Practices (KAP) Study. A KAP study is a tool to measure the level of public knowledge, and its main purpose is to explore changes in knowledge, attitudes, and practices within the community. Specific to the current topic, a KAP study can also provide information regarding the value and effectiveness of the HPAI control program as it applies to the LBM.

1.2. Study Objectives

This is an exploratory study using a survey that was conducted with three main objectives: the first was to measure the current knowledge, attitudes and practices in Live Bird Market (LBM) workers related to key behaviors of HPAI, the second was to explore how KAP towards HPAI among live bird market workers in Jakarta resulted in the correct perceptions of HPAI risk and behavior, and the third was to monitor the impact of government-run risk education activities for LBM workers regarding the control of HPAI.

1.3. Specific Aims

1. To collect information on knowledge, attitudes and practices related to HPAI and the way in which interviewees experienced the risks of HPAI and how this knowledge is translated into action.
2. To identify factors that are associated with hazardous attitudes and practices related to HPAI.

1.4 Strengths and Limitations

A KAP study with in-person interviews has a high completion rate and provides an opportunity for clarification. Individuals conducting the interview can probe the subject for answers and many questions can be asked about a given topic, giving considerable flexibility to the analysis. An in-person interview is also relatively inexpensive and is useful in describing the characteristics of a large population. A KAP study is generally easy to do because the design tends to be simple and the resulting data can be quantified and easily interpreted. Since this study was only used one enumerator, the potential interviewer bias may be reduced and may also increase the consistency of the interview since all the respondents were treated the same.

An in-person interview can also introduce bias as the interviewer can add his opinion through word choice or tone of voice which may possibly influence the subject. An in-person interview may also create social desirability bias (Spiker, 2009), referring to the process by which subjects modify their responses to survey questions based upon their perception of the interviewer's opinion. Essentially, individuals do not want to give an answer that is not socially desirable, so they tend to give answers which they believe to be correct, acceptable, or appreciated. This process can interfere with the accuracy of the results. In addition, it is challenging to standardize the questionnaire, and without a standardized questionnaire it is very hard to interpret the results.

Chapter 2

LITERATURE REVIEW AND BACKGROUND

2.1. Highly Pathogenic Avian Influenza—Status of Disease and Control Policies in Indonesia

Highly Pathogenic Avian Influenza (HPAI) is an animal disease that has captured the world's attention. The disease is caused by influenza virus type A subtype H5N1 and is able to infect animals (especially birds) and humans. The threat of transmission to humans heightens concern worldwide that HPAI could potentially cause an influenza pandemic.

The first case of HPAI in poultry in Indonesia was reported in August 2003, occurring in commercial poultry farms and causing the death of hundreds of thousands of chickens. Since the initial outbreak in 2003 in Central Java, HPAI has spread to 31 out of 33 provinces, causing over U.S.\$ 470 million in economic losses (KOMNAS, 2008a). HPAI disrupted the lives of more than 20 million people who depended on the poultry industry for their livelihood, and resulted in the deaths of more than 12 million birds (BPS, 2003). This epidemic of HPAI has caused deaths in poultry and humans. The first human cases were diagnosed in June 2005 in the province of Banten (west of Jakarta province) and to date human deaths have been reported in 12 provinces (DEPKES, 2007). As of February 2013 there have been 192 people confirmed to have HPAI in Indonesia and 160 (83 %) of them have died (WHO, 2013).

National guidelines for HPAI control policies in animals in Indonesia were outlined in the National Strategic Plan for Avian Influenza Control in Animals in 2006 – 2008. These guidelines were revised for the period 2009 – 2011 (DEPTAN, 2008). At the national level, the strategy for HPAI control (KOMNAS, 2008b) includes eight aspects which are: development and

strengthening of early detection and early warning systems, development and coordination of research, epidemiological studies, data sharing, development of information and decision-making processes, capacity building and empowerment of stakeholders, improvement of sectorial policies, and funding.

Another policy issued by the Indonesian government is to compartmentalize the poultry industry through Minister's of Agriculture Decree Number 28/2008, by applying specific rules for commerce and controlling the disease in a subpopulation having a certain animal health status in the region (DEPTAN, 2009). Compartmentalization is defined primarily by management and farming practices with specific attention to biosecurity activities. In practice, compartmentalization is conducted by separating an animal subpopulation based on its health status through strict biosecurity and management measures which are controlled by Veterinary Services (OIE, 2008). Although the concept of compartmentalization has been clearly described through the principles and guidelines, it has proven difficult to fully implement. Therefore a strong partnership between the private and public sectors is essential for efficient implementation of compartmentalization.

The Jakarta provincial government has been attempting to apply the compartmentalization policy (local regulation 4/2007) in order to control avian influenza by not allowing any live poultry trade in the Jakarta area. According to the regulation, any trade of poultry in the Jakarta area should already be in the form of poultry products or carcasses (DKP, 2009). Jakarta authorities have tried to enforce compartmentalization on the poultry industry, poultry slaughterhouses and all business units that supply poultry or have other connections with poultry operations. This policy has also been used by the Jakarta administration to control the sale of live poultry in traditional live bird markets (LBM) in Jakarta. The plan was to relocate the LBM to five centralized locations in Jakarta in order to control HPAI, but the policy has not yet been implemented because of resistance of LBM owners and workers. In the meantime it is

imperative that good biosecurity practices are in place while authorities continue to educate producers and the public about HPAI risks and why the control policy should be supported.

HPAI control policies throughout Indonesia are not free of problems, and one of the biggest problems today is the issue of decentralization (National versus Regional). Since 2001 Indonesia has implemented its decentralization policy through Law 22/1999 on Regional Government and Law 25/1999 Fiscal Decentralization (KEMDAGRI, 2013). In terms of authority and power, the emphasis of the new law is that regional and local governments have more discretion to formulate and implement economic policy, including livestock and agricultural development in general. This creates a problem when dealing with disease outbreaks as in most cases local governments are very slow to respond. As a result, the problem grows and is more prolonged.

Another obstacle to an effective HPAI control policy in Indonesia is institutional overlaps and gaps. The Ministry of Agriculture and the Ministry of Health are technically responsible for the management and implementation of HPAI programs. Both ministries partner with local heads of governments in all areas of the Republic of Indonesia to implement control policies. However, there is an institutional gap between the Ministry of Agriculture and the Ministry of Health. The Ministry of Health has institutional uniformity across Indonesia, thus all the provinces and districts have Human Health Services to carry out policies of the central government, including disease control. However, the Ministry of Agriculture does not have institutional uniformity and not all provinces and districts across Indonesia have animal/veterinary services, therefore most of the time animal disease control programs cannot be executed properly.

2.2. The Role of Live Bird Markets in the Spread of the Disease

Various risk factors associated with the local characteristics of poultry production in Indonesia have been identified as playing a key role in the sustainability of the HPAI virus. Live bird markets and traditional markets are considered to be the main pathways for disease transmission (Sims, 2007). The high density of hosts offers ideal conditions for virus amplification, re-assortment and cross-species transmission (Webster, 2004). LBM (where the interaction between people and poultry occurs) act as a 'hub' and potential reservoir of infection in domestic poultry. When HPAI became established in endemically-infected countries, the prevailing systems of rearing, transporting and marketing poultry provided an ideal environment for transmission and persistence of the virus.

During the H5N1 epidemics that affected Hong Kong in 1997 birds in LBM were found to be highly infected, with the prevalence of the infection in chickens reaching 19.5 per cent (Shortridge, 1999). A key lesson from Hong Kong was also confirmed in other parts of Asia and Egypt, that poorly managed LBM and traders yards can play a major role in the persistence and transmission of the avian influenza virus especially if poultry remain in the market over 24 hours, providing opportunities for transmission within market stalls (FAO, 2011).

In Jakarta, like many other places in Indonesia, LBM in general are still a prime location for purchasing poultry. For most city dwellers, live poultry markets are the only place to get chicken. There are several things that made LBM appealing to most people in Jakarta—fresh products close to their home, sale of a relatively complete variety of poultry, and negotiable prices. Several characteristics typical of LBM in Jakarta were observed in the field in 2012: 1) consumers generally buy chicken as a unit, no sales are based on kilograms, 2) the consumer can purchase chickens live or slaughtered, 3) chicken sellers usually also serve as a poultry slaughterhouse, and 4) live bird sellers are usually located in the traditional markets or

adjacent to traditional markets. The LBM usually sell *ayam kampung* (native chickens), broilers, spent hens, ducks, Muscovy ducks, and geese. Mixing of various species of birds frequently occurs; this is caused by failure to apply all in – all out management in these markets. The mixing of various ages and species of birds with new birds that come every day also increases the odds that HPAI virus will adapt and replicate in the new host.

Since traditional markets in general are not designed to accommodate live birds, LBM located inside or adjacent to these markets often have very poor hygiene conditions. Listed below are some of the conditions commonly encountered in the traditional markets selling live poultry and poultry products. This was based on direct observation of LBM in six cities in Indonesia (INFOVET, 2012).

1. The absence of veterinary examinations of poultry and poultry products.
2. Low biosecurity.
3. No program for cleaning and disinfecting transport vehicles, carts, equipment, or buildings. Even if a program exists, it is rarely carried out.
4. No clear boundary between other commodities and the poultry products, holding cages/shelters, or the slaughtering and selling facilities.
5. Unknown source/origin of poultry and the health status of the farm.
6. Transportation of poultry does not meet biosecurity standards (e.g., using motorcycles and open vehicles) and also do not meet animal welfare guidelines.
7. No special designation for entry and exit of poultry at the market.
8. Poultry cages/shelters and slaughtering facilities do not meet minimum standards of hygiene and sanitation.
9. Sales of multiple species of birds (chickens, ducks, geese) occurs in one place.
10. Live chicken sales still occur as evidenced by the ability of consumers to bring live chickens to their homes.

11. There are no rules concerning the arrangement of live poultry and their products in the market.
12. Poor personal hygiene of LBM workers.
13. Lack of awareness of sellers and buyers regarding safe poultry products.

More than 1.8 billion poultry are produced every year in Indonesia (DEPTAN, 2012) with production centered in Java and Sumatra. Birds are sold through very complex non-integrated chains that are heavily reliant on the sale of live poultry through LBM. Live bird markets are part of a complex system that provides fresh poultry meat for the community. The LBM system consists of several components such as poultry markets, traders, suppliers/collectors, consumers and distribution channels. In general, the poultry trade chain in Jakarta can be described as presented by the figure 1.

All live poultry in circulation in Jakarta come from provinces around the city. Under existing regulations, any poultry traded between regions must be accompanied by a veterinary health certificate from the area of origin and must go through an inspection at the border check point. However, implementation of this regulation is often constrained by the lack of resources, therefore most of the time the poultry trade between regions is not in compliance with the regulations.

Poultry collectors/traders sometimes purchase poultry from several different farms and mix them in a single transportation vehicle, making it difficult to trace birds back their origin. The complex and weakly regulated structure of the poultry sector in Indonesia has hampered the control and prevention of HPAI there. However, considering the vital role the poultry industry plays for the community and the concern over the spread of HPAI, the Indonesian government has been refocusing the priorities of the HPAI control program to the LBM since these markets are considered to be a 'weak link' in biosecurity.

2.3. Biosecurity Measures

Depending on the definition, measures included in biosecurity programs can be very broad or more narrow. According to FAO (2008b), biosecurity refers to those measures that should be taken to minimize the risk of incursion of HPAI into individual production units (bioexclusion) and the risk of outward transmission (biocontainment) and onward transmission through the production and marketing chain. Bioexclusion is the prevention of disease-causing organisms from coming in and biocontainment is preventing existing disease-causing organisms from spreading out (WHO, 2008).

Dargatz *et al* (2002) explained that bioexclusion is preventing entry of pathogenic agents into an animal population and biocontainment is the prevention of pathogenic agents spreading out among animals, either inter-area and out to other areas. Levis and Baker (2011) added that there are three components of biosecurity: bioexclusion, biocontainment and biomanagement. Bioexclusion prevents the entry of disease agents, biocontainment prevents the spread of disease agents between populations and between areas, and biomanagement includes practices to prevent and control disease agents that already exist in the area.

According to Jeffrey (2006), biosecurity is an effort to prevent transmission of the disease in an area by avoiding contact between the animals and the organisms that cause disease. The purpose of biosecurity is to reduce as much as possible the potential for disease in a region in order to maintain the human and animal health, welfare, and production. What should be noted is that biosecurity measures can be applied differently depending on the situation and environment. It is usually not feasible to achieve perfect biosecurity that prevents all spread, thus the aim should be for a level of biosecurity that contributes to reducing the spread of disease to below a certain threshold. In general biosecurity measures are carried out through three steps (FAO, 2008b):

1. Segregation.

Segregation does not only refer to keeping species separate, but also to keeping potentially infected animals and materials away from uninfected animals. Segregation involves the creation of barriers and the control of what passes through them. The barriers should be physical and/or temporal where possible and procedural where not. Segregation should be expected to have the greatest impact on achieving good levels of biosecurity.

2. Cleaning.

Most virus contamination is contained in organic materials such as fecal or respiratory secretions that adhere to the surface of physical objects. A properly conducted cleaning process will therefore remove most of the contaminating virus. The difficulty of properly cleaning large areas or items emphasizes the need for segregation as the first and best line of defense.

3. Disinfection.

This is regarded as the least effective step because it is often incorrectly done. There are many disinfectants that destroy avian influenza viruses under ideal controlled conditions, but under field conditions they are often much less effective. To achieve the 'ideal' condition, the cleaning process should be conducted before applying any disinfectant, because disinfectants will not necessarily penetrate into dirt and many disinfectants are inactivated by organic materials such as fecal material or respiratory secretions.

Ideally both biocontainment and bioexclusion should be applied to LBM, although in practice biocontainment is easier to implement by not allowing live birds to leave the market and

assuring that transport vehicles leave only after proper cleaning and disinfection. However, in most parts of Indonesia including in Jakarta province, LBM and the transport systems that carry birds from the farms to markets or slaughterhouses each present specific risks for disease spread. Many markets have a low standard of sanitary conditions. In addition, many markets in Indonesia operate daily, making them at higher risk than markets that are closed certain days when the premises can be disinfected. In the event that it is impossible to introduce sufficient biosecurity measures at the current location of LBM, it may be necessary to relocate them. This would be part of a restructuring process and should only be undertaken after careful consideration.

2.4. Knowledge, Attitudes and Practices Survey

Over the last 40 years, Knowledge, Attitudes and Practices (KAP)-based studies have been frequently used worldwide by the World Bank, an organization in the United States that uses both government and non-government entities within the scope of community development, education, public health and the environment (Crini and Julien 2009). The KAP study concentrates on the knowledge, attitudes and practices regarding a particular topic and is generally used before or after interventions so as to measure the effectiveness of these interventions.

KAP surveys are mostly designed for a particular area, culture and topic because the study assesses the community in its natural state. A KAP study shows how a person or a group of people believe in something specific, what they know and how they behave. Sometimes they change their knowledge on a particular topic and this affects their attitudes and practices that they believe to be true as a result of the intervention (Naylor 2010).

A KAP study measures the level of knowledge, attitudes and practices in a community. It can also determine the level of education of a community (Kaliyaperumal, 2004). The KAP survey examines specific populations to gather what they know, believe and do (WHO 2008). This study demonstrates the level of knowledge and attitudes of respondents regarding specific topics and how they practice it.

In most KAP surveys the data is collected through direct interviews using a structured questionnaire. The data are then analyzed both quantitatively and qualitatively depending on the object and design of the study. KAP surveys can be designed specifically to gather information about the topic of HPAI as well as information about beliefs and practices towards HPAI, in this case the practice of biosecurity.

KAP studies are also used to identify risk factors that may affect the behavior of most people, and the reasons for their attitudes and actions. KAP surveys can also investigate communication processes and the resources that are key to implementing HPAI prevention and control activities. In addition, KAP surveys can be used to identify the needs, problems and difficulties in the conveyance of programs; this information can provide answers to the challenges in improving the quality and accessibility of public services. This type of survey can also be designed to explore the entire implementation of HPAI control by the government, universities and non-governmental organizations (WHO, 2008).

Given the important role of LBM in the spread of HPAI, scientific data on knowledge, attitudes and practices towards the disease among LBM workers in Indonesia is important; however, such research has never been undertaken. Therefore, the level of success of interventions against workers' HPAI risky behaviors through public awareness in Jakarta cannot be measured. In order for the government to be able to effectively intervene against risky

behaviors, it is necessary to collect information about what is known and what needs to be known about HPAI by the LBM workers in Jakarta.

2.5. Key Components in Knowledge, Attitudes and Practices (KAP) Study

A KAP study can identify knowledge gaps, cultural beliefs, or behavioral patterns that may facilitate understanding and action, as well as those that pose problems or create barriers in program delivery. As with any study in general, a KAP study begins with developing the conceptual framework. The conceptual framework specifies the meaning of key components and identifies how variables are to be measured or operationalized. It also explains the rationale for the importance of particular concepts that are under study and why particular variables and their measurements are chosen (Nestor and Schutt, 2012). Key components in the KAP study are described as follows:

2.5.1. General Characteristics of Respondents

Characteristics of the respondents are formed by biological and socio-psychological factors. Biological factors include the phenotype of the respondents, while socio-psychological factors include cognitive (intellectual), conative (the mental processes or behavior directed towards action or change and including impulse, desire, volition, and striving), and affective (emotional) components (Maulana, 2009).

In the context of this research, the characteristics of the individual (i.e., poultry market workers) were restricted to demographic characteristics such as age, education, working experience, daily sales and number of supplier. Workers' characteristics are determined by

socio-psychological factors which based on assumption of having links with the attitudes and practices towards biosecurity.

2.5.2. Knowledge

According to the *Merriam-Webster Dictionary*, knowledge is defined as the fact or condition of knowing something with familiarity gained through experience or association. In Plato's *Theaetetus*, Socrates and Theaetetus discuss three definitions of knowledge: knowledge as nothing but perception, knowledge as true judgment, and, finally, knowledge as a true judgment with an account. Each of these definitions has been shown to be unsatisfactory (Audi, 2011).

Knowledge in the field of public health can be profitable, but it will not necessarily be able to increase positive behaviors. Measuring the level of knowledge using the KAP survey can help identify areas where the process of information dissemination and public education should continue to be implemented (WHO, 2008).

Azemi (2010) explains that in the KAP survey the level of public knowledge is assessed regarding concepts related to public health in programs at the national and international levels. Without knowledge one would not have a basis for making decisions and taking decisive action against the problem. In general, knowledge is divided into six levels which are:

1. Know. This is simply recall of information that has been studied previously. Included in this is the ability to recall anything specific from all the materials studied or from stimuli that have been received.

2. Comprehension. This is defined as the ability to correctly describe and interpret objects of a known material. People that have been aware of the object or material must be able to explain it, cite examples, infer and predict the object being studied.
3. Application. A person's ability to use the material learned in actual circumstances.
4. Analysis. The ability to describe the material or an object in its various components but where the components still relate to each other within an organizational structure. This ability can be revealed by the use of verbs such as describe, distinguish and classify.
5. Synthesis. This refers to the ability to place or connect multiple parts into a whole new form. In other words, the ability to combine several existing formulations and establish a new formulation.

Based on the above definitions it can be concluded that knowledge is to know a new object, and this becomes an attitude towards the object only if the knowledge is accompanied by a readiness to act accordingly. When a person has a certain attitude towards an object then that person has to know about the object. Knowledge is also a collection of information that has been conceived, acquired during the learning process in life, and can be used at any time to adjust themselves and their environment. Knowledge obtained either from direct experience or the experience of others gives people the ability to discern a problem and design solutions.

An individual's knowledge can grow and develop in accordance with his capabilities, needs, experiences and the intensity of information materials exchange in the environment. Individual sources of knowledge can be derived from a variety of learning experiences both formal and informal (Audi, 2011). In the context of this research, assessment of the level of knowledge was conducted to understand the condition of LBM workers' knowledge towards biosecurity practices, and was limited to aspects of biosecurity measures specific to HPAI prevention. The level of workers' knowledge was assumed to have a link with their attitudes and actions towards biosecurity practices.

2.5.3. Attitudes

Eagly and Chaiken (2007) defined an attitude as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. Attitude is translated from response towards a particular object and may be accompanied by a tendency to act in accordance with the perception to the object. In this context objects are not only physical objects or individuals, but can also be events, norms, values and so forth (Pratkanis et al, 1989).

In social psychology each attitude a person holds can be expected to help that person meet their needs in some way or other. According to Katz (1960) in Petty and Fazio (2008), the needs fulfilled by attitudes, and hence the functions of attitudes, fall into four broad categories:

1. The adaptive (or *instrumental*) function. Some attitudes serve to enable people to attain particular desired goals or avoid undesirable circumstances.
2. The knowledge function. Some attitudes are useful because they help to make the world more understandable. They help people ascribe causes to events and direct attention towards features of people or situations that are likely to be useful in making sense of them.
3. The value-expressive (or *ego-expressive*) function. Some attitudes are important to a person because they express values that are integral to that person's self-concept (i.e. their ideas about who they are), and the expression of that attitude communicates important things about that person to others.
4. The ego-defense function. Some attitudes serve to protect the person that holds them from psychologically damaging events or information by allowing them to be recast in less damaging or threatening ways.

Some social psychologists claim that attitude can be understood better by considering its components. There are three main components of attitude: cognition, affection and conative (behavior). Cognition is the component of attitude associated with individual beliefs about the object; affection includes the direction and intensity of individual assessments or the experience towards the object; while the conative component is the tendency to act in a certain way towards the object (Pratkanis et al, 1989). These three components are usually interrelated and consistent with each other.

Attitude can also be described as the reaction an individual has to what he likes or dislikes about something which ultimately determines the behavior of the individual. A person with an attitude of preference towards something tends to approach, to find out and to join, while a negative attitude towards something tends to make the person avoid it (Rahayuningsih, 2008). Rahayuningsih (2008) further defines attitude based on orientation:

1. Response oriented. Attitude is a form of feeling, that feeling of support (favorable) or a lack of support (unfavorable) towards an object.
2. Response preparedness oriented. Attitude is a readiness to react to an object in a certain way when confronted with a stimulus that requires a response. Or it is a conditioned pattern of behavior, tendency or anticipatory readiness to adapt to the social situation.
3. Triadic schemes oriented. Attitude is a constellation of cognitive, affective, and conative components interacting to understand, to feel, and to behave towards an object in the surrounding environment.

In addition to the attitude definitions outlined above, there are many more other definitions provided by experts. The discrepancies between these definitions seem more likely caused by a difference in emphasis, but in general attitude can be defined as the positive

(favorable) or negative (unfavorable) beliefs, feelings and assessment of individuals, and these provide direction or tendencies for individuals to behave in certain ways.

Attitudes can be changed through persuasion, so an important domain of research focuses on the effects of communication on attitudes. Experimental research into the factors that can affect the persuasiveness of a message include:

1. Target Characteristics. These are characteristics that refer to the person who receives and processes a message. One variable in this category is intelligence - more intelligent people are less easily persuaded by one-sided messages. Another variable in this category is self-esteem, with people having moderate self-esteem being more easily persuaded than are people with either high or low levels of self-esteem (Wood, 2000).
2. Source Characteristics. The major source characteristics are expertise, trustworthiness and interpersonal attraction or attractiveness. The credibility of a perceived message has been found to be a key variable here. For example, someone may be more easily persuaded by information from a professional journal, than by information from a newspaper (Heesacker *et al*, 1983).
3. Message Characteristics. The nature of the message plays a role in persuasion. People are not motivated to process the message; simply the number of arguments presented in a persuasive message will influence attitude change, such that a greater number of arguments will produce greater attitude change (Petty and Cacioppo, 1984).
4. Cognitive Routes. A message can appeal to an individual's cognitive evaluation and help change an attitude. In the main route to persuasion the individual is presented with the data and motivated to evaluate it and arrive at an attitude-changing conclusion.

However, attitude change can also be accomplished by encouraging the individual to not look at the content but at the source (Sternthal et al, 1978). This is commonly seen in modern advertisements that feature physicians or other experts. In some cases celebrities are used because they are attractive.

In the context of this research, the attitude subjects are the LBM workers in Jakarta, while the object of the attitude is the practice of biosecurity. Thus, the attitude of the LBM workers towards biosecurity can be formulated as a workers' belief, feeling or assessment (subject) on biosecurity practices (attitude object) that accompanied workers behavioral tendencies towards the attitude object (biosecurity practices).

2.5.4. Practices

Azemi (2010) argued that an attitude may not automatically translate to an action/practice. A supporting factor or proper conditions are needed for an attitude to become a real action. Practices also consist of several levels which are:

1. Perception. Identify and select different objects with respect to actions to be taken.
2. Guided response. Can follow a correct sequence in accordance with an example.
3. Mechanism. An automatic response or something that has become a habit.
4. Adaptation. A practice or action that is already well developed, meaning that the action has been modified without prejudice to the validity of the action.

Practice is partly a function of attitude. The word 'partly' here suggests that in addition to attitude factors there are also other factors that influence individual practice. The strength of the relationship between attitudes and practice is determined by the consistency between the attitude components and the other components. It is well defined that although two

individuals may have similar cognitive components, if the level of the affection components is different the behavioral tendencies of each individual will be different.

The model developed Pavlou and Fygenson (2006) stated that the behavior is primarily a function of the goal to achieve the practice. The intention to behave is determined by two factors, the attitude towards practice and the perceived social pressure (subjective norm) to practice. Subjective norm applies to situational variables that may hinder the implementation of someone's intention or desire. For example, a worker might have some friends who are desire to ignore the hygiene practices in their workplace and encourage him to do the same. However, his supervisor might have strict perspective about this due to safety issue. The beliefs of these people, weighted by the importance his attribute to each of their options, will then influence his behavioral intention, which will lead his behavior to obey the rule or not.

Based on model by Pavlou and Fygenson (2006) in figure 2, stressed that although the attitude tends to lead to behavior, subjective norms and the purpose of actions are factors that must also be considered. They also explained that a high degree of congruence between attitudes and behavior must be identified to evaluate the strength of the relationship between the two. The degree of the congruence in this case is how selected attitudes and behaviors are consistent in terms of action, target, context and time. The more specific an attitude the more strongly it is associated with the practice. Likewise, the stronger an attitude, which in this case is determined by the direct personal experience of the object or the personal interest in the object, the more powerful the relationship between attitudes and practice. With all this in mind, the extent of the relationship between the attitude of the LBM workers and the actual biosecurity practices they perform was investigated.

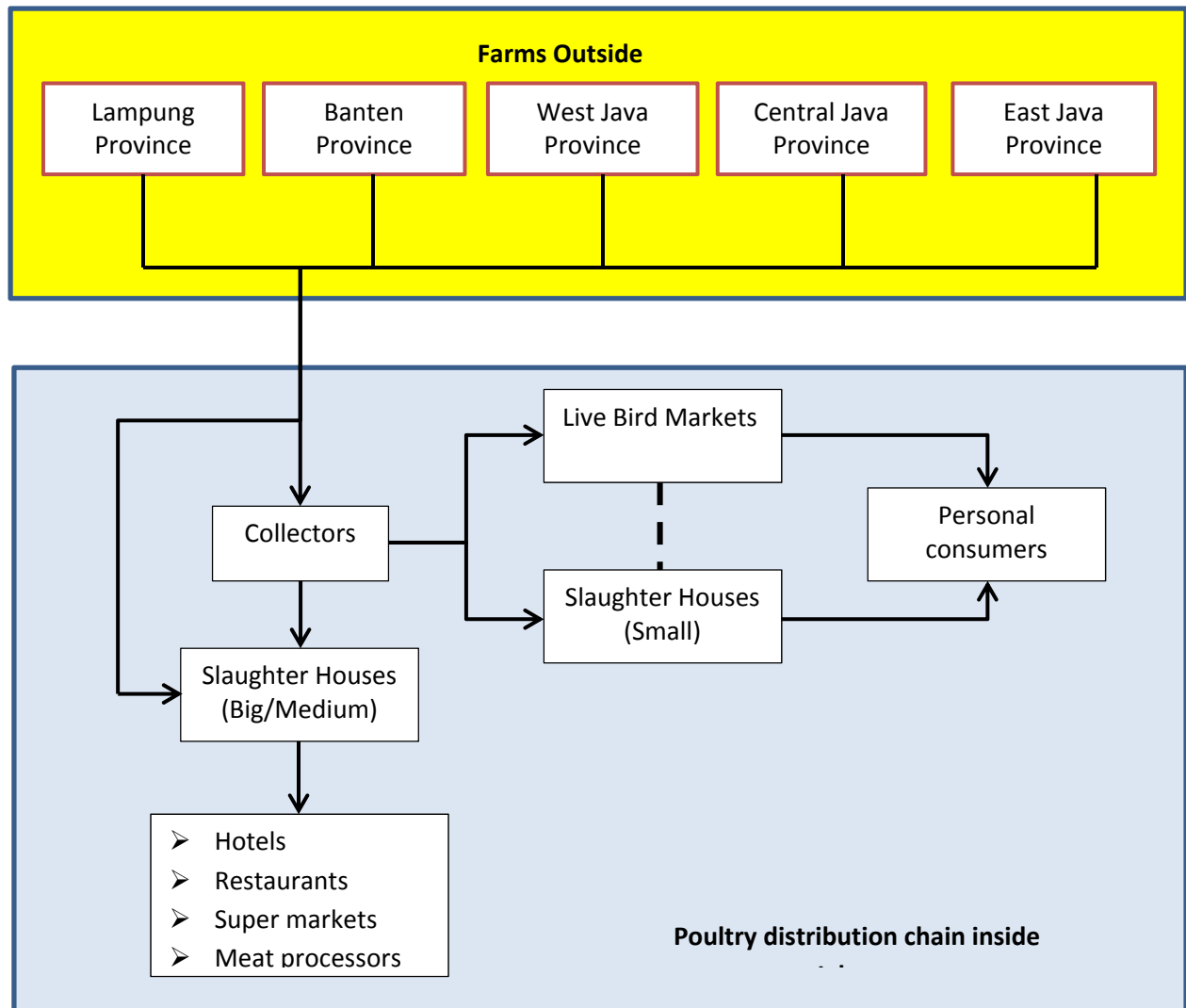


Figure 1. Market Chain of Poultry Trade in Jakarta - Indonesia

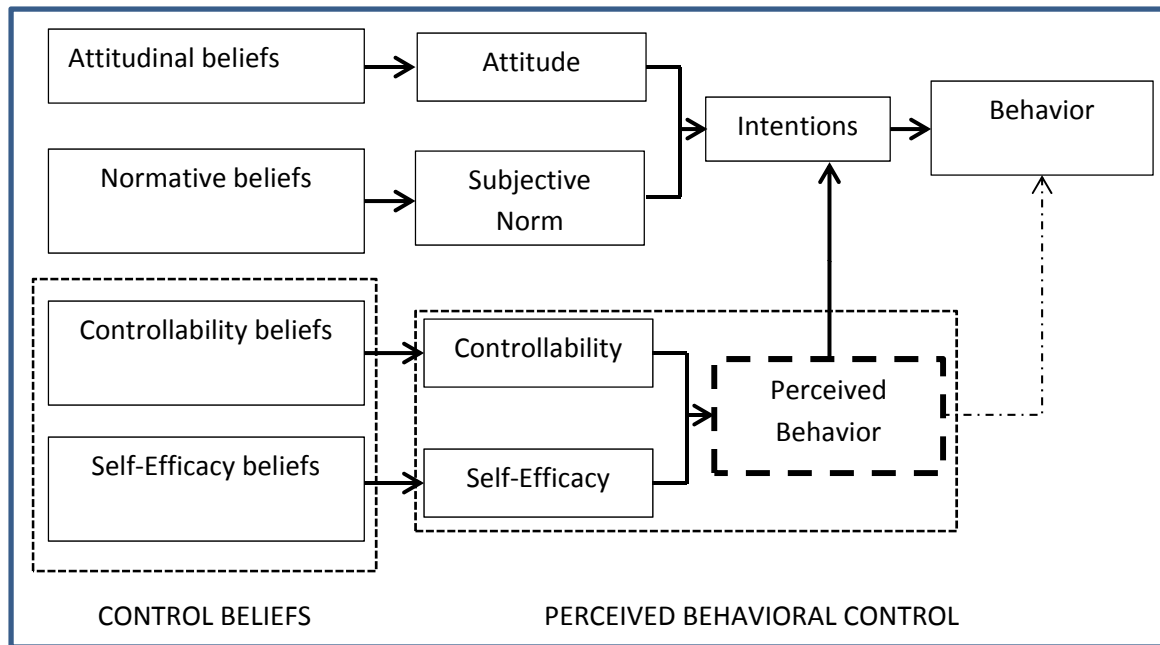


Figure 2. Attitudes and Practices Relationship Model (Pavlou and Fygenson, 2006).

Chapter 3

MATERIALS AND METHODS

3.1. Research Framework

Several variables were used in this research, including general characteristics of workers, the worker's knowledge and attitude towards HPAI. These variables and the relationship to the expected outcome are described in the research framework. A research framework explains the rationale for the importance of particular concepts that are under study and why particular variables and their measurements are chosen.

In this research, three variables were linked to the biosecurity practices of workers in their workplace based on direct observation by the researcher. The level of knowledge and attitudes of workers directly affected by the general characteristics of the individual such as gender, age, education, income, working experience and average working hour. Whereas the practice of workers can be directly affected by the knowledge and attitudes as described by Pavlou and Fygenon (2006), and also may be indirectly affected by general characteristics of the individual. Combined assessment of the worker's practices and the direct observations of biosecurity measures in the location determined the level of practice of the worker. The conceptual framework of the research is presented in Figure 3.

3.2. Time and Place of Research

The study was conducted from July 2012 to August 2012 at 100 live bird markets (LBM) in five areas of Jakarta Special Capital Region comprising Central Jakarta, South Jakarta, East Jakarta, West Jakarta and North Jakarta.

3.3. Sample

Samples were taken from LBM in five areas of Jakarta Special Capital Region including Central Jakarta, South Jakarta, East Jakarta, West Jakarta and North Jakarta (Figure 4). The sampling areas did not include Kepulauan Seribu which is an administrative territory consisting of a group of islands north of Jakarta. This exception was made because the number of LBM in this territory is very small and it is a difficult location to access.

Data on LBM for each area were obtained from the Jakarta Provincial Marine and Agriculture Services.

Sample size calculation is based on formula $n = \frac{Z^2 * p * (1-p)}{c^2}$, where :

Z = Area under normal curve corresponding to the desired confidence level (e.g. 1.96 for 95% confidence level)

p = True proportion of factor in the population, or the expected frequency value

c = Maximum difference between the sample mean and the population mean

Therefore the sample needed for this survey, based on assumptions of 95% confidence level, 50% of the expected frequency value (outcome of less knowledge, negative attitude), and 10% of the difference between the sample mean and the population mean, are:

$$n = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.1^2} = \frac{0.9604}{0.01} = 96.04 = 97 \text{ samples.}$$

A stratified random sampling method was applied. For this study, the population (total LBM as many as 866 locations) was stratified based on five regions, and each LBM was assigned a number. Using a random numbers table, a proportional samples were taken for each stratum. The results of the sample size calculation of the sample are presented in Table 1.

Having obtained the required number of samples in each region, the next step is the selection of respondents. Selection of the respondents was conducted by visiting the selected LBM location in each region and followed by a survey of workers who are willing to do the interview. Selection of the workers was not based on specific preferences except based on predefined inclusion criteria which are:

- a) Age over 18.
- b) Not decisionally impaired (person who have a diminished capacity for rationally and autonomously providing informed consent due to a psychiatric, organic, developmental or other disorder that affects cognitive or emotional functions).
- c) Have been working for at least six months.
- d) Responsible for poultry care activities and/or slaughter.

3.4. Research Design

The Jakarta region was selected for this cross-sectional study due to the high risk of HPAI present there, along with the assumption that a high level of knowledge regarding HPAI exists because of better access to sources of information. Jakarta was also chosen because the number of LBM was the largest compared to other provinces in Indonesia. The large number of live bird market transactions per day in Jakarta makes the risk of spreading HPAI

higher than in LBM elsewhere. Another reason why the Jakarta region was selected because it is expected that the study results will draw more attention from policy makers and other stakeholders since the study was conducted in the capital of Indonesia.

The study utilized a questionnaire as a tool to measure the level of knowledge, attitudes and practices of the respondents (Di Giuseppe, Abbate et al. 2008, Leslie, Billaud et al. 2008, Khun, Heng et al. 2012). The research was conducted by direct interview of live bird market workers at LBM and observation of biosecurity conditions of the live poultry collecting/slaughtering sites. Interviews were conducted using a structured questionnaire and a checklist was used to record direct observations at the location of business.

Using a standardized questionnaire, the workers were interviewed confidentially in their workplace. Questions covered demographics, work activity, knowledge of transmission and prevention of HPAI, attitudes towards this disease, compliance with precautions at work, and sources of information. Interviews took approximately 30 minutes per worker to perform.

Information about the study objective, methods and feedback were provided to market operators during the course of the study. Permission to participate in the study was obtained from market managers at the time of data collection. Since inappropriate dissemination of findings may have economic consequences for market communities, market managers and workers were assured of confidentiality during and after the study. To achieve this, the sample data collected and analyzed from participating markets were coded.

This research has been reviewed and received approval from the Colorado State University Institutional Review Board – Human Subjects, including the instruments used for this study such as questionnaires and an informed consent sheet. Prior to use the questionnaire and checklist were tested to evaluate the suitability of the questions and also to assess the level

of difficulty of the questions. Subsequently, to assess the feasibility of the questionnaire as a research device the questionnaire was tested for validity and reliability.

Prior to use of the questionnaire, it was tested with 5 pilot samples, and measured subjectively by the enumerator. The validity was measured based on enumerator judgement whether all of the pilot samples were understood and provided the appropriate answers to the questions. The reliability was measured based on the judgement whether all of the pilot sample results were consistent. To increase the participation rate for this study, a 20,000 Rupiah (approximately U.S.\$ 3) compensation was given to study participants for each survey completed.

The questionnaire covered general characteristics/information of the worker, the worker's knowledge, attitude, and practices, as well as barriers to the preventative measures. These variables need to be translated into an operational definition. An operational definition provides a recipe for specifying variables that are to be used to measure the research framework (Nestor and Schutt, 2012). Operational definitions for each variable as it applied to this study are presented in Table 2.

The questionnaire was divided into 6 subsets of questions. Each subset was designed to collect information on specific subjects and has a different assessment of right and wrong answers. Explanation of each subset is as follows:

3.4.1. General Information of Respondents

The first subset of the questions in the questionnaire collected general information about the workers. There were 11 questions in this subset covering gender, age, education, income per day, average sales per day, work experience, average working time per day, number of poultry suppliers as well as the reasons to buy from suppliers, and the origin of purchased birds.

This information was collected in order to identify whether the level of knowledge, attitudes and practices of the workers was associated with some general variables such as age, education, work experience, and so forth. Some questions in this subset were interval, ordinal and nominal, and were given a code to make it easier to analyze the data. More details are given in Table 3.

3.4.2. Assessment of Worker's Knowledge

The second subset in the questionnaire included 26 questions designed to assess the basic knowledge of the workers about HPAI and biosecurity. To eliminate guessing by the respondent, the questions were divided into positive and negative questions and open-ended as well as closed questions. There were 14 closed questions where the answer choices were read to the respondent, while there are 12 open questions where the answer choices were not read to the respondent.

From a total of 26 questions about the worker's knowledge, eight of these (question numbers 4, 17, 20, 21, 22, 24, 25, and 26) do not have right or wrong answers, so these questions were not included for scoring the knowledge level of the respondents. These questions did, however, collect useful information regarding the preferences the workers had towards specific issues related to the prevention and control of HPAI.

Each correct response to the questions regarding knowledge towards HPAI and biosecurity was given a score of 1, while each wrong response and the 'Do not know/Not sure' responses were given a score of 0. Thus the maximum knowledge score for a worker was 18 and the minimum was 0. Based on the weighting criteria above, the worker's knowledge towards HPAI and biosecurity were categorized as follows:

- Less Knowledge if the total score was 0 – 9
- Moderate/Sufficient Knowledge if the total score was 10 – 14
- Good Knowledge if the total score was 15 – 18

The assessment and scoring criteria for each question are presented in Table 4.

3.4.3. Assessment of Worker’s Attitude

The third subset of questions in the questionnaire was designed to assess the attitudes of the LBM workers. Seventeen statements related to attitude towards certain HPAI and biosecurity issues were read, and respondents were given three possible responses using a Likert scale of 'Agree/Satisfied', 'Disagree/Dissatisfied' and 'Not sure/Don’t know'. The statements were divided into positive and negative forms to eliminate bias from the respondent’s responses. There were 12 positive statements in which the correct response by the respondent was 'Agree/Satisfied', while there were 5 negative statements in which the correct response was 'Disagree/Dissatisfied'.

Each correct response to the statements regarding certain HPAI and biosecurity issues was given a score of 2, a 'Not sure/Don’t know' response was given a score of 1, while a wrong response was given a score of 0. Thus the maximum attitude score for a worker was 34 and the minimum was 0. Based on the scoring criteria above, the worker’s attitude towards HPAI and biosecurity were therefore categorized as follows:

- Negative attitude if the total score was 0 – 17
- Neutral attitude if the total score was 18 – 26
- Positive attitude if the total score was 27 – 34

Assessment and scoring criteria for each question are presented in Table 5.

3.4.4. Assessment of Worker's Practice

The fourth subset of questions in the questionnaire was designed to assess the practice of LBM workers. Ten questions about daily practices towards HPAI were included and covered sanitation practices (5 questions), poultry traffic monitoring practices (2) and disease reporting practices (3).

Respondents were given three possible responses which were 'All the time', 'Sometimes' and 'Never'. Questions were divided into positive and negative forms to eliminate bias from respondent's responses. There were eight positive questions where the correct response was 'All the time', while there were two negative questions where the correct response was 'Never'.

Each correct response for the questions regarding the worker's practice was given a score of 2, 'Sometimes' was given a score of 1, while a wrong response was given a score of 0. Thus the maximum attitude score was 20 and the minimum was 0. Based on the scoring criteria above, the LBM worker's practice towards HPAI and biosecurity were therefore categorized as follows:

- Inappropriate practice if the total score was 0 – 10
- Moderate practice if the total score was 11 – 15
- Good practice if the total score was 16 – 20

Assessment and scoring criteria for each question is presented in Table 6. Inappropriate practice term was used to describe the practices that did not comply with the HPAI precautionary behavior.

3.4.5. Assessment of Barriers to Preventative Practices

The fifth subset of questions in the questionnaire was designed to identify barriers to preventative practices based on worker opinion. Seven questions about preventative practices towards HPAI were included, and the workers were given responses so they could choose which response met/matched their opinion. There was no right or wrong response for these questions; they were used to discover the opinion of the respondents related to specific issues regarding prevention practices for HPAI. The questions for this subset are presented in Table 7.

3.4.6. Direct Observations

The sixth subset of questions in the questionnaire was designed to identify site-specific compliance with the key points of HPAI-related biosecurity. The enumerator made direct observations of the business location and the LBM worker's workplace conditions. Direct observation was conducted after the respondents completed the interview and was conducted using a checklist provided as part of the questionnaire. There were six key points related to HPAI biosecurity that were observed at each of the worker's business location/workplace. When it was seen that the criteria was met, a score of 1 was given, while any criteria not met was given a score of 0. Thus the maximum score for direct observation was 6 and the minimum was 0. Questions in this subset are presented in Table 8.

3.4.7. Assessment of Level of Practice

The Level of Practice assessment was made by combining the worker's practice score with the direct observation score. There were 10 questions regarding worker's practices with a possible maximum score of 20 and minimum score of 0, while there were 6 questions

based on direct observation with a possible maximum score of 6 and minimum score of 0. Therefore the total possible score for level of practice that may be attained by the LBM worker was a maximum of 26 and minimum of 0. Based on the scoring criteria above, the worker's level of practice towards HPAI and biosecurity were therefore categorized as follows:

- Inappropriate Level of Practice if the total score was 0 – 12
- Good Level of Practices if the total score was 13 – 26.

3.5. Data Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics (such as frequency, percent distribution, mean, minimum and maximum values) were used to analyze the demographic information, and also for some information regarding knowledge, attitudes and practices.

In the inferential statistics, data were analyzed using multivariable logistic regression and Chi-square or Fisher's Exact Test to investigate the association of several independent explanatory variables such as gender, age, education, income, experience and number of supplier to the outcome of knowledge, attitudes and practices in live bird market workers.

Before testing the multivariable logistic regression model associating the outcome estimates, the correlations among the independent variables and bivariate relations between the independent variables and the outcome were assessed using univariate analysis. The criterion to be met before any independent variable was considered for entry into an initial multivariable logistic regression model was a p -value ≤ 0.25 obtained for each outcome variable in the univariate analysis (Di Giuseppe, Abbate et al. 2008). Using the variables that were significant at p -value ≤ 0.25 , a multivariable logistic regression model was constructed. Because there

were two factors that considered having collinearity, thus, they were analyzed into two separate final models. The Odds ratios (ORs) and their corresponding 95% confidence intervals were also calculated in the model for the independent variables. The Minitab version 16 software was used for all statistical analyses.

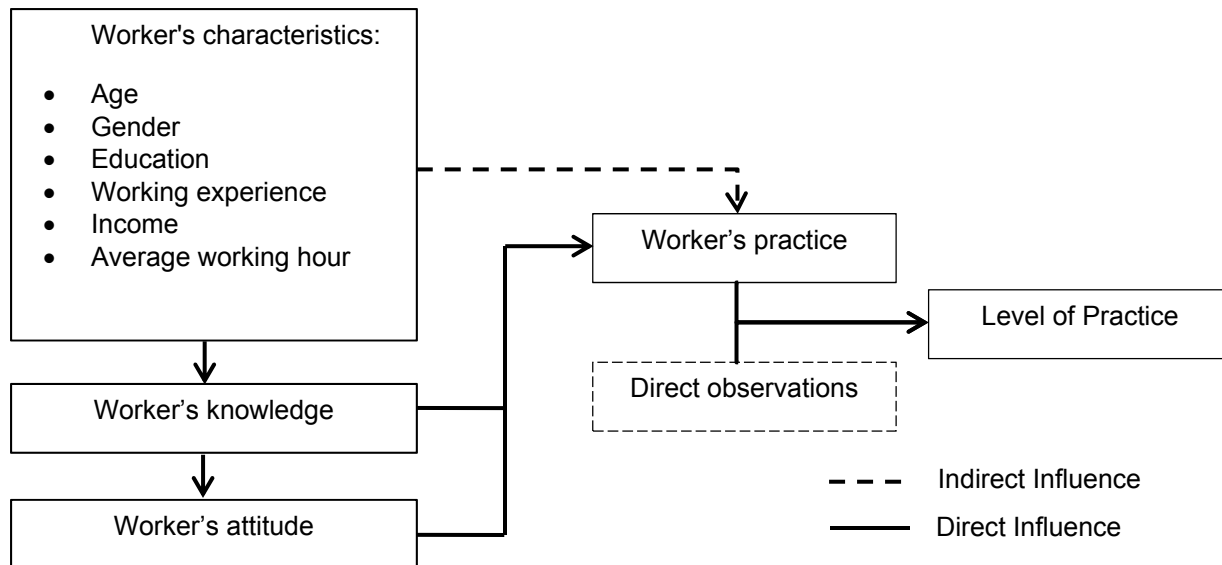


Figure 3. Research Framework

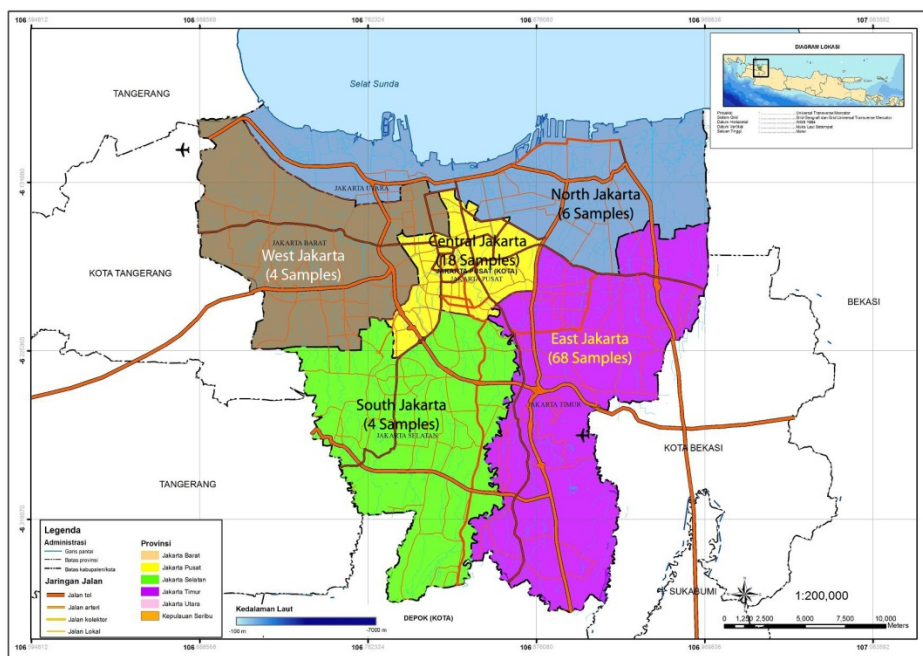


Figure 4. Jakarta Special Capital Region Map (KEMDAGRI, 2012).

Table 1. Proportional sample size calculation based on region in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Location	Total number of live bird markets	Proportion	Sample
1	Central Jakarta	163	0.18	18
2	North Jakarta	48	0.06	6
3	South Jakarta	33	0.04	4
4	West Jakarta	31	0.04	4
5	East Jakarta	591	0.68	68
	Total	866		100

Table 2. Operational definition of each variable in the questionnaire for HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Variables	Definition	Type of Data
Gender	Worker's gender	Categorical - Dichotomous (Male/Female)
Age	Age of worker calculated from the last birthday	Numerical – Discrete
Age group	Age of worker categorized into one of 4 groups	Categorical – Ordinal (1, 2, 3)
Education	Last education qualification held by the worker	Categorical – Ordinal (0, 1, 2, 3, 4, 5)
Income	The amount of money received from the sale of poultry per day	Categorical – Ordinal (1, 2, 3, 4)
Experience	The length of time an employee has worked at the site	Categorical – Ordinal (1, 2, 3, 4)
Average working hour	The average time worker works every day	Numerical - Discrete
Number of suppliers	Number of suppliers from which poultry was purchased	Categorical - Dichotomous (One/More than one)
Knowledge	Worker's level of awareness of the facts associated with HPAI, maintenance management, sanitation and biosecurity practices in the workplace as measured through questionnaire assessment	<ul style="list-style-type: none"> ➤ Numerical – Discrete ➤ Categorical – Ordinal (Less, Moderate, Good)
Attitude	Fundamental attitudes, beliefs and misconceptions of the statements related to HPAI were measured through questionnaire assessment	<ul style="list-style-type: none"> ➤ Numerical – Discrete ➤ Categorical – Ordinal (Negative, Neutral, Positive)
Practice	Sanitation and biosecurity measures taken by workers as measured through questionnaire assessment	<ul style="list-style-type: none"> ➤ Numerical – Discrete ➤ Categorical – Ordinal (Inappropriate, Moderate, Good)
Barriers of preventative practices	Worker's opinion on the issues relating to reasons that serve as barriers to preventative practices against HPAI	Categorical
Direct observation	Assessment of the condition of the business location through several parameters related to environmental safety towards HPAI	Numerical - Discrete
Level of Practices	Assessment combining worker's practices as examined via questionnaire and direct observation.	Categorical - Dichotomous (Inappropriate/Good)

Table 3. Questions and codes for the subset of general information for HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Question		Code
1	Gender	Male	1
		Female	0
2	Age		Numerical - Discrete
3	Age groups (years)	18 - < 25	1
		25 - <40	2
		≥ 40	3
4	What is your highest education level?	Illiterate	0
		Informal education	1
		Primary	2
		Secondary	3
		High School	4
		University/College	5
5	What is your average daily sales? (in Rupiah)	<500.000	1
		500.000 - < 1.500.000	2
		1.500.00 - <5.000.000	3
		≥ 5.000.000	4
6	What type of poultry do you sell?	Broiler only	Numerical - Discrete
		Broiler + Native Chicken	
		Broiler + Native Chicken + Others (Duck, Goose, Muscovy)	
		Broiler + Others (Duck, Goose, Muscovy)	
7	What is the approximate number of poultry, that you sell every day?		Numerical - Discrete

Table 3. Questions and codes for the subset of general information for HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Question		Code
8	How long have you been working at this establishment/business?	<1 year	1
		1 - <5 year	2
		5 - <10 year	3
		≥ 10 year	4
9	How many hours do you work each day for this establishment/business?		Numerical - Discrete
10	From how many suppliers/farms do you usually buy the poultry?	1	1
		> 1	2
11	What is your reason for buying the poultry from that source?	Price	Used to gather information on respondent's choice about certain issues
		Contract	
		Convenience	
		Relationship	
		Other	
12	From what area did you buy your poultry?	Greater Jakarta	Used to gather information on respondent's choice about certain issues
		Banten	
		West Java	
		Central Java	
		East Java	
		Other	

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Questions	Answer	Correct answer	Score
1	Have you heard about bird flu?	Yes	Yes	1
		No		0
2	What is the causative agent of bird flu?	Virus	Virus	1
		Bacterial		0
		Parasite		0
		Don't know		0
3	What animals can be infected with bird flu?	Only Chicken	All poultry	0
		All Poultry		1
		Mammals		0
		Don't know		0
4	From where did you learn about bird flu?	TV	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		Radio		
		Newspaper/Magazine		
		Brochures/banners		
		Market Administrator		
		Health Officer		
		Family Members		
Others				
5	How likely do you think it is that your poultry will be infected with bird flu?	Very likely	Very likely and Likely	1
		Likely		1
		Unlikely		0
		Very unlikely		0
6	Do you think that bird flu can be prevented?	Yes	Yes	1
		Not sure		0
		No		0
		Don't know		0

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
7	Can you tell me the things that you think you could do to prevent bird flu in poultry?	Vaccinate poultry against bird flu	The respondent may be able to give one or more answers that match/similar to the choices	1
		Change clothes/shoes/sandals when coming from another farm or market		1
		Keep poultry in good condition (access to clean water, and adequate food/housing)		1
		Control entries into the premise		1
		Keep poultry in a protected environment (enclosed building/ fenced area)		1
		Separate the chickens from the ducks		1
		Keep all poultry brought to the premise separate from other poultry for at least 2 weeks		1
		Wash hands with soap before and after taking care of poultry and other animals		1
		Do nothing		0
		Don't know		0
8	In your opinion, how is bird flu spread among poultry?	Contact with other infected/sick birds	The respondent may be able to give one or more answers that match/similar to the choices	1
		Contact with other contaminated environment, feed		1
		Contact with infected manure		1
		Contact with infected equipment		1
		Purchase of unidentified poultry		1
		Free-ranging poultry		1
		Contact with virus brought by people, their clothing or footwear		1
		Don't know		0

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
9	Can you describe signs of bird flu in poultry?	Sudden onset of illness or death	The respondent may be able to give one or more answers that match/similar to the choices	1
		Sudden death in large numbers		1
		Sleepiness		1
		Dark/red/blue comb and wattles		1
		Excessive thirst		1
		Swollen and puffy-looking eyes		1
		Discharge from nose and eyes		1
		Fast breathing		1
		Ruffled feathers		1
		Loss of appetite		1
		Bleeding		1
		Diarrhea		1
		Don't know		0
		No responses		0
10	What do you do with your poultry that you suspect have bird flu?	Keep them in a closed building/separate from other poultry & animals	The respondent may be able to give one or more answers that match/similar to the choices	1
		Sell them		0
		Eat them		0
		Kill them and throw them away in the river/pond		0
		Kill them and throw them outside/ public dumpster		0
		Kill them and bury them		1
		Kill them and burn them		1
		Report to an authority		1
		Follow animal health authority instructions		1
		Do nothing		0
		Don't know		0
Other (Sell them as fish feed)	0			
11	What will you do if there is a bird flu outbreak in the area from which you purchase your poultry?	Keep poultry in an enclosed space and separate from other poultry & animals	The respondent may be able to give one or more answers that match/similar to the choices	1
		Follow animal health authority instructions		1
		Do Nothing		0
		Other (temporarily stop purchases)		1

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
12	In your opinion, what should you do with the waste from your business?	Throw them away in the river/pond	The respondent may be able to give an answer that match/similar to: - Throw them in a specific pit for poultry waste	0
		Throw them in a specific pit for poultry waste		1
		Throw them in a public dumpster		0
		Burn them		0
		Do nothing		0
		Don't know		0
		Other, please specify		0
13	In your opinion, how is bird flu spread in humans?	Contact with infected/sick poultry	If the respondent able to give one or more answer that match/similar to the choices	1
		Contact with infected poultry manure		1
		Contact with other contaminated equipment		1
		Eat raw/undercooked poultry products		0
		Contact with human infected with bird flu		0
		Don't know		0
		Other, please specify		0
14	Can you describe the symptoms of bird flu in humans?	Fever	The respondent may be able to give one or more answers that match/similar to the choices	1
		Difficult/fast breathing		1
		Cough		1
		Muscle aches		1
		Sore throat		1
		Eye infection		1
		Diarrhea		1
		Don't know		0
		Other, please specify		0
15	In your opinion, what would you do to prevent bird flu when handling/slaughtering live poultry?	Wear gloves	The respondent may be able to give one or more answers that match/similar to the choices	1
		Wear a mask		1
		Wash hands afterwards		1
		Clean area afterwards		1
		Don't know		0
		Other, please specify		0

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
16	If you thought you had a bird flu case in your poultry would you report it?	Yes	Yes	1
		No		0
		Not sure		0
17	To whom would you be more likely to report suspected cases of bird flu in poultry?	Animal health authority	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		Local authority (village coordinator)		
		Market administrator		
		Other, please specify		
18	Have you ever attended, been trained or participated in an activity that educated about bird flu?	Yes	Yes	1
		No		0
19	Have you ever had direct experience with bird flu?	Yes	Yes	1
		No		0
20	Would you like to get more information about bird flu?	Yes	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		No		
		Don't care		
21	What specific information on bird flu would you like to know?	Basic knowledge	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		Prevention methods		
		Treatment		
		Outbreak announcement		
		Other, please specify		
22	What are the best ways to get this information to you?	TV	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		Radio		
		Newspaper/Magazine		
		Brochure/Banner		
		Market administrator		
		Health personnel		
		Family member		
		Other, please specify		

Table 4. Questions, answers, and scoring criteria for the worker's knowledge in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
23	Do you know about local regulation Number 4/2007 that prohibits live poultry trade in the territory of Jakarta?	Yes	Yes	1
		No		0
		Not sure		0
24	Do you agree with/support the regulation?	Yes	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		No		
		Not sure		
25	Why do you not agree with/support the regulation?	Afraid to lose customers	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		May decrease my sales		
		Will increase my production cost		
		Inconvenience		
		Refuse to give a reason		
		Other, please specify		
26	Do you actively protest against the government on the new regulation related to LBM relocation?	Yes	There is no correct answer for this question, it is only used to gather information on respondent's choice about certain issues	0
		No		
		Not sure		

Table 5. Questions, answers and scoring criteria for worker's attitude in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Questions	Answer	Correct answer	Score
1	I am satisfied with the government efforts in controlling bird flu	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
2	I believe that the government can control the bird flu	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
3	The government programs to control bird flu been beneficial for you	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
4	Bird flu issues are important for my business.	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
5	Bird flu issues do not affect my sales	Agree/satisfied	Do Not Agree/Are not satisfied	0
		Do Not Agree/Are not satisfied		2
		Not sure/Do not know		1
6	We can always see the symptoms of bird flu in the chicken when it is infected	Agree/satisfied	Do Not Agree/Are not satisfied	0
		Do Not Agree/Are not satisfied		2
		Not sure/Do not know		1
7	Bird flu in poultry can be cured	Agree/satisfied	Do Not Agree/Are not satisfied	0
		Do Not Agree/Are not satisfied		2
		Not sure/Do not know		1
8	Infected poultry can shed bird flu especially in secretions such as feces, saliva, mucus and blood	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1

Table 5. Questions, answers and scoring criteria for worker's attitude in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
9	Contaminated equipment such as cages, boots, and clothes can spread bird flu	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
10	People can get bird flu by touching sick poultry	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
11	Human bird flu can be associated with the environment in wet markets	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
12	People who work with poultry or poultry products have a greater risk for becoming infected with bird flu	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
13	Bird flu is a harmful disease because it can cause death in humans	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
14	Bird flu in humans can be cured	Agree/satisfied	Do Not Agree/Are not satisfied	0
		Do Not Agree/Are not satisfied		2
		Not sure/Do not know		1
15	If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, they should see a doctor as soon as possible	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1

Table 5. Questions, answers and scoring criteria for worker's attitude in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continued)

No.	Questions	Answer	Correct answer	Score
16	If your chickens die suddenly or get sick from an unknown cause over the course of more than one day, you must inform the animal health authority	Agree/satisfied	Agree/satisfied	2
		Do Not Agree/Are not satisfied		0
		Not sure/Do not know		1
17	I think I am safe from bird flu infection, even without using proper equipment in handling the poultry	Agree/satisfied	Do Not Agree/Are not satisfied	0
		Do Not Agree/Are not satisfied		2
		Not sure/Do not know		1

Table 6. Questions, answers and scoring criteria for worker's practices in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Questions	Answer	Correct answer	Score
1	Do you use proper personal protective equipment (e.g. mask, gloves, etc) when handling live birds, feces, feathers, or bedding, or when slaughtering the birds?	All the time	All the time	2
		Sometimes		1
		Never		0
2	Do you use proper personal protective equipment (e.g. mask, gloves, etc.) before having contact with sick or dead poultry?	All the time	All the time	2
		Sometimes		1
		Never		0
3	Do you wash your hands and any equipment when you finish your work?	All the time	All the time	2
		Sometimes		1
		Never		0
4	Do you use soap or disinfectant to clean your hands and equipment?	All the time	All the time	2
		Sometimes		1
		Never		0
5	Do you spray disinfectant on vehicles before and after they are used to transport poultry?	All the time	All the time	2
		Sometimes		1
		Never		0
6	Do you use the same vehicle to transport chickens and other poultry?	All the time	Never	0
		Sometimes		1
		Never		2
7	Do you use the same vehicle to transport poultry and humans?	All the time	Never	0
		Sometimes		1
		Never		2
8	Do your workers who regularly having contact with poultry have an annual health check?	All the time	All the time	2
		Sometimes		1
		Never		0
9	If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, do you report it to the public health authority?	All the time	All the time	2
		Sometimes		1
		Never		0
10	If sudden unexplained deaths occur among your chickens during transportation, do you report it to the animal health authority?	All the time	All the time	2
		Sometimes		1
		Never		0

Table 7. Questions and answers regarding perceived barriers to preventative practices in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Question	Answer
1	In your opinion, why do you think some people refuse to use personal protective equipment (e.g. mask, apron, gloves) when handling live poultry/slaughtering poultry?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
2	In your opinion, why do you think some people refuse to change clothes when coming from other farms/markets?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
3	In your opinion, why do you think some people refuse to wash hands and equipment with soap/disinfectant before and after handling poultry?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
4	In your opinion, why do you think some people refuse to separate chickens and ducks?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
5	In your opinion, why do you think some people refuse to keep poultry in cages/closed buildings?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
6	In your opinion, why do you think some people refuse not to eat sick poultry?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu
7	In your opinion, why do you think some people refuse to burn and bury dead poultry?	Can't afford to do it/cost too much money
		They were not aware of this recommendation
		Too much trouble
		They don't believe it will help to prevent/protect from bird flu

Table 8. Key points, answers and scoring criteria for direct observations at LBM in HPAI knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

No.	Key point	Answer	Correct Answer
1	Are all poultry kept in a closed building or in cages at all times?	Yes	Yes
		No	
2	Are chicken and duck placed in a separate area or cages?	Yes	Yes
		No	
3	Are there other animals which can come in contact with the poultry?	Yes	No
		No	
4	Is there any poultry waste (manure, feathers, blood) in the handling facility?	Yes	Yes
		No	
5	Is there adequate air ventilation in the working area?	Yes	Yes
		No	
6	Is there an adequate water source in the working area?	Yes	Yes
		No	

Chapter 4

RESULTS AND DISCUSSION

4.1. General Information of Research Area

In general, almost all live bird markets in Jakarta are located in traditional markets that also sell other food and necessary supplies. However, some LBMs (24 out of 100 sampled) are located apart from a nearby traditional market. Unlike modern markets, traditional markets in Indonesia have extremely poor sanitary conditions and there is no clear separation between merchants. Beef, chicken or fish can be sold next to fresh vegetables, and occasionally one seller offers fresh vegetables and poultry in the same booth.

Traditional markets generally do not have a sanitation process which is conducted on a regular basis. Almost all of the traditional markets are open all year with no rest days to do the cleaning. The traditional markets also do not have a separate waste-handling facility, so poultry waste is mixed with additional waste generated from the sale of other items including live animals and animal products. Only the live poultry markets located outside the traditional markets (24 out of 100 sampled) have their own waste-handling facilities, although most of these do not conform to standard requirements for sanitation.

4.2. Descriptive Statistics

Descriptive statistics (such as frequency, percent distribution, the mean, minimum and maximum values) were applied to the responses to all questions in each subset of the questionnaire used in this study. Descriptive statistics were used to provide an overview of the

responses given by the LBM workers in Jakarta and the relation to the demographic information. The results of the descriptive statistics are presented in the following subsections:

4.2.1. General Characteristic of Live Bird Market Workers in Jakarta

The first subset of the questions in the questionnaire collected general information about the workers (Tables 9 and 10). This information represents particular characteristics to distinguish one worker from another. These individual characteristics were then combined to give an overall representation of LBM workers in Jakarta. This research collected some characteristics of the workers such as gender, age, education, income, business experience, number of suppliers, length of work day, and the average sales per day. These general characteristics were then linked to the knowledge, attitudes and biosecurity practices in LBMs as related to HPAI.

Of the total of 100 workers there were 94 men and 6 women. The average age of the workers was 35 years old, with the youngest being 18 years and the oldest 59 years. The majority (48%) were between the ages of 25 - 39 years, while 31% were aged \geq 40 years, and 21% were aged between 18 - 24 years.

Based on education level, 85% of LBM workers had a low educational background with 3% being illiterate and 4% having only informal education, while 38% of the workers had a primary school education and 40% had completed secondary school. Only 15% of workers had a high educational level, and this consisted of a high school education. None of the LBM workers had a university/college background.

Based on the daily sales of poultry, an average of 346 birds/day were sold. The minimum sales were 15 birds/day and the maximum sales were 1,500 birds/day. Approximately

17% of the workers worked at or owned a small scale establishment with average daily sales of <1,500,000 Rupiah or approximately less than US\$156, while 30% worked at or owned a medium scale establishment with average daily sales of between 1,500,000 to < 5,000,000 Rupiah or approximately between US\$156 to US\$580. The majority of the workers (53%) worked at or owned a large scale establishment with average daily sales of \geq 5,000,000 Rupiah or more than approximately US\$580.

The workers' job experience was divided into 3 categories: 19% of the workers had job experience of < 5 years, 48% had job experience of between 5 - <10 years, while 33% had job experience of \geq 10 years.

The majority (98%) of the workers worked at or owned a business establishment which had more than one poultry supplier. Only two (2.0%) of the workers worked at or owned a business establishment which had only one supplier.

The workers on average worked for 9.76 hours per day, with a minimum number of work hours of 9 and a maximum of 10. On average the workers started working at 3:00 am and finished at 12:00 or 1:00 pm.

Sixty-eight percent of the live bird market workers were selling broilers and native chicken, 11% were selling broilers, native chicken and others (duck/Muscovy/goose), and 8% were selling broilers and others (duck/Muscovy/goose), while only 14% of the LBMs were selling only broilers.

4.2.2. Knowledge assessment results towards highly pathogenic avian influenza among LBM workers in Jakarta - Indonesia.

The second subset in the questionnaire included 26 questions designed to assess the basic knowledge of the workers about HPAI and biosecurity measures. Based on the scoring criteria for KAP results, the workers' knowledge towards HPAI and biosecurity measures were categorized as Less Knowledge if the total score was between 0 – 9, Moderate/Sufficient Knowledge if the total score was between 10 – 14, and Good Knowledge if the total score was 15 – 18.

Based on these criteria, 57% of the workers had less knowledge about HPAI and biosecurity measures, 36% of the workers had moderate/sufficient knowledge about HPAI and biosecurity measures, while only 7% of the workers had a good level of knowledge (Table 11). These results indicated that the majority of workers had less knowledge about HPAI and biosecurity measures.

The results for each question in the second subset about knowledge is presented as follows:

- Q1 : All (100%) of the workers had heard about HPAI.
- Q2 : Only 23% of the workers knew the cause of HPAI, while 77% of the workers did not know or gave a wrong answer for the cause of HPAI.
- Q3 : Eighty percent of the workers knew what animals can be infected with HPAI, and only 20% of the workers did not know or gave a wrong answer.
- Q4 : Sixty percent of the workers learned about HPAI from television, 14% from radio, 10% from brochures/banners, 4% from a market administrator. Only 12% learned about HPAI from a health officer.

- Q5 : Sixty-seven percent of the workers thought that it was unlikely for their poultry to get infected by HPAI, 3% thought that it was very unlikely. Only 30% of the workers thought that it was likely for their poultry to get infected by HPAI.
- Q6 : Seventy-eight percent of the workers thought that HPAI can be prevented, and 20% of the workers did not know or were not sure, while only 2% of the workers thought that HPAI cannot be prevented.
- Q7 : Sixty-nine percent of the workers could not describe the things that they could do to prevent HPAI in poultry, while 31% could describe things they could do to prevent HPAI in poultry.
- Q8 : Sixty-six percent of the workers knew how HPAI spreads among poultry, while 34% did not know.
- Q9 : Fifty-three percent of the workers did not know the signs of HPAI in poultry and 47% did know the signs of HPAI in poultry.
- Q10 : Sixty-nine percent of the workers did not know or gave a wrong answer about what to do with poultry that are suspected of having HPAI, while 31% of the workers did know what to do with poultry that are suspected of having HPAI.
- Q11 : Seventy-three percent of the workers indicated they will do nothing if there is a HPAI outbreak in the area from which they purchase the poultry, while 27% of the workers will temporarily stop purchasing poultry from an outbreak area.
- Q12 : Sixty-three percent of the workers gave a wrong answer and 11% did not know what should they do with the waste products from their business. Only 26% of the workers knew what to do with the waste products from their business.
- Q13 : Fifty-five percent of the workers did not know how HPAI spreads to humans, and 48% of the workers did know how HPAI spreads to humans.
- Q14 : Seventy-three percent of the workers could describe symptoms of HPAI in humans. Only 27% of the workers could not describe symptoms of HPAI in humans.

- Q15 : Ninety-five percent of the workers knew what to do to prevent HPAI when handling/slaughtering live poultry. Only 5% of the workers did not know what to do to prevent HPAI when handling/slaughtering live poultry.
- Q16 : Sixty-three percent of the workers would report to authorities if they thought they had a HPAI case in their poultry, while 37% indicated they would not report it if they thought they had a HPAI case in their poultry.
- Q17 : Seventy-four percent of the workers preferred to report a suspected HPAI case in poultry to the local village coordinator, while 26% preferred to report a suspected HPAI case in poultry to the market administrator. None (0%) of the workers preferred to report a suspected HPAI case in poultry to an animal health authority.
- Q18 : All of the workers had never attended, been trained or participated in an activity that educated about HPAI.
- Q19 : All of the workers never had direct experience with a HPAI case.
- Q20 : All of the workers would like to get more information about HPAI.
- Q21 : Fifty-four percent of the workers would like to get more information about prevention methods, 26% would like to get more information about basic knowledge of HPAI, 12% would like to get more information about treatments and 8% would like to get more information about outbreak announcements.
- Q22 : Fifty-one percent of the workers would like to get information regarding HPAI from the market administrator, 27% would like to get information regarding HPAI from television, 12% would like to get information regarding HPAI from radio, and 10% would like to get the information from brochures/banners.
- Q23 : Eighty-seven percent of the workers had knowledge about local regulation Number 4/2007 that prohibits live poultry trade in the territory of Jakarta, and only 9% of the workers did not have knowledge about local regulation Number 4/2007.

Q24 : Of the 87 workers who had knowledge about local regulation Number 4/2007, only 9 (10%) workers agreed with or supported the regulation, while 78 (90%) workers did not agree with or support the regulation.

Q25 : Of the 78 workers who did not agree with or support the local regulation Number 4/2007, 58 (74%) of them said the reason was because they were afraid they would lose customers. Twelve (15%) of them said the reason was because it will increase production costs, and 8 (11%) of them said the reason was because they were afraid it will influence their sales.

Q26 : Only 8 (10%) out of 78 workers who disagreed with the regulation related to relocation of LBMs actively protested against the government on the new regulation. Seventy (90%) out of 78 workers who disagreed with the regulation related to relocation of LBMs did not actively protest against the government on the new regulation.

Of the 26 questions in this subset, 16 had a right or wrong response. In only 8 of these 16 questions did the majority of the workers (> 50%) answer correctly (Table 12).

A summary of results of knowledge towards HPAI among LBM workers in Jakarta – Indonesia in 2012, based on workers' characteristics such as gender, age, education level, average daily sales, job experience and number of suppliers (Table 13) can be described as follows:

1. Based on gender category, the majority of male workers (55%, 52 of 94) had less knowledge about HPAI and biosecurity measures, and only 42 of 94 (45%) had moderate/sufficient to good knowledge about HPAI and biosecurity measures. The result was also similar among female workers, with 5 of 6 (83%) having less knowledge about HPAI and biosecurity measures, and only 1 of 6 (17%) having moderate/sufficient to good knowledge about HPAI and biosecurity measures.

2. Based on the workers' age category, all workers (100%) between 18 – 24 years of age had moderate/sufficient to good knowledge about HPAI and biosecurity measures, while 26 of 48 (54%) workers 25 – 39 years old had less knowledge about HPAI and biosecurity measures, Only 22 of 48 (46%) workers 25 – 39 years of age had moderate/sufficient knowledge about HPAI and biosecurity measures. All workers (100%) \geq 40 years of age had less knowledge about HPAI and biosecurity measures.
3. Based on the education level categories, 57 of 85 (67%) workers with lower educational backgrounds (illiterate, informal education, primary and secondary school) had less knowledge about HPAI and biosecurity measures, and only 28 of 85 (33%) workers with lower educational backgrounds had moderate/sufficient to good knowledge about HPAI and biosecurity measures. All workers (100%) with a higher educational background (high school and university/college) had moderate/sufficient to good knowledge about HPAI and biosecurity measures.
4. Based on the average daily sales category, 10 of 17 (59%) workers who worked at or owned a small scale establishment (sales <1,500,000 Rupiah per day) had less knowledge, and only 7 of 17 (41%) in this category had moderate/sufficient to good knowledge about HPAI and biosecurity measures. For workers who worked at or owned a medium scale establishment (sales 1,500,000 - <5,000,000 Rupiah per day), 18 of 30 (60%) had less knowledge about HPAI and biosecurity measures, and only 12 of 30 (40%) workers had moderate/sufficient to good knowledge. For the workers who worked at or owned a large scale establishment (sales > 5,000,000 Rupiah per day), 29 of 53 (55%) had less knowledge, and 24 of 53 (45%) workers in this category had moderate to good knowledge about HPAI and biosecurity measures.
5. Based on the job experience category, all workers (100%) who had job experience of <5 years had moderate/sufficient to good knowledge about HPAI and biosecurity measures. Twenty-five of 48 (52%) workers who had job experience of 5 - <10 years had less

knowledge, and only 23 of the total 48 (48%) of workers who had job experience of 5 - <10 years had moderate/sufficient knowledge about HPAI and biosecurity measures. For workers who had job experience of ≥ 10 years, 32 of 33 (97%) had less knowledge and only 1 (3%) had moderate/sufficient knowledge about HPAI and biosecurity measures.

6. Based on the number of suppliers category, all workers (100%) who worked at or owned an establishment that had only one poultry supplier had less knowledge about HPAI and biosecurity measures, while for workers who worked at or owned an establishment that had more than one supplier 55 of 98 (56%) had less knowledge, and 43 of 98 (44%) had moderate/sufficient to good knowledge about HPAI and biosecurity measures.

The low level of knowledge among LBM workers in Jakarta may not reflect the level of knowledge for the same subject in different parts of Indonesia. However, we should keep in mind that the reasons for choosing Jakarta as an area of research was based on the assumption that the access to information about HPAI among LBM workers may be better compared to other regions in Indonesia since Jakarta is the capital. Thus, it is evident that HPAI-related education programs undertaken by the Jakarta administration and the central government of Indonesia have not been able to increase the knowledge of LBM workers in Jakarta.

Based on field observations made during the study, the workers were getting HPAI-related information only in the early years of the epidemic, around 2005 to 2007. According to the workers, information in the mass media about HPAI in poultry has not been seen in recent years.

Information about HPAI is mostly commonly issued by the National Committee for Avian Influenza Control and Influenza Pandemic Preparedness (Komnas FBPI). The National

Committee for Avian Influenza Control and Influenza Pandemic Preparedness was established on March 13, 2006 by the President's Decree Number 7/2006 (KOMNAS, 2010), about three years after the initial outbreak of HPAI in poultry and one year after the first case of HPAI in humans. The commission ended its term on March 13, 2010 and since then changed its name to the National Committee for Zoonosis Disease or Komnas Zoonosis.

The National Committee for Zoonosis Disease is under the Coordinating Ministry of People's Welfare and chaired by the Coordinating Minister of People's Welfare (KESRA, 2013). The National Committee for Zoonosis Disease has been given the mandate to do the nationwide coordination of zoonosis disease emergency control measures. In addition to the basic tasks of emergency control measures, the National Committee for Zoonosis Disease has also been given a role in zoonosis disease prevention and the promotion of healthy living. The National Committee for Zoonosis Disease tenure is not restricted as was the tenure for the National Committee for Avian Influenza Control and Influenza Pandemic Preparedness.

4.2.3. Attitude assessment results towards HPAI among LBM workers in Jakarta - Indonesia.

The third subset of questions in the questionnaire was designed to assess the attitudes of the LBM workers. The worker's attitude towards HPAI and biosecurity measures was categorized as Negative if the total score was 0 – 17, Neutral if the total score was 18 – 26, and Positive if the total score was 27 – 34. Based on this criteria, 72 (72%) of the workers had a neutral attitude and 28 (28%) had a negative attitude, while none (0%) of the workers had a positive attitude towards HPAI and biosecurity measures.

There were 17 statements in the subset questionnaire related to attitude (Table 14), and the workers' response to these statements can be described as follows:

- Q1 : Only 8% of the workers were satisfied with the government efforts in controlling HPAI, 25% were not, and 67% of the workers were not sure or did not know about the government efforts in controlling HPAI.
- Q2 : Eighty-four percent of the workers did agree that the government can control HPAI, and 16% of the workers were not sure whether the government can control HPAI.
- Q3 : Ninety-six percent of the workers did agree that the government programs to control HPAI had been beneficial for them, only 2% did not agree, and 2% of the workers were not sure or did not know whether the government programs to control HPAI had been beneficial for them.
- Q4 : All of the workers did agree that HPAI issues are important for their business.
- Q5 : Fifty percent of the workers thought that HPAI issues did affect their sales, 36% thought that HPAI issues did not affect their sales, and 14% were not sure or did not know.
- Q6 : Seventy-six percent of the workers were not sure or did not know whether symptoms of HPAI in chicken can always be seen, 14% did agree, and 10% of the workers did not agree that the symptoms of HPAI in chicken can always be seen.
- Q7 : Seventy-four percent of the workers were not sure if HPAI in poultry can be cured and 6% did agree, while 20% did not agree that HPAI in poultry can be cured.
- Q8 : Sixty-three percent of the workers were not sure or did not know that infected poultry can shed HPAI especially in secretions such as feces, saliva, mucus and blood. Seven percent of the workers did not agree that infected poultry can shed HPAI especially in secretions such as feces, saliva, mucus and blood, while only 30% did agree that infected poultry can shed HPAI especially in those types of secretions.
- Q9 : Ninety-seven percent of the workers were not sure or did not know that contaminated equipment such as cages, boots, and clothes can spread HPAI. Three percent of the workers did not agree that contaminated equipment such as cages, boots, and clothes

can spread HPAI, while none of the workers agreed that contaminated equipment such as cages, boots, and clothes can spread HPAI.

- Q10 : Eighty-three percent of the workers did not agree that people can get HPAI by touching sick poultry, and only 17% of the workers did agree that people can get HPAI by touching sick poultry.
- Q11 : Eighty-one percent of the workers were not sure or did not know that human HPAI can be associated with the environment in wet markets, while 19% of the workers did not agree that human HPAI can be associated with the environment in wet markets. None of the workers agreed that human HPAI can be associated with the environment in wet markets.
- Q12 : Ninety-three percent of the workers were not sure or did not know that people who work with poultry or poultry products have a greater risk for becoming infected with HPAI, and only 7% of the workers did agree that people who work with poultry or poultry products have a greater risk for becoming infected with HPAI.
- Q13 : Ninety-five percent of the workers did agree that HPAI is a harmful disease because it can cause death in humans. Three percent of the workers did not agree that HPAI is a harmful disease because it can cause death in humans, while 2% were not sure or did not know that HPAI is a harmful disease because it can cause death in humans.
- Q14 : Ninety-seven percent of the workers did agree that HPAI in humans can be cured, and 3% were not sure or did not know that HPAI in humans can be cured.
- Q15 : Eighty-seven percent of the workers did agree that if people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing they should see a doctor as soon as possible. Thirteen percent of the workers were not sure or did not know that if people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing they should see a doctor as soon as possible.

- Q16 : Fifty-four percent of the workers did not agree that if their chickens die suddenly or get sick from an unknown cause over the course of more than one day, then they must inform the animal health authority. Only 37% of the workers did agree that if their chickens die suddenly or get sick from an unknown cause over the course of more than one day, then they must inform the animal health authority, and 9% were not sure or did not know that if their chickens die suddenly or get sick from an unknown cause over the course of more than one day, then they must inform the animal health authority.
- Q17 : Eighty-three percent of the workers did agree that they are safe from HPAI infection even without using proper equipment in handling poultry, and 17% of the workers were not sure or did not know whether they are safe from HPAI infection even without using proper equipment in handling poultry.

A summary of results of attitude towards HPAI among LBM workers in Jakarta – Indonesia, 2012, based on workers' characteristics such as gender, age, education level, average daily sales, job experience and number of suppliers (Table 15) can be described as follows:

1. Based on the gender categories, the majority of male workers (68 of 94, 72%) had a neutral attitude related to HPAI and biosecurity measures, and only 26 of 94 (28%) had a negative attitude. A similar result was found among female workers with the majority (4 of 6, 67%) having a neutral attitude related to HPAI and biosecurity measures, and only 2 of 6 (33%) having a negative attitude.
2. Based on the workers' age categories, all workers 18 – 24 years old had a neutral attitude related to HPAI and biosecurity measures, while 38 of 48 (79%) workers 25 – 39 years old had a neutral attitude. Only 10 of 48 (21%) workers 25 – 39 years of age had a negative attitude related to HPAI and biosecurity measures. For the age category of \geq

40 years, 18 of 31 (58%) workers in this category had negative attitudes, while 13 of 31 (42%) had a neutral attitude.

3. Based on the education level categories, 57 of 85 (67%) workers with a lower educational background (illiterate, informal education, primary and secondary school) had a neutral attitude related to HPAI and biosecurity measures, and only 28 of 85 (33%) in that group had a negative attitude. All of the workers with a higher educational background (high school, and university/college) had a neutral attitude related to HPAI and biosecurity measures.
4. Based on the workers' average daily sales categories, 12 of 17 (71%) workers who worked at or owned a small scale establishment (sales <1,500,000 Rupiah per day) had a neutral attitude related to HPAI and biosecurity measures, and only 5 of 17 (29%) had a negative attitude. For workers who worked at or owned a medium scale establishment (sales 1,500,000 - <5,000,000 Rupiah per day), 26 of 30 (87%) had a neutral attitude and only 4 of 30 (13%) had a negative attitude related to HPAI and biosecurity measures. For the workers who worked at or owned a large scale establishment (sales > 5,000,000 Rupiah per day), 34 of 53 (64%) had a neutral attitude and 19 of 53 (36%) had a negative attitude related to HPAI and biosecurity measures.
5. Based on the workers' job experience categories, all workers (100%) who had job experience of <5 years had a neutral attitude related to HPAI and biosecurity measures, while 39 of 48 (81%) workers who had job experience of 5 - <10 years had a neutral attitude, and only 9 out of 48 (19%) workers in this category had a negative attitude related to HPAI and biosecurity measures. Nineteen of 33 (58%) workers who had job experience of ≥ 10 years had a negative attitude related to HPAI and biosecurity measures, and only 14 of 33 (42%) in this category had a neutral attitude.
6. Based on the number of poultry suppliers categories, all workers who worked at or owned an establishment that had only one poultry supplier had a negative attitude

related to HPAI and biosecurity measures. For workers who worked at or owned an establishment that had more than one poultry supplier, 72 of 98 (74%) had a neutral attitude, and 26 of 98 (26%) had a negative attitude related to HPAI and biosecurity measures.

It should be noted that the attitude based on the workers' characteristics such as those described above showed that for all levels of these characteristics, none of the workers had a positive attitude toward the HPAI and biosecurity measures.

Eagly and Chaiken (2007) defined an attitude as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. Attitude is translated from response towards a particular object and may be accompanied by a tendency to act in accordance with the perception to the object. The objects in the context of the current research are HPAI and biosecurity measures.

Attitudes are formed as a result of experience. They may emerge due to direct personal experience, or they may result from observation. Social roles and social norms can have a strong influence on attitudes. Social roles relate to how people are expected to behave in a particular role or context. Social norms involve society's rules for what behaviors are considered appropriate.

Some social psychologists claim that understanding attitude should be considered in terms of its components. There are three main components of attitude: cognition component associated with individual beliefs about the object, affection component which includes the direction and intensity of individual assessments or the experience towards the object, and conative (behavior) component which is the tendency to act in a certain way toward the object (Pratkanis et al, 1989).

To be able to change or modify the attitude of the LBM workers toward HPAI and biosecurity measures, it would be beneficial to have a better understanding of the theory on how attitudes can be changed. As explained in Chapter 2, attitudes can be changed through persuasion. Thus it is important for the government of Indonesia to incorporate the following factors that can affect the persuasiveness of a message into the educational messages related to HPAI:

1. Target Characteristics.

The government has to be aware of the characteristics of the person who will receive and process the message. Several variables in this category should be taken into account such as the intelligence level of individuals. In our research this is represented by the education level variable - more intelligent people are less easily persuaded by one-sided messages and vice versa. Another example variable in this category is self-esteem, with people having moderate self-esteem being more easily persuaded than are people with either high or low levels of self-esteem (Wood, 2000).

2. Source Characteristics.

The credibility of a perceived message has been found to be very important. The major source characteristics are expertise, trustworthiness and interpersonal attraction or attractiveness. For example, someone may be more easily persuaded by information from a professional journal than by information from a newspaper (Heesacker et al, 1983). During the first outbreak of HPAI in Indonesia the government used public figures to convey messages related to HPAI and prevention measures.

3. Message Characteristics.

People are not motivated to process the message, so simply the number of arguments presented in a persuasive message will influence attitude change. A greater number of arguments will produce greater attitude change (Petty and Cacioppo, 1984).

It is important that the government of Indonesia create messages about HPAI and preventive measures that are accompanied by arguments that make sense to the workers. The arguments should be practical, easy to understand, and explain a clear causal relationship. It is also essential that the messages are conveyed using terminology that is suitable to the characteristics of the majority of workers.

4. Cognitive Routes.

A message can appeal to an individual's cognitive evaluation and help change an attitude. In the main route to persuasion the individual is presented with the data and motivated to evaluate it and arrive at an attitude-changing conclusion. However, attitude change can also be accomplished by encouraging the individual to not look at the content but at the source (Sternthal et al, 1978). Therefore, it may be more effective to convey the HPAI-related messages by increasing the attractiveness of the message through using celebrities or respected community leaders and presenting the supporting arguments as simply as possible.

4.2.4. Practice assessment results toward HPAI among LBM workers in Jakarta - Indonesia.

The fourth subset of the questions in the questionnaire was designed to assess the practice of LBM workers toward HPAI biosecurity measures. These questions covered sanitation practices, poultry traffic monitoring practices and disease reporting practices.

There were 10 questions in this subset (Table 16), and the results from each question about practice can be described as follows:

- Q1 : Eighty-three percent of the workers never used proper personal protective equipment (e.g. mask, gloves, etc.) when handling live birds, feces, feathers, or bedding, or while slaughtering the birds. Only 17% of the workers sometimes used proper personal protective equipment, and none used proper personal protective equipment (e.g. mask, gloves, etc.) at all times when handling live birds, feces, feathers, or bedding, or while slaughtering the birds.
- Q2 : Ninety-seven percent of the workers never used proper personal protective equipment (e.g. mask, gloves, etc.) before contacting sick or dead poultry, while only 3% of the workers sometimes used proper personal protective equipment. None of the workers used proper personal protective equipment (e.g. mask, gloves, etc.) at all the times while in contact with sick or dead poultry.
- Q3 : All of the workers washed their hands and equipment every time after finishing work.
- Q4 : All of the workers used soap or disinfectant every time to clean their hands and equipment.
- Q5 : Ninety-three percent of the workers always sprayed disinfectant on their vehicles before and after transporting poultry, while 7% sprayed disinfectant only sometimes.
- Q6 : Ninety-two percent of the workers always used the same vehicle to transport chicken and other poultry, while 8% never used the same vehicle.

- Q7 : Ninety-eight percent of the workers always used the same vehicle to transport poultry and humans. Only 2% of the workers never used the same vehicle to transport poultry and humans.
- Q8 : Ninety-seven percent of the workers never had an annual health check, and only 3% of the workers sometimes had an annual health check.
- Q9 : Seventy-three percent of the workers never reported to the public health authority if people in poultry-related jobs had clinical signs of high fever, shivering, sore throat, or difficulty breathing, while 27% sometimes made such a report to the public health authority.
- Q10 : None of the workers reported to the animal health authority if sudden unexplained deaths occurred among their chickens during transportation.

The LBM worker's practice towards HPAI and biosecurity measures was given a score for each response and then categorized as Inappropriate practice if the total score was 0 – 10, Moderate practice if the total score was 11 – 15, and Good practice if the total score was 16 – 20. Based on this criteria, almost all of the workers (98%) performed inappropriate practice. Only 2 (2%) of the workers performed moderate practice in biosecurity measures related to HPAI, while none performed good practice.

A summary of results of practice towards HPAI among LBM workers in Jakarta – Indonesia, 2012, based on workers' characteristics such as gender, age, education level, average daily sales, job experience and number of suppliers (Table 17) can be described as follows:

1. Based on the worker's gender categories, the majority of male workers (92 of 94, 98%) performed inappropriate practice related to HPAI and biosecurity measures, and only 2 of 94 (2%) performed moderate practice. All of the female workers (6 of 6, 100%) performed inappropriate practice related to HPAI and biosecurity measures.

2. Based on the worker's age categories, all workers 18 – 24 years of age performed inappropriate practice related to HPAI and biosecurity measures, while 47 of 48 (98%) 25 – 39 years of age performed inappropriate practice. Only 1 of 48 (2%) workers 25 – 39 years of age performed moderate practice related to HPAI and biosecurity measures. For the category of age \geq 40 years, 30 of 31 (97%) workers performed inappropriate practice while 1 of 31 (3%) performed moderate practice related to HPAI and biosecurity measures.
3. Based on the workers' education level categories, 83 of 85 (98%) workers with a lower educational background (illiterate, informal education, primary and secondary school) performed inappropriate practices related to HPAI and biosecurity measures, and only 2 of 85 (2%) workers in this category performed moderate practice. All of the workers with a higher educational background (high school, and university/college) performed inappropriate practice related to HPAI and biosecurity measures.
4. Based on the average daily sales categories, all workers who worked at or owned a small scale establishment (sales <1,500,000 Rupiah per day) performed inappropriate practice related to HPAI and biosecurity measures. All workers who worked at or owned a medium scale establishment (sales 1,500,000 - <5,000,000 Rupiah per day) also performed inappropriate practice related to HPAI and biosecurity measures. Fifty-one of 53 (96 %) workers who worked at or owned a large scale establishment (sales > 5,000,000 Rupiah per day) performed inappropriate practice, while only 2 of 53 (4%) in this category performed moderate practice related to HPAI and biosecurity measures.
5. Based on the workers' job experience categories, all workers who had job experience of <5 years performed inappropriate practice related to HPAI and biosecurity measures, while 47 of 48 (98%) who had job experience of 5 - <10 years also performed inappropriate practice. Only 1 of 48 (2%) workers who had job experience of 5 - <10 years performed moderate practice related to HPAI and biosecurity measures. For

workers who had job experience of ≥ 10 years, 32 of 33 (97%) performed inappropriate practice related to HPAI and biosecurity measures, and only 1 of 33 (3%) performed moderate practice.

6. Based on the number of poultry suppliers categories, all workers who worked at or owned an establishment that had only one poultry supplier performed inappropriate practice related to HPAI and biosecurity measures. For workers who worked at or owned an establishment that had more than one poultry supplier, 96 of 98 (98%) performed inappropriate practice, and only 2 of 98 (2%) performed moderate practice related to HPAI and biosecurity measures.

Practice in this survey reflects the behavior that is shown by the LBM workers. In general, the relationship between attitude and behavior is weak (Aiken, 2002). However, it is possible to strengthen this relationship. Attitudes are more predictive of behavior when people have a vested interest in the issue, when people are under time pressure or when situational cues make the attitude noticeable (a focus of attention) (Petty and Fazio, 2008).

There are several theories that predict behavior from attitudes. However, the most-used theoretical models that explain why attitudes can predict behavior are the Theory of Reasoned Action and the Attitude-To-Behavior Process Model.

- 1) Theory of Reasoned Action/TORA (Fishbein and Ajzen, 1977, in Aiken 2002):

This theory mainly explains the relationship between attitude and behavior with the premise that attitudes towards behaviors are derived from beliefs concerning the effects of those behaviors, and that consequently specific behavior can be predicted from specific measures of attitude toward the behavior.

TORA assumes that behavior is the result of conscious decisions to act in a certain manner. Before actions are taken by a person, he will engage in deliberative processing of

information related to the attribute of the object or situation, the relevance of the attitude and the costs and benefits of the behavior.

2) Attitude-To-Behavior Process Model (Fazio and Roskos-Ewoldsen, 1994, in Aiken 2002)

This theory mainly explains the relationship between attitude and behavior when the behavior is a spontaneous reaction to one's immediate situation. According to this model, a particular situation activates a particular attitude. When this situation is combined with the person's knowledge of what behavior is appropriate in that situation (social norms), this perception automatically determines the individual's situational expression of behavior.

Although the relationship between attitudes and behaviors (in this case practice) is weak, nevertheless these results show that there is an agreement between attitude and practice (behavior) descriptive results. At all levels of the workers' characteristics the results of the workers' attitude assessment indicated that according to the descriptive assessment none of the workers demonstrated a positive attitude, while the results of the workers' practice assessment also indicated that none of the workers performed good practices related to HPAI and biosecurity measures.

4.2.5. Results of barriers to preventative practice toward HPAI for the LBM workers in Jakarta.

The fifth subset of the questions in the questionnaire was designed to assess workers' response to barriers to preventative practice towards HPAI and biosecurity measures. There was no right or wrong response to these questions. However, the questions were used to discover the workers' opinion related to specific issues that may prevent someone from performing preventative practices for HPAI.

The results for the questions (Table 18) in this subset are described as follows:

- Q1 : When the workers were asked about why some people refuse to use personal protective equipment (e.g. mask, apron, gloves) when handling live poultry/slaughtering poultry, 83% thought it was because it is too much trouble, 10% thought it was because they cannot afford to do it/cost too much money, and 7% thought it was because they do not believe it will help prevent/protect from HPAI.
- Q2 : When the workers were asked about why some people refuse to change clothes when coming from other farms/markets, 76% thought it was because they were not aware of this recommendation and 24% thought it was because it is too much trouble.
- Q3 : When the workers were asked about why some people refuse to wash their hands and equipment with soap/disinfectant before and after handling poultry, 87% thought it was because they were not aware of this recommendation, 7% thought it was because they do not believe it will help to prevent/protect from HPAI, and 6% thought it was because it is too much trouble.
- Q4 : When the workers were asked about why some people refuse to separate chickens and ducks, 81% thought it was because it is too much trouble, and 19% thought it was because they were not aware of this recommendation.
- Q5 : When the workers were asked about why some people refuse to keep poultry in cages/closed buildings, 47% thought it was because they cannot afford to do it/cost too much money, 41% thought it was because it is too much trouble, and 12% thought it was because they were not aware of this recommendation.
- Q6 : When the workers were asked about why some people will still eat sick poultry, all thought it was because they do not believe refusing it will help to prevent/protect from HPAI.

Q7 : When the workers were asked about why some people refuse to burn and bury dead poultry, 93% thought it was because it is too much trouble and 7% thought it was because they were not aware of this recommendation.

The results based on the workers' answers should be considered when developing an educational program to improve attitudes and practices among the LBM workers. The government should also consider rewards for workers or business owners who have positive attitudes and perform good practices.

As explained by Smith and Mackie (2007), people are more likely to behave according to their attitudes under certain conditions such as: when the attitudes are the result of personal experience, when the individuals are an expert in the subject, when the individual expects a favorable outcome, when the attitudes are repeatedly expressed, and when the individual stands to win or lose something due to the issue.

4.2.7. Results for level of practice towards HPAI of the LBM workers in Jakarta.

The sixth subset of the questions in the questionnaire was designed to identify through direct observation site-specific compliance with the key points of HPAI-related biosecurity. There were six key points related to HPAI biosecurity that were observed at each of the worker's business location/workplace. Scores from direct observation were combined with the worker's practice score to create a level of practice score.

There were 10 questions regarding worker's practices with a possible maximum score of 20 and a minimum score of 0, while 6 questions were based on direct observation with a possible maximum score of 6 and a minimum score of 0. Therefore the total possible score for level of practice that may be attained by the LBM worker was a maximum of 26 and a minimum of 0. Based on this scoring criteria, the worker's level of practice towards HPAI and

biosecurity measures were therefore categorized as Inappropriate Level of Practice if the total score was between 0 – 12 and Good Level of Practice if the total score was between 13 – 26.

A summary of level of practice results towards HPAI among LBM workers in Jakarta – Indonesia, 2012, based on workers' characteristics such as gender, age, education level, average daily sales, job experience and number of suppliers (Table 19) can be described as follows:

1. Based on the workers' gender categories, the majority of male workers (89 of 94, 95%) had an inappropriate level of practice related to HPAI and biosecurity measures, and only 5 of 94 (5%) had a good level of practice. For female workers, 5 of 6 (83%) had an inappropriate level of practice and only 1 of 6 (17%) had a good level of practice related to HPAI and biosecurity measures.
2. Based on the workers' age categories, all workers 18 – 24 years of age had an inappropriate level of practice related to HPAI and biosecurity measures, while 44 of 48 (92%) 25 – 39 years of age had an inappropriate level of practice. Only 4 of 48 (8%) workers 25 – 39 years of age had a good level of practice related to HPAI and biosecurity measures. For the category of age ≥ 40 years, 29 of 31 (94%) workers had an inappropriate level of practice while 2 of 31 (6%) had a good level of practice related to HPAI and biosecurity measures.
3. Based on the workers' education level categories, 79 of 85 (93%) workers with a lower educational background (illiterate, informal education, primary and secondary school) had an inappropriate level of practice related to HPAI and biosecurity measures, and only 6 of 85 (7%) in that category had a good level of practice. All of the workers with a higher educational background (high school, and university/college) had an inappropriate level of practice related to HPAI and biosecurity measures.

4. Based on the average daily sales categories, all workers who worked at or owned a small scale establishment (sales <1,500,000 Rupiah per day) had an inappropriate level of practice related to HPAI and biosecurity measures. Twenty-nine of 30 (97%) workers who worked at or owned a medium scale establishment (sales 1,500,000 - <5,000,000 Rupiah per day) had an inappropriate level of practice related to HPAI and biosecurity measures, and only 1 of 30 (3%) in this category had a good level of practice. Forty-eight of 53 (91%) workers who worked at or owned a large scale establishment (sales > 5,000,000 Rupiah per day) had an inappropriate level of practice, and only 5 of 53 (9%) workers in this category had a good level of practice related to HPAI and biosecurity measures.
5. Based on the workers' job experience categories, all workers who had job experience of <5 years had an inappropriate level of practice related to HPAI and biosecurity measures, while 44 of 48 (92%) who had job experience of 5 - <10 years had an inappropriate level of practice. Only 4 of 48 (8%) workers who had job experience of 5 - <10 years had a good level of practice related to HPAI and biosecurity measures. For workers who had job experience of ≥ 10 years, 31 of 33 (94%) had an inappropriate level of practice, and only 2 of 33 (6%) had a good level of practice related to HPAI and biosecurity measures.
6. Based on the number of poultry suppliers category, all workers who worked at or owned an establishment that had only one poultry supplier had an inappropriate level of practice related to HPAI and biosecurity measures. For workers who worked at or owned an establishment that had more than one poultry supplier, 92 of 98 (94%) had an inappropriate level of practice, and only 6 of 98 (6%) had a good level of practice related to HPAI and biosecurity measures.

4.3. Inferential Statistics

To perform inferential statistical analysis, several independent and dependent variables were re-categorized (Table 20) because some cells in the contingency table had zero (0) values. For the dependent variables, the outcome of interest is the worker with less knowledge and negative attitudes related to HPAI and biosecurity measures. Therefore for workers' knowledge, moderate and good knowledge were combined as was the neutral and positive attitude for the workers' attitude outcome.

Since the range of working age in Indonesia is 18 - 60 years (LABOUR, 2003) so that the median value is 39 years, the workers' age groups were re-categorized into < 40 years and \geq 40 years. Regarding the workers' job experience, for convenience the data set was re-categorized into < 10 years and \geq 10 years.

For the logistic regression analysis univariable analysis for each factor was performed, and factors were included for further multivariable analysis if the P - value < 0.25, and a critical alpha of 0.05 was used for selection of the variables.

The inferential statistic results of knowledge, attitude and practices towards HPAI among LBM workers in Jakarta – Indonesia, 2012, based on workers' characteristics, can be described as follows:

4.3.1. Knowledge assessment towards HPAI among LBM workers based on workers' characteristics.

For analysis related to the association between the level of workers' knowledge with the characteristics of workers, the Chi-square or Fisher's exact test was used. Logistic regression for the outcome level of workers' knowledge could not be done because some cells

in this category had a value of zero (0). The results of analysis of the level of workers' knowledge associated with HPAI and biosecurity measures based on the workers' characteristics are presented in Table 21.

Based on the worker's knowledge analysis results, the level of worker's knowledge had a significant association (at the 5% level of significance) with the worker's age group ($P < .0001$), education level ($P < .0001$), and job experience ($P < .0001$).

Based on the age group categories (Table 22), all (31/31) of the LBM owners/workers ≥ 40 years of age had less knowledge related to HPAI and biosecurity measures. Only 38% (26/69) of the LBM owners < 40 years of age had less knowledge. The difference in the proportions was statistically significant ($P < 0.0001$) at the 5% level of significance.

Based on worker's education level (Table 23), 67% (57/85) of the LBM owners/workers with a lower educational background (Illiterate, Informal education, Primary and Secondary school) had less knowledge related to HPAI and biosecurity measures. None (0/15) of the LBM owners/workers with a higher educational background (High School and University/College) had less knowledge related to HPAI and biosecurity measures. The difference in the proportions was statistically significant ($P < 0.0001$) at the 5% level of significance.

Based on worker's job experience (Table 24), 97% (32/33) of the LBM owners/workers who had job experience of ≥ 10 years had less knowledge related to HPAI and biosecurity measures. Only 37% (25/67) of the LBM owners/workers who had job experience of < 10 years had less knowledge related to HPAI and biosecurity measures. The difference in the proportions is statistically significant ($P < 0.0001$) at the 5% level of significance.

4.3.2. Attitude assessment towards HPAI among LBM workers based on workers' characteristics.

For analysis of the association between attitude and the workers' characteristics logistic regression was used. The results of the analysis of the attitude of workers associated with HPAI and biosecurity measures based on the characteristics of workers are presented in Table 25.

Based on the results of univariable analysis, there are three independent variables—age group, daily sales and experience—that had statistically significant association with the attitude of workers. Workers' daily sales is representing the workers' income, thus, it can be interpreted as the workers' income. However, from the results (Table 26) there is evidence that age group and experience are highly correlated ($P < .0001$), and this may indicate a colinearity between the two variables. Hence, the final two models were assessed separately by taking age group and experience in and out of the model (Table 27 and Table 28).

Worker's daily sales in reality represents and can be interpreted as the worker's income. The final model of worker's negative attitude with daily sales and age group (Table 27) can be interpreted as follows:

1. The probability of a negative attitude toward the fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity measures among LBM owners/workers is higher in the high income group as compared to the middle income group ($P = 0.03$) after adjusting for the age of the LBM owners/workers. However, the low income group is borderline significant at $P=0.095$.
2. The probability of a negative attitude toward the fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity measures among LBM

owners/workers is higher in LBM owners/workers ≥ 40 years old as compared to the owners/workers who are < 40 years old after adjusting for income level.

Final model of worker's negative attitude with daily sales and experience (Table 28) can be interpreted as follows:

1. The probability of a negative attitude toward the fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity measures is higher in the high income group as compared to the middle income group ($P = 0.03$) after adjusting for the experience of the LBM owners/workers.
2. The probability of a negative attitude toward the fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity measures is higher among LBM owners/workers who had job experience of ≥ 10 years as compared to the owners/workers who had job experience of < 10 years ($P < .0001$) after adjusting for income level.

The live bird market workers or owners in the middle-income level may have more motivation to process persuasive HPAI-related messages in order to survive or to scale up their business. Therefore, they may have personal relevance to the messages conveyed and motivated to process the HPAI-related messages resulting in positive attitude shift.

Meanwhile, the live bird market workers or owners in the low income level may not have the same motivation to be better. They might assumed that persuasive HPAI-related messages do not have any personal relevance or direct benefit to their livelihood. While, the live bird market workers or owners in high income level require more attention to take care their business, thus, their "ability to process" persuasive HPAI-related messages may be distracted and inhibited attitude change. Regarding the relationship between age group and experience with attitude change, it is possible that the older workers (≥ 40 years) and workers with job

experience ≥ 10 years are more difficult to accept change, therefore they did not have the motivation to process persuasive HPAI-related messages.

4.3.3. Level of practice assessment related to workers' knowledge and attitude towards HPAI.

The relationship between worker's knowledge and attitude with the outcome of an inappropriate level of practice showed that there was no significant association (Table 29). Ninety-one percent (52/57) of the LBM owners/workers who had less knowledge related to HPAI and biosecurity measures performed inappropriate practice, while 98% (42/43) of the LBM owners/workers who had moderate to good knowledge also performed inappropriate practice. The difference in the proportions is not statistically significant at the 5% level. Ninety-six percent (27/28) of the LBM owners/workers who had a negative attitude related to HPAI and biosecurity measures performed inappropriate practice, while 93% (67/72) of the LBM owners/workers who had a neutral to positive attitude also performed inappropriate practice. The difference in the proportions is not statistically significant at the 5% level.

The relationship between knowledge and attitude with the level of practice was not statistically significant. However, these results had a significance that can be interpreted from a practical standpoint. The main objective in a disease control program is to prevent the disease from spreading. Preventive measures can be implemented well if the disease-related risk practices can also be eliminated. Although the government of Indonesia has conducted a massive HPAI education program through the mass media, it seems that the LBM workers have not been able to perform the correct practices or to abandon high risk HPAI-related practices.

As explained previously, the relationship between knowledge, attitude and behavior (practice) is weak sometimes; however, this relationship must be understood using social-psychology theories. We tend to assume that people behave in accordance with their attitudes. However, social psychologists have found that attitudes and actual behavior are not always perfectly aligned (Hockenbury and Hockenbury, 2007). The reasons should be explored as to why workers with moderate to good knowledge were no different from workers who had less knowledge. Both groups performed inappropriate practices related to HPAI and biosecurity measures. Similarly, workers who had neutral to positive attitudes performed inappropriate practices related to HPAI and biosecurity measures to the same extent as workers who had negative attitude. The reasons behind this should also be explored.

People may alter their attitudes in order to better align them with their behavior. This may happen when a person changes his attitudes to reflect his other beliefs or actual behaviors in order to reduce the psychological tension caused by conflicting thoughts or beliefs. In social-psychology this phenomenon is called Cognitive Dissonance (Aiken, 2002). Imagine the following situation: A worker has always placed a high value on personal hygiene, but he has to work in a place that has minimum sanitation/equipment. In order to reduce the tension caused by the conflict between belief and behavior, he has two options. He can quit work and seek a better facility or find a different job, or he can de-emphasize the importance of personal hygiene. In order to minimize the dissonance between his conflicting attitude and behavior, he either has to change the attitude or change his actions.

Another reason for the unpredictable attitude toward behavior is that sometimes an attitude change is temporary so it is susceptible to counter-persuasion. This theory is explained by The Elaboration Likelihood Model of Persuasion (Figure 5).

Based on the model, behavior becomes difficult to predict when the change in attitude is only temporary and peripheral. For attitude to better predict behavior requires changes that are permanent. It takes a few steps so that attitude change can become permanent, such as:

1. Are the workers being motivated to process a request to change the attitude? This is influenced by personal relevance to the solicitation or whether the change is really necessary.
2. Do workers have the ability to process the request? This is influenced by the presence or absence of distraction experienced by the workers, whether the message is conveyed repeatedly, and the presence or absence of prior knowledge as well as whether the message is easy to understand.
3. How are the workers' openness to receive the message? This is influenced by whether the workers had more dominant negative assumptions about the message or vice versa.
4. Is there any peripheral cue to the delivery of the message? This is influenced by how the message was delivered, the attractiveness of the message source, and the number of arguments presented.

As mentioned earlier, based on field observations made during the study the workers were getting HPAI-related information only in the early years of the epidemic, around 2005 to 2007. According to the workers, information about HPAI in poultry in the mass media has not been seen in recent years. Non-continuous message delivery may be one factor that can cause only temporary changes in attitude. Another factor may be the openness of workers to receive the message, whether the worker has dominant negative assumptions about the message or vice versa. Therefore a temporary attitude change could not predict the behavior, such as in this case why workers with moderate to good knowledge or neutral to positive attitudes were

performing inappropriate practices related to HPAI and biosecurity measures, the same as workers who had less knowledge or negative attitudes.

In theory, persuasibility is the extent to which a person can be induced or convinced to do something or to accept an idea or proposition (Petty and Fazio, 2008). There are some people that are more easily persuaded especially when the persuader is perceived as an authority figure, but there are also some people who are nearly impossible to convince or persuade under these same conditions. They are often very suspicious of authority and fail to understand new ideas. This was found in many LBM workers in Jakarta who tended to have considerable suspicion towards authority figures, especially after the Jakarta administration issued local regulation number 4/2007 that is considered very detrimental to their business.

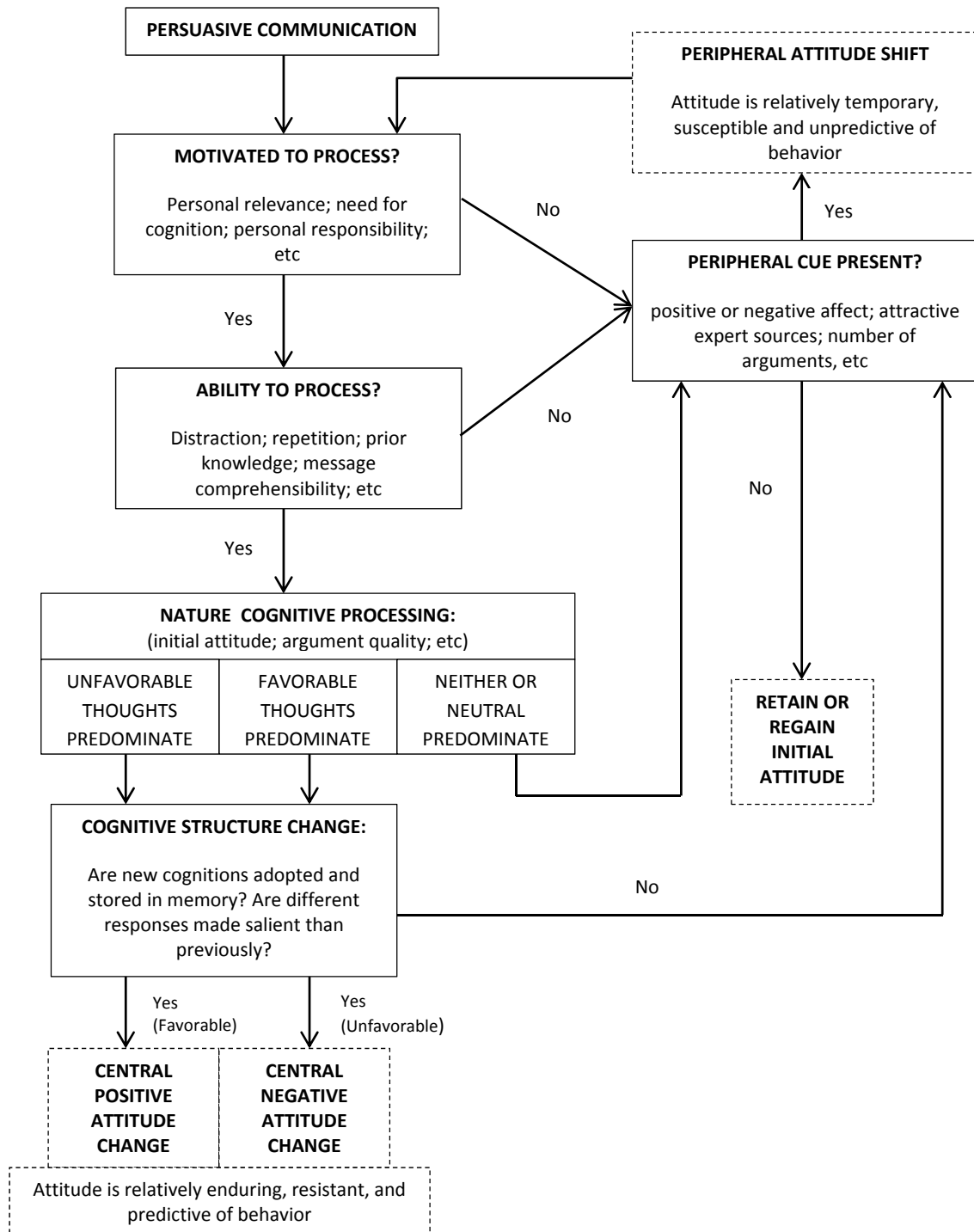


Figure 5. The Elaboration Likelihood Model of Persuasion based on Petty and Cacioppo (1986) in Aiken (2002).

Table 9. General characteristics of the live bird market workers in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (categorical variables, n = 100)

General Information		n	%
Gender	Male	94	94.0
	Female	6	6.0
Age groups	18 - < 25	21	21.0
	25 - < 40	48	48.0
	≥ 40	31	31.0
Education level	- Low education		
	Illiterate	3	3.0
	Informal education	4	4.0
	Primary	38	38.0
	Secondary	40	40.0
	- High education		
	High School	15	15.0
University/College	0	0.0	
Average daily sales (In Rupiah)	< 1,500,000	17	17.0
	1,500,000 - < 5,000,000	30	30.0
	≥ 5,000,000	53	53.0
Working experience	< 5 years	19	19.0
	5 - < 10 years	48	48.0
	≥ 10 years	33	33.0
Number of suppliers	1	2	2.0
	> 1	98	98.0

Table 10. General characteristics of the live bird market workers in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (continuous variables)

General Information	n	Mean	Std. Dev.	Min	Max
Age	100	35.0	10.5	18	59
Average work duration (hours/day)	100	9.8	0.4	9	10
Average poultry sales (birds/day)	100	345.7	289.7	15	1500

Table 11. A summary of knowledge, attitudes and practices survey results towards highly pathogenic avian influenza among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

KAP Result	n	%
Knowledge Score		
Low score (0 – 9)	57	57.0
Moderate score (10 – 14)	36	36.0
Good score (15 – 18)	7	7.0
Attitude Score		
Negative score (0 – 17)	28	28.0
Neutral score (18 – 26)	72	72.0
Positive score (27 – 34)	0	0.0
Practice Score		
Inappropriate score (0 – 10)	98	98.0
Moderate score (11 – 15)	2	2.0
Good score (16 – 20)	0	0.0
Level of Practice Category		
Inappropriate score (0 – 12)	94	94.0
Good score (13 – 26)	6	6.0

Table 12. Correctly answered knowledge questions towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

Questions	Correctly answered	
	Number	Percent
1 Have you heard about HPAI?	100	100.0
2 What is the causative agent of HPAI?	23	23.0
3 What animals can be infected with HPAI?	80	80.0
4 How likely do you think it is that your poultry will be infected with HPAI?	30	30.0
5 Do you think that HPAI can be prevented?	78	78.0
6 Can you tell me the things that you think you could do to prevent HPAI in poultry?	31	31.0
7 In your opinion, how is HPAI spread among poultry?	66	66.0
8 Can you describe signs of HPAI in poultry?	47	47.0
9 What do you do with your poultry that you suspect have HPAI?	31	31.0
10 What will you do if there is a HPAI outbreak in the area from which you purchase your poultry?	27	27.0
11 In your opinion, what should you do with the waste from your business?	26	26.0
12 In your opinion, how is HPAI spread in humans?	48	48.0
13 Can you describe the symptoms of HPAI in humans?	73	73.0
14 In your opinion, what would you do to prevent HPAI when handling/slaughtering live poultry?	95	95.0
15 If you thought you had a HPAI case in your poultry would you report it?	63	63.0
16 Do you know about local regulation Number 4/2007 that prohibits live poultry trade in the territory of Jakarta?	87	87.0

Table 13. A summary of results of knowledge in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

Variables			Knowledge Categories		
			Less	Moderate	Good
1	Gender	Male	52 (55%)	35 (37%)	7 (8%)
		Female	5 (83%)	1 (17%)	0 (0%)
2	Age groups (years)	18 - < 25	0 (0%)	14 (67%)	7 (33%)
		25 - < 40	26 (54%)	22 (46%)	0 (0%)
		≥ 40	31 (100%)	0 (0%)	0 (0%)
3	Education Level	Low (Illiterate, Informal, Primary and Secondary)	57 (67%)	26 (31%)	2 (2%)
		High (High School and University/College)	0 (0%)	10 (67%)	5 (33%)
4	Average daily sale (in Rupiah)	< 1.500.000	10 (59%)	6 (35%)	1 (6%)
		1.500.000 - < 5.000.000	18 (60%)	9 (30%)	3 (10%)
		≥ 5.000.000	29 (55%)	21 (40%)	3 (5%)
5	Working Eperience	< 5 years	0 (0%)	12 (63%)	7 (37%)
		5 - < 10 years	25 (52%)	23 (48%)	0 (0%)
		≥ 10 years	32 (97%)	1 (3%)	0 (0%)
6	Number of Suppliers	1	2 (100%)	0 (0%)	0 (0%)
		> 1	55 (56%)	36 (37%)	7 (7%)

Table 14. Workers' response to statements towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

Attitude		n	%	
1	I am satisfied with the government efforts in controlling HPAI	Agree/satisfied	8	8.0
		Do Not Agree/Do not satisfied	25	25.0
		Not sure/Do not know	67	67.0
2	I believe that the government can control the HPAI	Agree/satisfied	84	84.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	16	16.0
3	The government programs to control HPAI been beneficial for you	Agree/satisfied	96	96.0
		Do Not Agree/Do not satisfied	2	2.0
		Not sure/Do not know	2	2.0
4	HPAI issues are important for my business.	Agree/satisfied	100	100.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	0	0.0
5	HPAI issues do not affect my sales	Agree/satisfied	36	36.0
		Do Not Agree/Do not satisfied	50	50.0
		Not sure/Do not know	14	14.0
6	We can always see the symptoms of HPAI in the chicken when it is infected	Agree/satisfied	14	14.0
		Do Not Agree/Do not satisfied	10	10.0
		Not sure/Do not know	76	76.0
7	HPAI in poultry can be cured	Agree/satisfied	6	6.0
		Do Not Agree/Do not satisfied	20	20.0
		Not sure/Do not know	74	74.0
8	Infected poultry can shed HPAI especially in secretions such as feces, saliva, mucus and blood	Agree/satisfied	30	30.0
		Do Not Agree/Do not satisfied	7	7.0
		Not sure/Do not know	63	63.0
9	Contaminated equipment such as cages, boots, and clothes can spread HPAI	Agree/satisfied	0	0.0
		Do Not Agree/Do not satisfied	3	3.0
		Not sure/Do not know	97	97.0

Table 14. Workers' response to statements towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100) – (continued)

Attitude		n	%	
10	People can get HPAI by touching sick poultry	Agree/satisfied	17	17.0
		Do Not Agree/Do not satisfied	83	83.0
		Not sure/Do not know	0	0.0
11	Human HPAI can be associated with the environment in wet markets	Agree/satisfied	0	0.0
		Do Not Agree/Do not satisfied	19	19.0
		Not sure/Do not know	81	81.0
12	People who work with poultry or poultry products have a greater risk for becoming infected with HPAI	Agree/satisfied	7	7.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	93	93.0
13	HPAI is a harmful disease because it can cause death in humans	Agree/satisfied	95	95.0
		Do Not Agree/Do not satisfied	3	3.0
		Not sure/Do not know	2	2.0
14	HPAI in humans can be cured	Agree/satisfied	97	97.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	3	3.0
15	If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, they should see a doctor as soon as possible	Agree/satisfied	87	87.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	13	13.0
16	If your chickens die suddenly or get sick from an unknown cause over the course of more than one day, you must inform the animal health authority	Agree/satisfied	37	37.0
		Do Not Agree/Do not satisfied	54	54.0
		Not sure/Do not know	9	9.0
17	I think I am safe from HPAI infection, even without using proper equipment in handling the poultry	Agree/satisfied	83	83.0
		Do Not Agree/Do not satisfied	0	0.0
		Not sure/Do not know	17	17.0

Table 15. A summary of results of attitudes in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

Variables			Attitude Categories		
			Negative	Neutral	Positive
1	Gender	Male	26 (28%)	68 (72%)	0 (0%)
		Female	2 (33%)	4 (67%)	0 (0%)
2	Age groups (years)	18 - < 25	0 (0%)	21 (100%)	0 (0%)
		25 - < 40	10 (21%)	38 (79%)	0 (0%)
		≥ 40	18 (58%)	13 (42%)	0 (0%)
3	Education Level	Low (Illiterate, Informal, Primary and Secondary)	28 (33%)	57 (67%)	0 (0%)
		High (High School and University/College)	0 (0%)	15 (100%)	0 (0%)
4	Average daily sale (in Rupiah)	< 1.500.000	5 (29%)	12 (71%)	0 (0%)
		1.500.000 - < 5.000.000	4 (13%)	26 (87%)	0 (0%)
		≥ 5.000.000	19 (36%)	34 (64%)	0 (0%)
5	Working Experience	< 5 years	0 (0%)	19 (100%)	0 (0%)
		5 - < 10 years	9 (19%)	39 (81%)	0 (0%)
		≥ 10 years	19 (58%)	14 (42%)	0 (0%)
6	Number of Suppliers	1	2 (100%)	0 (0%)	0 (0%)
		> 1	26 (26%)	72 (74%)	0 (0%)

Table 16. Workers' response to practice questions towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

Practices		n	%	
1	Do you use proper personal protective equipment (e.g. mask, gloves, etc) when handling live birds, feces, feathers, or bedding, or when slaughtering the birds?	All the times	0	0.0
		Sometimes	17	17.0
		Never	83	83.0
2	Do you use proper personal protective equipment (e.g. mask, gloves, etc.) before having contact with sick or dead poultry?	All the times	0	0.0
		Sometimes	3	3.0
		Never	97	97.0
3	Do you wash your hands and any equipment when you finish your work?	All the times	100	100.0
		Sometimes	0	0.0
		Never	0	0.0
4	Do you use soap or disinfectant to clean your hands and equipment?	All the times	100	100.0
		Sometimes	0	0.0
		Never	0	0.0
5	Do you spray disinfectant on vehicles before and after they are used to transport poultry?	All the times	93	93.0
		Sometimes	7	7.0
		Never	0	0.0
6	Do you use the same vehicle to transport chickens and other poultry?	All the times	92	92.0
		Sometimes	0	0.0
		Never	8	8.0
7	Do you use the same vehicle to transport poultry and humans?	All the times	98	98.0
		Sometimes	0	0.0
		Never	2	2.0
8	Do your workers who regularly having contact with poultry have an annual health check?	All the times	0	0.0
		Sometimes	3	3.0
		Never	97	97.0

Table 16. Workers' response to practice questions towards highly pathogenic avian influenza and biosecurity among live bird market workers in Jakarta – Indonesia, 2012. (n = 100) – (continued)

Practices		n	%	
9	If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, do you report it to the public health authority?	All the times	0	0.0
		Sometimes	27	27.0
		Never	73	73.0
10	If sudden unexplained deaths occur among your chickens during transportation, do you report it to the animal health authority?	All the times	0	0.0
		Sometimes	0	0.0
		Never	100	100.0

Table 17. A summary of results of practices in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

Variables		Practice Categories			
		Inappropriate	Moderate	Good	
1	Gender	Male	92 (98%)	2 (2%)	0 (0%)
		Female	6 (100%)	0 (0%)	0 (0%)
2	Age groups (years)	18 - < 25	21 (100%)	0 (0%)	0 (0%)
		25 - < 40	47 (98%)	1 (2%)	0 (0%)
		≥ 40	30 (97%)	1 (3%)	0 (0%)
3	Education Level	Low (Illiterate, Informal, Primary and Secondary)	83 (98%)	2 (2%)	0 (0%)
		High (High School and University/College)	15 (100%)	0 (0%)	0 (0%)
4	Average daily sale (in Rupiah)	< 1.500.000	17 (100%)	0 (0%)	0 (0%)
		1.500.000 - < 5.000.000	30 (100%)	0 (0%)	0 (0%)
		≥ 5.000.000	51 (96%)	2 (4%)	0 (0%)
5	Working Experience	< 5 years	19 (100%)	0 (0%)	0 (0%)
		5 - < 10 years	47 (98%)	1 (2%)	0 (0%)
		≥ 10 years	32 (97%)	1 (3%)	0 (0%)
6	Number of Suppliers	1	2 (100%)	0 (0%)	0 (0%)
		> 1	96 (98%)	2 (2%)	0 (0%)

Table 18. Workers' response to barrier to preventative practice questions in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

Barrier To Preventative Practices		n	%	
1	In your opinion, why do you think some people refuse to use personal protective equipment (e.g. mask, apron, gloves) when handling live poultry/slaughtering poultry?	Can't afford to do it/cost too much money	10	10.0
		They were not aware of this recommendation	0	0.0
		Too much trouble	83	83.0
		They don't believe it will help to prevent/protect from HPAI	7	7.0
2	In your opinion, why do you think some people refuse to change clothes when coming from other farms/markets?	Can't afford to do it/cost too much money	0	0.0
		They were not aware of this recommendation	76	76.0
		Too much trouble	24	24.0
		They don't believe it will help to prevent/protect from HPAI	0	0.0
3	In your opinion, why do you think some people refuse to wash hands and equipment with soap/disinfectant before and after handling poultry?	Can't afford to do it/cost too much money	0	0.0
		They were not aware of this recommendation	87	87.0
		Too much trouble	6	6.0
		They don't believe it will help to prevent/protect from HPAI	7	7.0
4	In your opinion, why do you think some people refuse to separate chickens and ducks?	Can't afford to do it/cost too much money	0	0.0
		They were not aware of this recommendation	19	19.0
		Too much trouble	81	81.0
		They don't believe it will help to prevent/protect from HPAI	0	0.0

Table 18. Workers' response to barrier to preventative practice questions in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100) – (continued)

Barrier To Preventative Practices		n	%	
5	In your opinion, why do you think some people refuse to keep poultry in cages/closed buildings?	Can't afford to do it/cost too much money	47	47.0
		They were not aware of this recommendation	12	12.0
		Too much trouble	41	41.0
		They don't believe it will help to prevent/protect from HPAI	0	0.0
6	In your opinion, why do you think some people refuse not to eat sick poultry?	Can't afford to do it/cost too much money	0	0.0
		They were not aware of this recommendation	0	0.0
		Too much trouble	0	0.0
		They don't believe it will help to prevent/protect from HPAI	100	100.0
7	In your opinion, why do you think some people refuse to burn and bury dead poultry?	Can't afford to do it/cost too much money	0	0.0
		They were not aware of this recommendation	7	7.0
		Too much trouble	93	93.0
		They don't believe it will help to prevent/protect from HPAI	0	0.0

Table 19. A summary of level of practices results in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

	Variables	Level of Practice Category	
		Inappropriate	Good
1 Gender	Male	89 (95%)	5 (5%)
	Female	5 (83%)	1 (17%)
2 Age groups (years)	18 - < 25	21 (100%)	0 (0%)
	25 - < 40	44 (92%)	4 (8%)
	≥ 40	29 (94%)	2 (6%)
3 Education Level	Low (Illiterate, Informal, Primary and Secondary)	79 (93%)	6 (7%)
	High (High School and University/College)	15 (100%)	0 (0%)
4 Average daily sale (in Rupiah)	< 1.500.000	17 (100%)	0 (0%)
	1.500.000 - < 5.000.000	29 (97%)	1 (3%)
	≥ 5.000.000	48 (91%)	5 (9%)
5 Working Experience	< 5 years	19 (100%)	0 (0%)
	5 - < 10 years	44 (92%)	4 (8%)
	≥ 10 years	31 (94%)	2 (6%)
6 Number of Suppliers	1	2 (100%)	0 (0%)
	> 1	92 (94%)	6 (6%)

Table 20. Re-categorized of the independent and dependent variables for the inferential statistics for the highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Variable	Old Category	New Category
Age groups (Years)	18 - < 25	< 40
	25 - < 40	≥ 40
	≥ 40	
Working Experience (Years)	< 5	< 10
	5 - < 10	≥ 10
	≥ 10	
Knowledge	Less	Less
	Moderate	Moderate+Good
	Good	
Attitude	Negative	Negative
	Neutral	Neutral+Positive
	Positive	

Table 21. Chi-square and Fisher's Exact Test results of knowledge towards highly pathogenic avian influenza among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

	Factors	Chi-square Test		Fisher's Exact Test
		χ^2	P – value	
Gender	Male	-	-	0.233
	Female	-	-	
Age Group (years)	< 40	-	-	<.0001*
	≥ 40	-	-	
Education Level	Low (Illiterate, Informal education, Primary and Secondary school)	-	-	<.0001*
	High (High school and University/College)	-	-	
Daily Sales (in Rupiah)	< 1.500.000	0.246	0.884	-
	1.500.000 - < 5.000.000			
	≥ 5.000.000			
Experience (years)	< 10	-	-	<.0001*
	≥ 10	-	-	
Supplier	1	-	-	0.504
	>1	-	-	

Table 22. A two-by-two table of workers' knowledge and age group in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Age Group (Years)	Knowledge		Total	Fisher's Exact Test
	Less	Moderate + Good		
< 40	26	43	69	<.0001
≥ 40	31	0	31	
Total	57	43	100	

Table 23. A two-by-two table of workers' knowledge and education level in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Education Level	Knowledge		Total	Fisher's Exact Test
	Less	Moderate + Good		
Low	57	28	85	<.0001
High	0	15	15	
Total	57	43	100	

Table 24. A two-by-two table of workers' knowledge and job experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Experience (Years)	Knowledge		Total	Fisher's Exact Test
	Less	Moderate + Good		
< 10	25	42	67	<.0001
≥ 10	32	1	33	
Total	57	43	100	

Table 25. Univariate analysis of negative attitude in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012, based on workers' characteristic. (n = 100)

	Factors	Odds Ratio	95% CI		P-value	Type 3 P-value	Fisher's Exact Test
			Low. Lim.	Up. Lim.			
1	Gender Male Female	0.76	0.13 Reference	4.43	0.765	-	0.671
2	Age Group (years) < 40 ≥ 40	8.17	Reference 3.07	21.74	<.0001*	-	<.0001*
3	Education Level Low High	0.00	Reference 0.00	-	0.998	-	0.010**
4	Daily Sales (in Rupiah) < 1.500.000 1.500.000 - < 5.000.000 ≥ 5.000.000	0.25 1.11	Reference 0.04 0.27	1.44 4.53	- -	0.091*	
5	Experience < 10 years ≥ 10 years	8.75	Reference 3.27	23.41	<.0001*	-	<.0001*
6	Supplier 1 >1	0.00	Reference 0.00	-	0.999	-	0.076**

* Included in the Final Model

** excluded because it has 0 values in one of the cells

Table 26. Chi-square Test result between workers' age group and experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

Age Group (Years)	Experience (Years)		Total	Chi-Square	
	< 10	≥ 10		Value	P-value
< 40	67	2	69	91.22	<.0001
≥ 40	0	31	31		
Total	67	33	100		

Table 27. Final model of 'negative' attitude with daily sales and age group in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Effect	Odds Ratio	95% Confidence Limits		P-value	Type 3 p-value
		Lower	Upper		
Daily Sales (in Rupiah)	< 1,500,000	4.16	0.78	22.16	0.095
	1,500,000 - < 5,000,000	1.00*	-	-	0.08
	> 5,000,000	4.48	1.18	16.97	0.03**
Age Group (Years)	< 40	1.00*	-	-	<.0001
	≥ 40	9.37	3.29	26.64	<.0001**

* Reference Category
 ** Significant at 5% Level of Significance

Table 28. Final model of 'negative' attitude with daily sales and job experience in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012.

Effect	Odds Ratio	95% Confidence Limits		P-value	Type 3 p-value
		Lower	Upper		
Daily Sales (in Rupiah)	< 1,500,000	3.50	0.66	18.48	0.14
	1,500,000 - < 5,000,000	1.00*	-	-	0.099
	> 5,000,000	4.26	1.13	16.08	0.03**
Experience (Years)	< 10	1.00*	-	-	<.0001
	≥ 10	9.54	3.39	26.80	<.0001**

* Reference Category
 ** Significant at 5% Level of Significance

Table 29. Relationship between worker's knowledge and attitude with level of practice in highly pathogenic avian influenza knowledge, attitudes and practices study among live bird market workers in Jakarta – Indonesia, 2012. (n = 100)

	Factors	Level of Practice		Fisher's Exact Test
		Inappropriate	Good	
1	Knowledge	Less	52	0.233
		Moderate+Good	42	
2	Attitude	Negative	27	1.000
		Neutral+Positive	67	

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The following conclusions can be drawn from the findings of this study:

1. The workers' knowledge assessment indicated that 57% of workers had less knowledge related to HPAI and biosecurity measures, while 36% of workers had moderate/sufficient knowledge and only 7% of the workers had good knowledge related to HPAI and biosecurity measures.
2. The workers' attitude assessment revealed that 72% of the workers had a neutral attitude toward questions regarding fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity and 28% of the workers had a negative attitude. None of the workers (0%) showed a positive attitude toward questions regarding fundamental beliefs, misconceptions, and the government programs related to HPAI and biosecurity.
3. The results for the workers' practice assessment showed that 98% of the workers performed inappropriate practice related to sanitation and biosecurity measures during daily business activities. Only 2% of workers performed moderate practice, and none of the workers (0%) performed good practice related to sanitation and biosecurity measures in daily business activities.
4. Workers' knowledge is associated with the age of the workers, the educational background of the workers, and the work experience of the workers.
5. Workers' attitude is associated with the age of the workers, the income level (daily sales) of the workers, and the workers' experience.

6. The difference in the proportions between the LBM owners/workers who had less knowledge and performed inappropriate practice is not statistically significant (at the 5% level of significance) compared to the proportions of the LBM owners/workers who had moderate to good knowledge and performed inappropriate practice.
7. The difference in the proportions between the LBM owners/workers who had a negative attitude and performed inappropriate practice is not statistically significant (at the 5% level of significance) compared to the proportions of the LBM owners/workers who had a neutral to positive attitude and performed inappropriate practice.
8. The results of this study illustrate that, despite being given information, LBM workers had no detailed understanding of avian influenza, had a less perceived risk of experiencing avian influenza, and had a low compliance with precautions behaviors. As a result, biosecurity in the LBMs is woefully inadequate, increasing the threat of another serious outbreak of HPAI in poultry and perhaps in humans as well.

5.1. Recommendations

In order for the HPAI control program to be most effective, one of the goals should be to improve Jakarta LBM workers' knowledge, attitude and practice regarding this disease. The results of this study give rise to several recommendations for the policy makers in Jakarta and are as follows:

1. Continuous, effective and properly delivered public education related to HPAI needs to be in place in order to create a permanent change in attitude and promote behavioral change.
2. The Jakarta administration and the Government of Indonesia should provide incentives for the live poultry markets workers/owners who have implemented good practice. The incentives may be given in the form of sanitary equipment aid or certification for establishments that have implemented good practice.

3. The government should prioritize using persuasive approaches involving respected community leaders so that the workers develop a more positive attitude regarding the fundamental beliefs, misconceptions and the government programs related to HPAI.
4. The Government needs to identify the most effective and practical source for HPAI information, and find the optimal way of correcting these deficiencies by developing and implementing public health policy regarding priorities for tailored educational and promotion strategies and in particular more attention should be given on using preventive approaches in these population.
5. There is a need to established a solid and binding network of partners consisting of public sector, private sector and non-government organizations so as to form a strong and mutually beneficial relationship.
6. Encouragingly, worker's interest in learning more about avian influenza was high in this survey. Therefore, designing and implementing avian influenza educational programs and measuring their effectiveness should be priorities to encourage the population to take a more active role.

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APPENDICES

Appendix A. Recruitment of Survey Respondents.

HIGHLY PATHOGENIC AVIAN INFLUENZA KNOWLEDGE, ATTITUDES AND PRACTICES SURVEY

AMONG LIVE BIRD MARKET WORKERS IN JAKARTA

Recruitment:

Good morning/afternoon,

My name is Yadi Cahyadi Sutanto and I am a graduate student from Colorado State University. I am conducting a research study to explore the knowledge, attitudes and practices related to the risk of bird flu among live bird market workers in Jakarta.

Would you be interested in answering questions about our knowledge of the bird flu and your daily practices related to the risks of bird flu?

Participation in this survey will take approximately 30 minutes. Your participation in this research is voluntary, however you will receive a Rp.20.000,- as compensation for your time. There is a possibility that you may feel uncomfortable with the questions, but you may stop whenever you want or skip the question.

If yes, we will proceed with survey questions after I read your consent for joining the study.

If no, thank you for your time and have a good day.

Do you have any questions?

Appendix B. Survey Consent for Respondents.

Consent – read and hand them the consent

The title of my project is “Highly Pathogenic Avian Influenza Knowledge, Attitudes, And Practices Study among Live Bird Market Workers in Jakarta – Indonesia”. The principal Investigator is Dr. M.D. Salman who is a professor at Clinical Science Department of Colorado State University, USA. I am the Co-Principal Investigator.

Participation in this survey will take approximately 30 minutes. Your participation in this research is voluntary, however you will receive a Rp.20.000,- as compensation for your time. There is a possibility that you may feel uncomfortable with the questions, but you may stop whenever you want or skip the question.

We will not ask for your name and we will combine all the information from all the participants when we share the information with other researchers or publish the information. There are no known risks for participating. It is not possible to identify all potential risks in research procedures, but the researcher has taken reasonable safeguards to minimize any known and potential risks.

While there are no direct benefits to you from your participation, however we hope that the study outcome will provide information to help the government improve the awareness programs related to highly pathogenic avian influenza (bird flu) prevention to be more appropriate to the needs of community.

Do you have any questions? If you have any questions later, please contact Yadi Cahyadi Sutanto at Kementerian Pertanian, Direktorat Jenderal Peternakan dan Kesehatan Hewan, Jl. Harsono RM No. 3, Ragunan - Jakarta or phone: 0816633919 .

Appendix C. Highly Pathogenic Avian Influenza Knowledge, Attitudes and Practices among Live Bird Market Workers in Jakarta – Indonesia Survey Questionnaire.

**HIGHLY PATHOGENIC AVIAN INFLUENZA KNOWLEDGE, ATTITUDES AND PRACTICES SURVEY
AMONG LIVE BIRD MARKET WORKERS IN JAKARTA**

PARTICIPANT'S ID : (Included Code for location and sample number)

DATE OF INTERVIEW :

I. GENERAL INFORMATION

1. Gender

Male

Female

2. How old are you? Date of Birth(MM/DD/YYYY)

< 18 year

18 – < 25 year

25 - < 40 year

≥ 40 year

3. What is your highest education level?

None (Illiterate)

Middle School

Religious/informal

High School

Primary School

College/University

4. What is your average daily income?

Less than Rp. 500.000,-

Rp. 500.000,-to Rp. 1.500.000,-

—

Rp. 1.500.001,- to Rp. 5.000.000,-

More than Rp. 5.000.000,-

5. What type of poultry do you sell? (Can check more than one)

Broiler chicken

Duck

Native chicken

Other, please specify.....

6. What is the approximate number of birds specified below, that you sell every day?

Chicken

Ducks

Other (please specify)

7. How long have you been working at this establishment/business?

Less than 1 year

1 to < 5 years

5 to < 10 years

More than 10 years

8. How many hours do you work each day for this establishment/business?.....

9. From how many suppliers/farms do you usually buy the poultry?

One

More than one, please specify the number.....

10. What is your reason for buying the poultry from that source?

Price

Convenience

Other, please specify...

Contract

Relationship

11. From what area did you buy your poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below.
If the response is not in the list, please write in Other section.

Greater Jakarta (JABODETABEK)

West Java

East Java

—

—

—

Banten

Central Java

Other, please specify.....

II. KNOWLEDGE

1. Have you heard about bird flu?

Yes

No

If **No**, prompt with "I'm talking about the poultry disease that caused many outbreaks during 2004 and 2005", if still say No, then thank them and terminate the interview.

2. What is the causative agent of bird flu?

Virus

Bacteria

Parasite

Don't know

3. What animals can be infected with bird flu?(can check more than 1)

Only chickens

Poultry

Mammals

Don't know

4. From where did you learn about bird flu?

TV

Market administrator

Radio

Animal health/Public health personnel

Newspaper/Magazine

Family member

Brochure/Banner

Other, please specify.....

5. How likely do you think it is that your poultry will be infected with bird flu?

Very likely

Likely

Somewhat likely

Unlikely

Very Unlikely

6. Do you think that bird flu can be prevented? (if the answer is No/Not sure/Don't know, skip Q7)

Yes

No

Not sure

Don't know

7. Can you tell me the things that you think you could do to prevent bird flu in poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

Vaccinate poultry against bird flu

Change clothes/shoes/sandals when coming from another farm or market

Keep poultry in good condition (access to

Control entries into the premise

- clean water, and adequate food/housing) —
- Keep poultry in a protected environment (enclosed building/ fenced area) Do nothing
- Separate the chickens from the ducks Other, please specify.....
- Keep all poultry brought to the premise separate from other poultry for at least 2 weeks Don't know
- Wash hand with soap before and after taking care of poultry and other animals

8. In your opinion, how is bird flu spread among poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

- Contact with another infected/sick birds Free-ranging poultry
- Contact with other contaminated environment, feed Contact with virus brought by people, their clothing or footwear
- Contact with infected manure Other, please specify.....
- Contact with infected equipment Don't know
- Purchase of unidentified poultry

9. Can you describe signs of bird flu in poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

- Sudden onset of illness or death Ruffled feathers
- Sudden death in large number Loss of appetite
- Sleepiness Bleeding
- Dark/red/blue comb and wattles Diarrhea
- Excessive thirst Other, please specify.....
- Swollen and puffy looking eyes Don't know
- —

- Discharge from nose and eyes
- No responses
- Fast breathing

10. What do you do with your poultry that you suspect have bird flu?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

- Keep them in a closed building/separate from other poultry & animals
- Kill them and burn them
- Sell them
- Report to an authority
- Eat them
- Follow animal health authority instructions
- Kill them and throw them away in the river/pond
- Do nothing
- Kill them and throw them outside/public dumpster
- Other, Please specify.....
- Kill them and bury them
- Don't know

11. What you do if there is a bird flu outbreak in the area from which you purchase your poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

- Keep poultry in an enclosed space and separate from other poultry & animals
- Do Nothing
- Follow animal health authority instructions
- Other, please specify.....

12. In your opinion, what should you do with the waste from your business?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

- Throw them away in the river/pond
- Do nothing
- Throw them in a specific pit for poultry waste
- Don't know
- Throw them in a public dumpster
- Other, please specify.....
- Burn them

13. In your opinion, how is bird flu spread in humans?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below.
If the response is not in the list, please write in Other section.

- | | |
|--|--|
| <input type="checkbox"/> Contact with infected/sick poultry | <input type="checkbox"/> Contact with human infected with bird flu |
| <input type="checkbox"/> Contact with infected poultry manure | <input type="checkbox"/> Other, please specify..... |
| <input type="checkbox"/> Contact with other contaminated equipment | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Eat raw/undercooked poultry products | |

14. Can you describe the symptoms of bird flu in humans?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below.
If the response is not in the list, please write in Other section.

- | | |
|---|---|
| <input type="checkbox"/> Fever | <input type="checkbox"/> Eye infection |
| <input type="checkbox"/> Difficult/fast breathing | <input type="checkbox"/> Diarrhea |
| <input type="checkbox"/> Cough | <input type="checkbox"/> Other, please specify..... |
| <input type="checkbox"/> Muscle aches | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Sore throat | |

15. In your opinion, what would you do to prevent bird flu when handling/slaughtering live poultry?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below.
If the response is not in the list, please write in Other section.

- | | |
|---|---|
| <input type="checkbox"/> Wear gloves | <input type="checkbox"/> Clean area afterwards |
| <input type="checkbox"/> Wear a mask | <input type="checkbox"/> Other, please specify..... |
| <input type="checkbox"/> Wash hand afterwards | <input type="checkbox"/> Don't know |

16. If you thought you had a bird flu case in your poultry would you report it? (If the answer is No/Not sure, skip Q17)

- Yes No Not sure

17. To whom would you be more likely to report suspected cases of bird flu in poultry?
DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below.
If the response is not in the list, please write in Other section.

- | | |
|---|---|
| <input type="checkbox"/> Animal health authority | <input type="checkbox"/> Market administrator |
| <input type="checkbox"/> Local authority (village/police) | <input type="checkbox"/> Other, please specify..... |

18. Have you ever attended, been trained or participated in an activity that educated about bird flu?

- Yes When.....
 By.....
- No

19. Have you ever had direct experience with bird flu?

- Yes When.....
 How.....
- No

20. Would you like to get more information about bird flu? (if the answer is No/Don't care skip Q21 and 22)

- Yes No Do not care

21. What specific information on bird flu would you like to know?

- | | |
|---|---|
| <input type="checkbox"/> Basic knowledge | <input type="checkbox"/> Outbreak announcement |
| <input type="checkbox"/> Prevention methods | <input type="checkbox"/> Other, please specify..... |
| <input type="checkbox"/> Treatment | |

22. What are the best ways to get this information to you?

- | | |
|---|---|
| <input type="checkbox"/> TV | <input type="checkbox"/> Market administrator |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Health personnel |
| <input type="checkbox"/> Newspaper/Magazine | <input type="checkbox"/> Family member |
| <input type="checkbox"/> Brochure/Banner | <input type="checkbox"/> Other, please specify..... |

23. Do you know about local regulation (*Peraturan Daerah*) Number 4/2007 that prohibits live poultry trade in the territory of Jakarta? (if the answer is No/Not sure, skip Q24 and 25)

Yes No Not sure

24. Do you agree with/support the regulation? (if the answer is Yes, skip Q25)

Yes No Not sure

25. Why do you not agree with/support the regulation?

DON'T READ THE ANSWER. Let respondent answer and check the appropriate answer below. If the response is not in the list, please write in Other section.

Afraid to lose customers Inconvenience
 Afraid to influence my sales Other, please specify.....
 Will increase my production cost Refuse to give a reason

26. Do you actively protest against the government on the new regulation related to LBM relocation?

Yes No Not sure

III. ATTITUDES

	Agree/satisfied	Do not agree/ Are not satisfied	Not sure/ Don't know
1. I am satisfied with the government efforts in controlling bird flu			
2. I believe that the government can control the bird flu			
3. The government programs to control bird flu been beneficial for you			
4. Bird flu issues are important for my business.			
5. Bird flu issues do not affect my sales			
6. We can always see the symptoms of bird flu in the chicken when it is infected			
7. Bird flu in poultry can be cured			
8. Infected poultry can shed bird flu especially in secretions such as feces, saliva, mucus and blood			
9. Contaminated equipment such as, cages, boots, and clothes can spread bird flu			
10. People can get bird flu by touching sick poultry			

11. Human bird flu can be associated with the environment in wet markets			
12. People who work with poultry or poultry products have a greater risk for becoming infected with bird flu			
13. Bird flu is a harmful disease because it can cause death in humans			
14. Bird flu in humans can be cured			
15. If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, they should see a doctor as soon as possible			
16. If your chickens die suddenly or get sick from an unknown cause over the course of more than one day, you must inform the animal health authority			
17. I think I am safe from bird flu infection, even without using proper equipment in handling the poultry			

IV. PRACTICES

1. Do you use proper personal protective equipment (e.g. mask, gloves, etc) when handling live birds, feces, feathers, or bedding, or when slaughtering the birds?

All the time Sometime Never

2. Do you use proper personal protective equipment (e.g. mask, gloves, etc) before having contact with sick or dead poultry?

All the time Sometime Never

3. Do you wash your hands and any equipment when you finish your work?

All the time Sometime Never

4. Do you use soap or disinfectant to clean your hands and equipment?

All the time Sometime Never

5. Do you spray disinfectant on vehicles before and after they are used to transport poultry?

All the time Sometime Never

6. Do you use the same vehicle to transport chickens and other poultry?

All the time Sometime Never

7. Do you use the same vehicle to transport poultry and humans?
- All the time Sometime Never
8. Do your workers who regularly having contact with poultry have an annual health check?
- All the time Sometime Never
9. If people in poultry-related jobs have clinical signs of high fever, shivering, sore throat, or difficulty breathing, do you report it to the public health authority?
- All the time Sometime Never
10. If sudden unexplained deaths occur among your chickens during transportation, do you report it to the animal health authority?
- All the time Sometime Never

V. BARRIER TO PREVENTATIVE PRACTICES

1. In your opinion, why do you think some people refuse to use personal protective equipment (e.g. mask, apron, gloves) when handling live poultry/slaughtering poultry?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu
2. In your opinion, why do you think some people refuse to change clothes when coming from other farms/markets?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu
3. In your opinion, why do you think some people refuse to wash hands and equipment with soap/disinfectant before and after handling poultry?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu

4. In your opinion, why do you think some people refuse to separate chickens and ducks?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu
5. In your opinion, why do you think some people refuse to keep poultry in cages/closed buildings?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu
6. In your opinion, why do you think some people refuse not to eat sick poultry?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu
7. In your opinion, why do you think some people refuse to burn and bury dead poultry?
- Can't afford to do it/cost too much money They were not aware of this recommendation
- Too much trouble They don't believe it will help to prevent/protect from bird flu

VI. DIRECT OBSERVATION

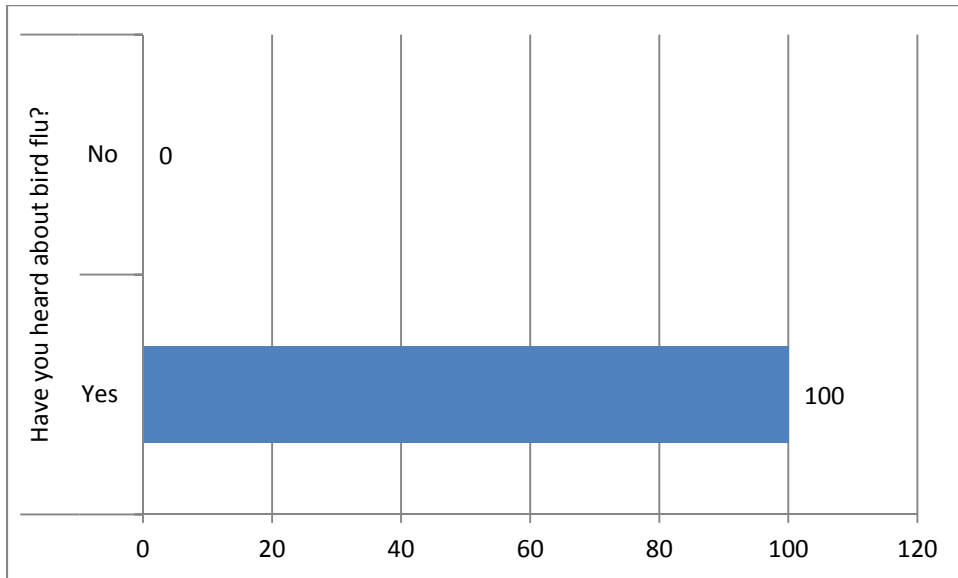
(to be filled by interviewer based on field observation)

1. Are all poultry kept in a closed building or in cages at all times
2. Are chicken and duck placed in a separate area or cages
3. Are there other animals which can come in contact with the poultry
4. Is there any poultry waste (manure, feathers, blood) handling facility
5. Is there an adequate air ventilation in working area
6. Is there an adequate water source in the working area

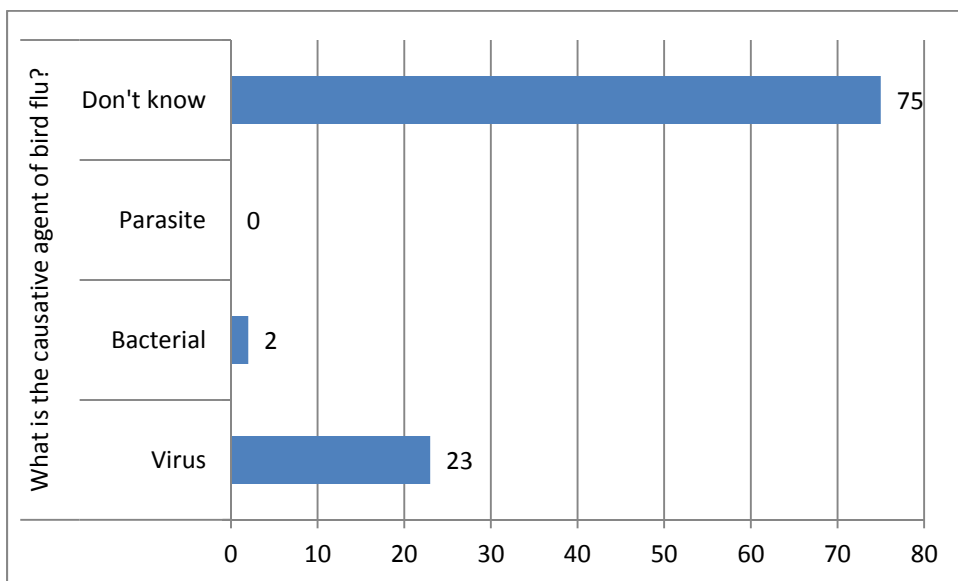
Yes	No

Appendix D. Respondent's Answer on Knowledge Questions.

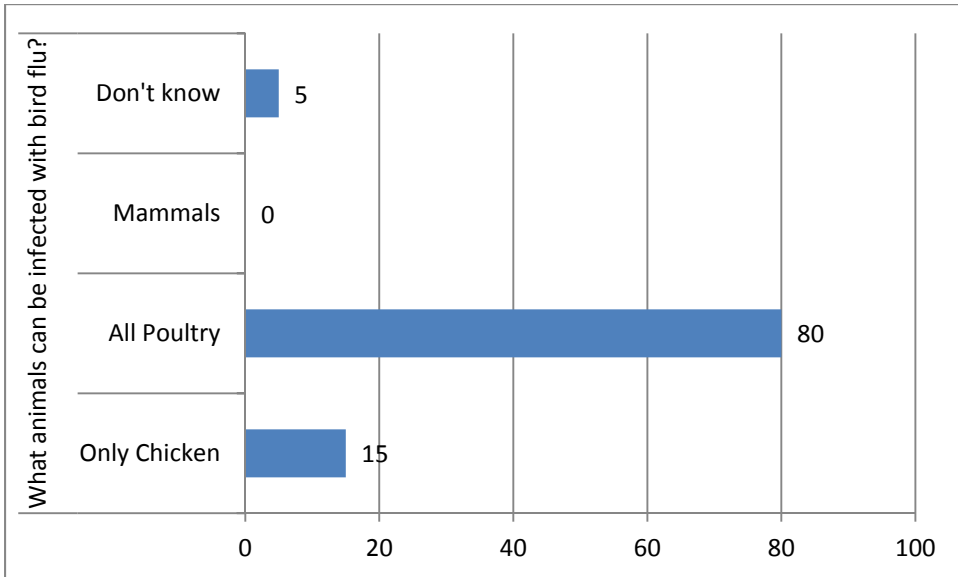
Q1 : Have you heard about HPAI?



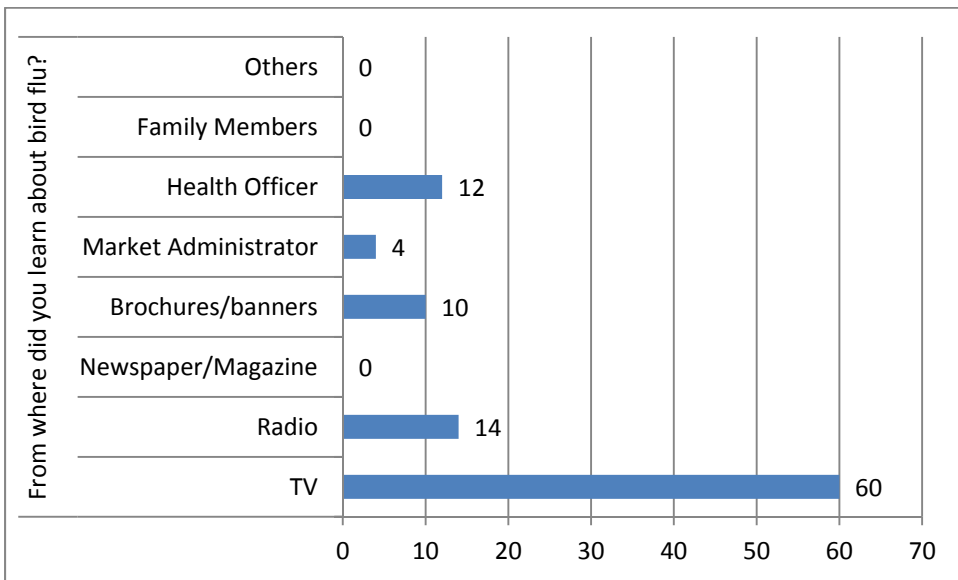
Q2 : What is the causative agent of HPAI?



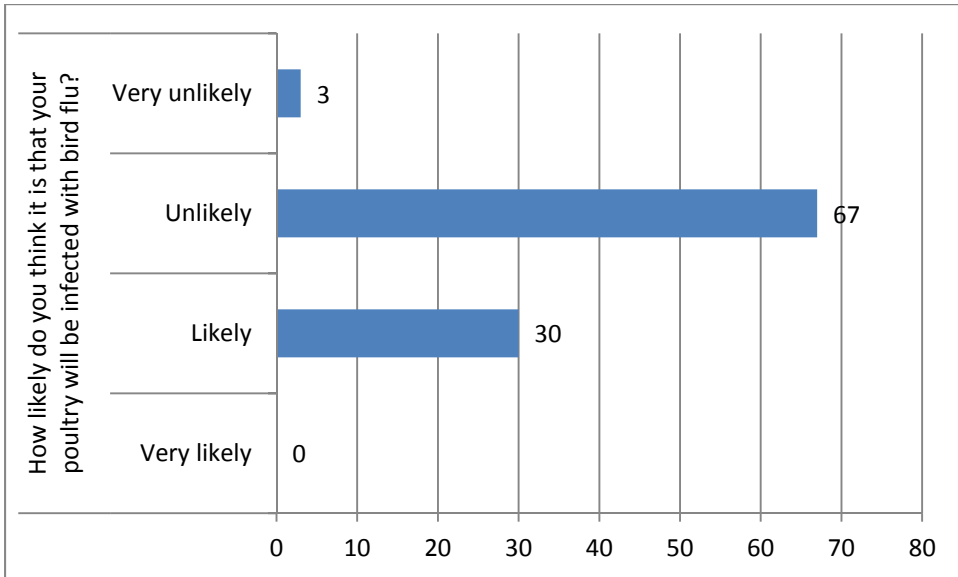
Q3 : What animals can be infected with HPAI?



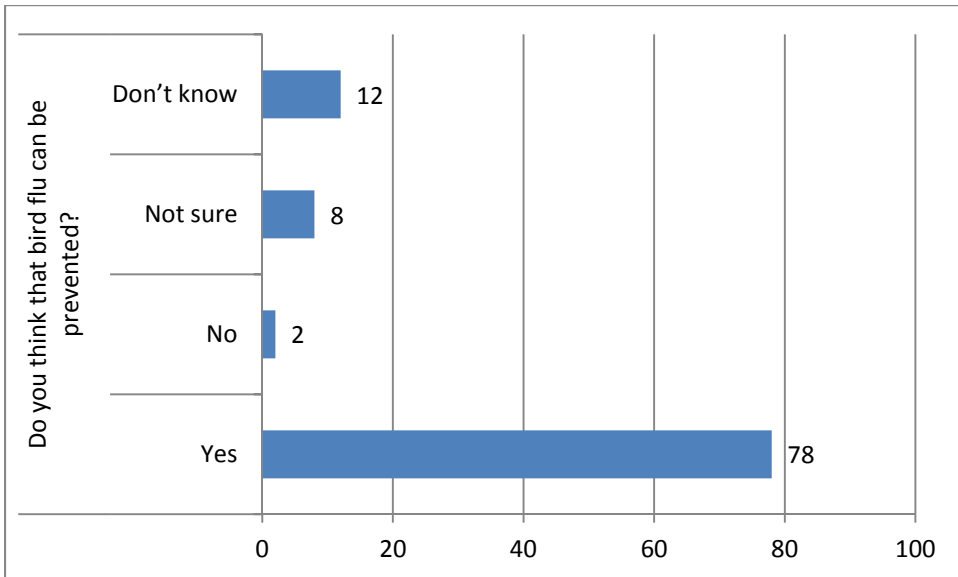
Q4 : From where did you learn about HPAI?



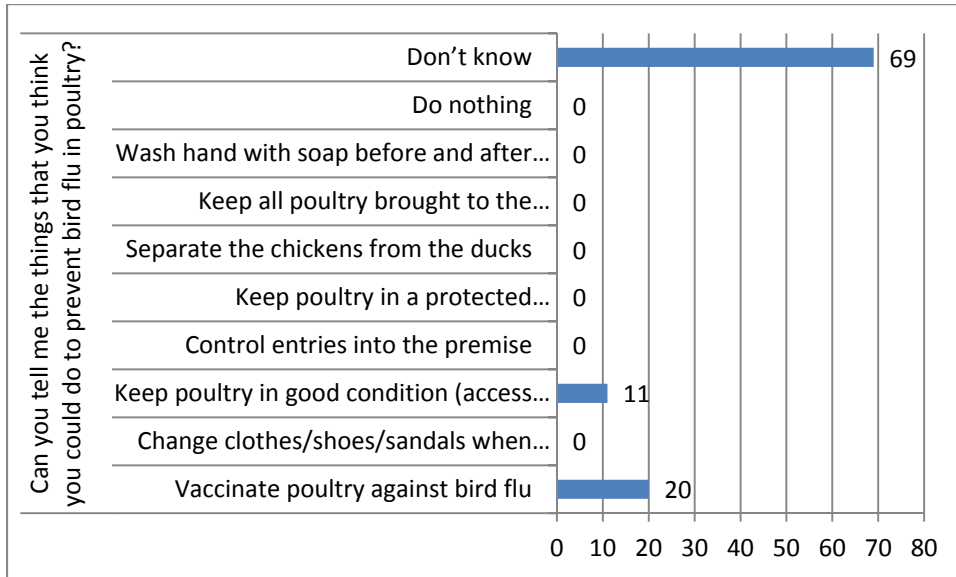
Q5 : How likely do you think it is that your poultry will be infected with HPAI?



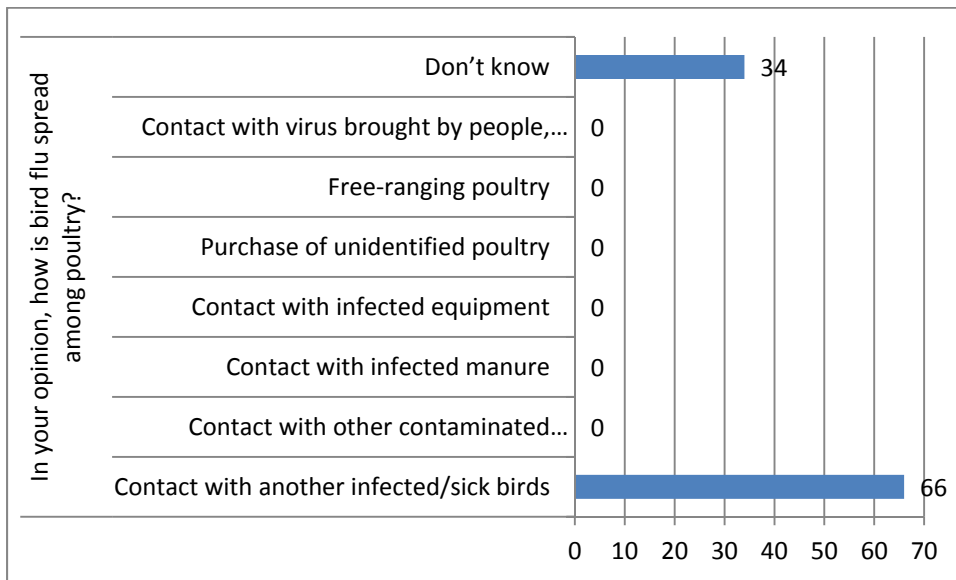
Q6 : Do you think that HPAI can be prevented?



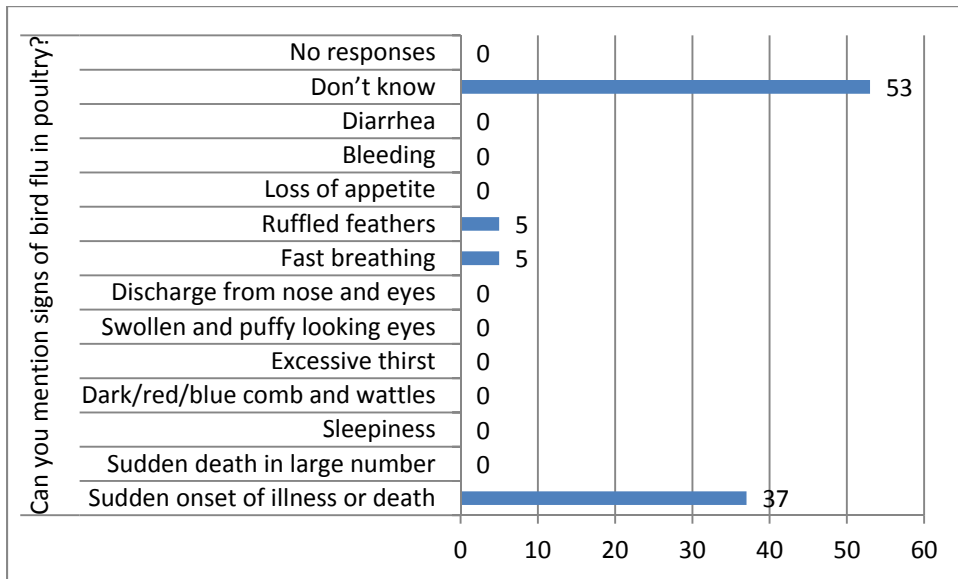
Q7 : Can you tell me the things that you think you could do to prevent HPAI in poultry?



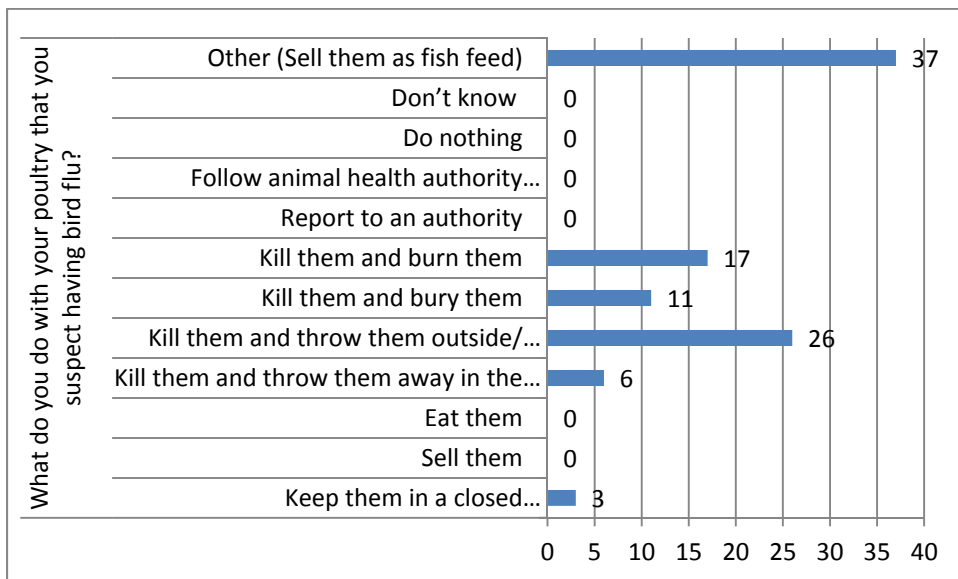
Q8 : In your opinion, how is HPAI spread among poultry?



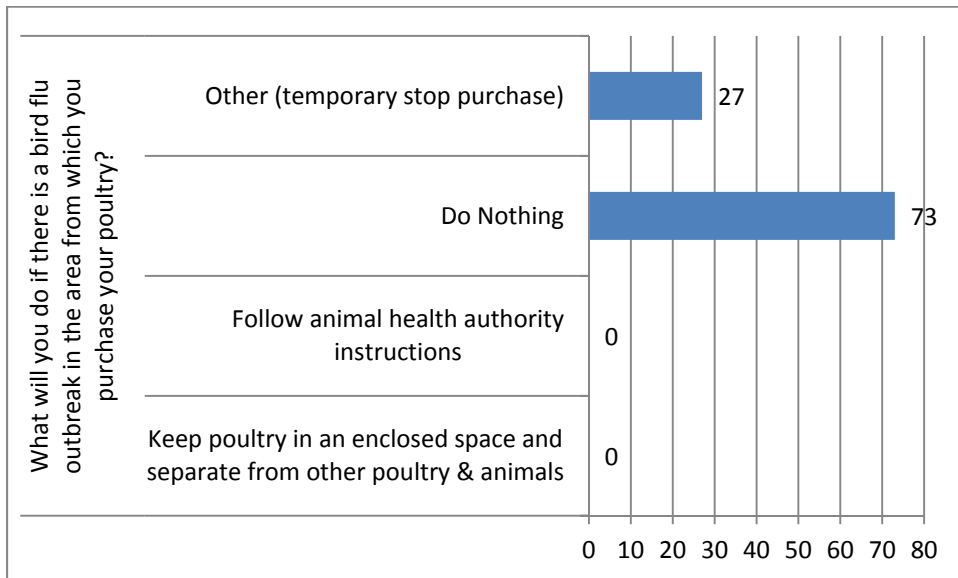
Q9 : Can you describe signs of HPAI in poultry?



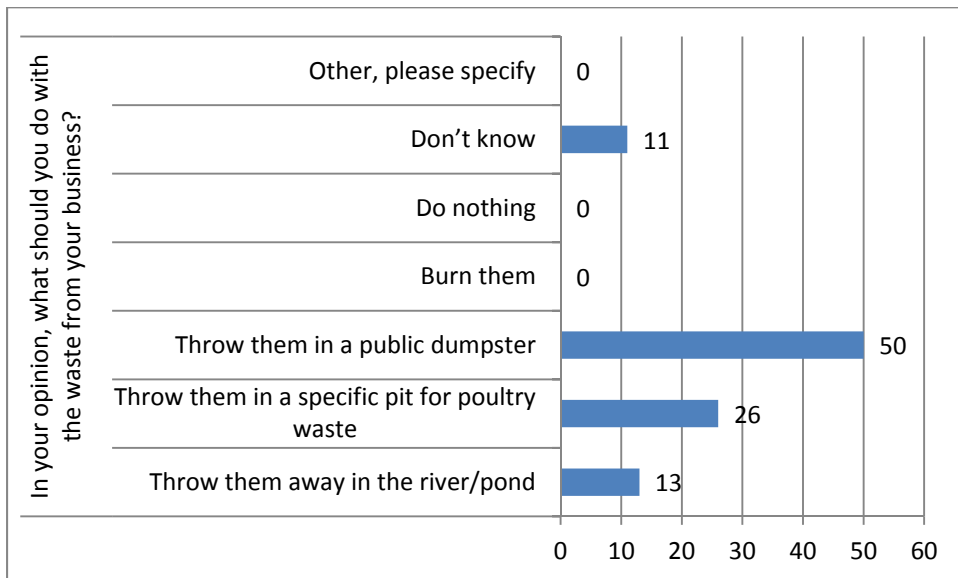
Q10 : What do you do with your poultry that you suspect have HPAI?



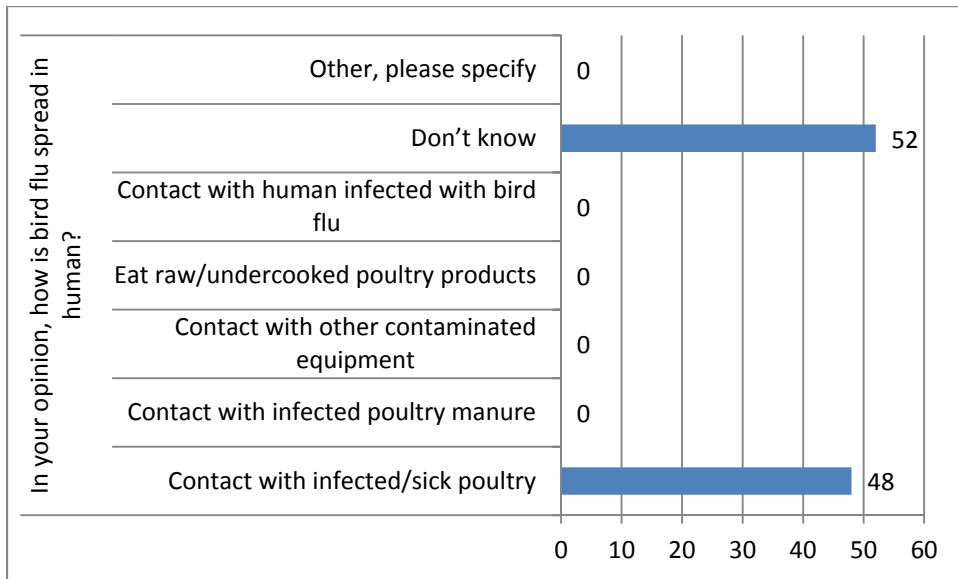
Q11 : What will you do if there is a HPAI outbreak in the area from which you purchase your poultry?



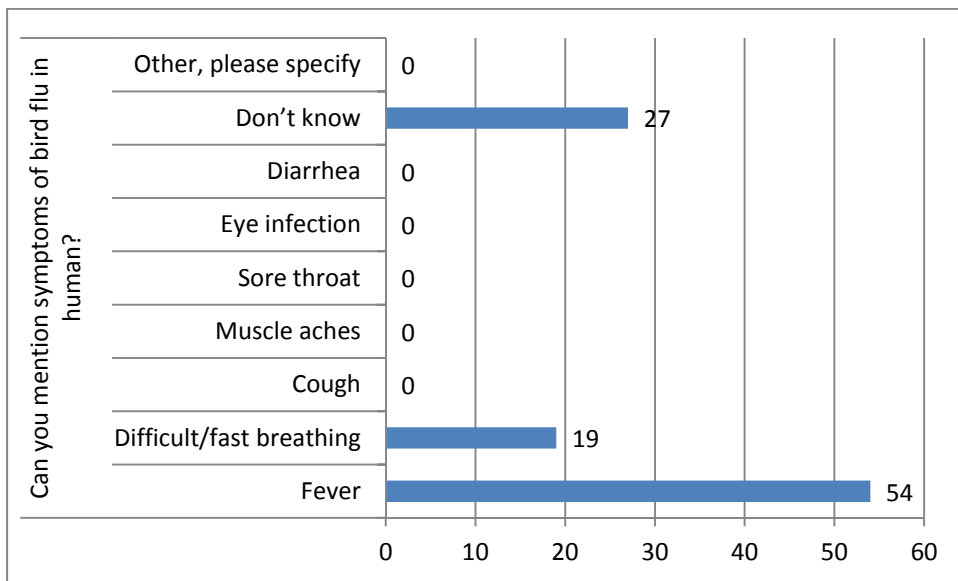
Q12 : In your opinion, what should you do with the waste from your business?



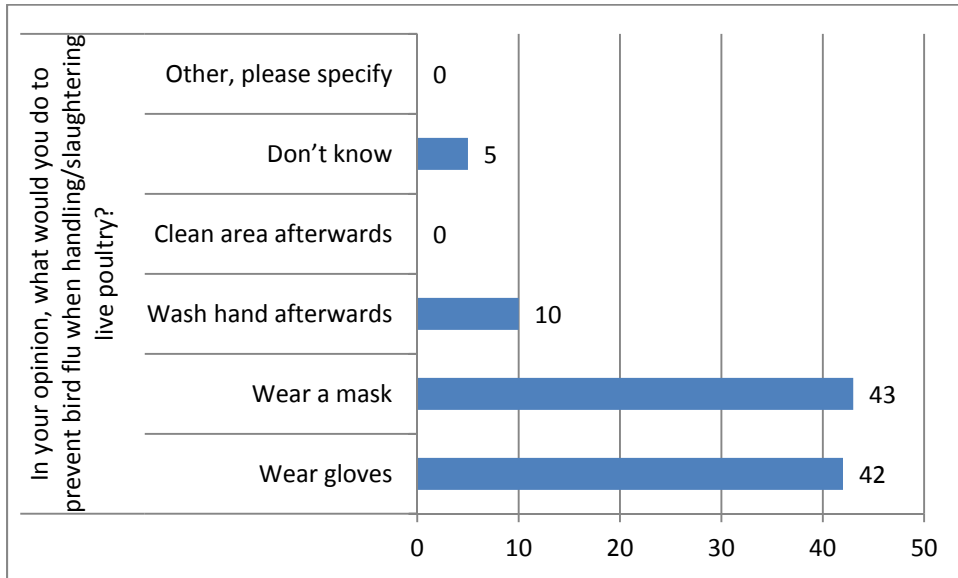
Q13 : In your opinion, how is HPAI spread in humans?



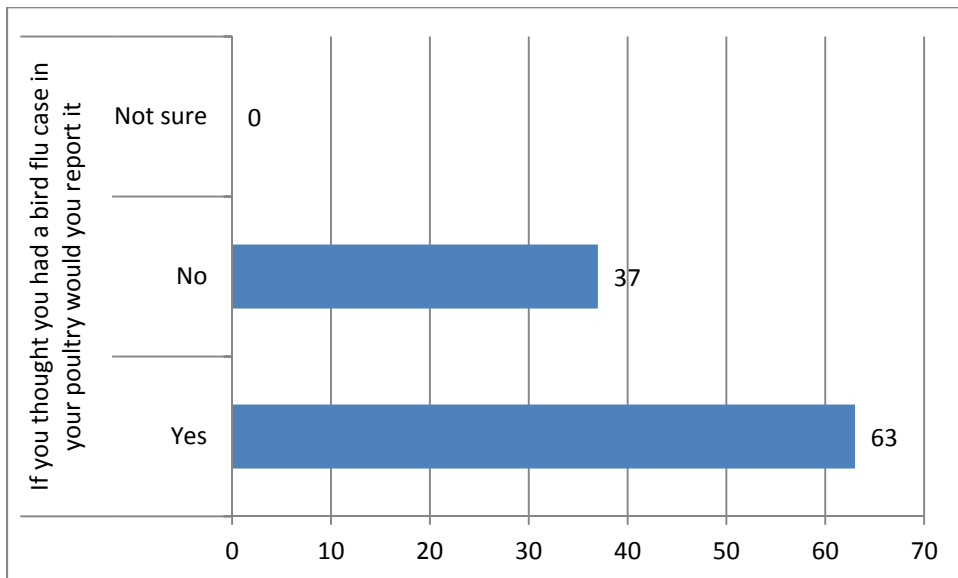
Q14 : Can you describe the symptoms of HPAI in humans?



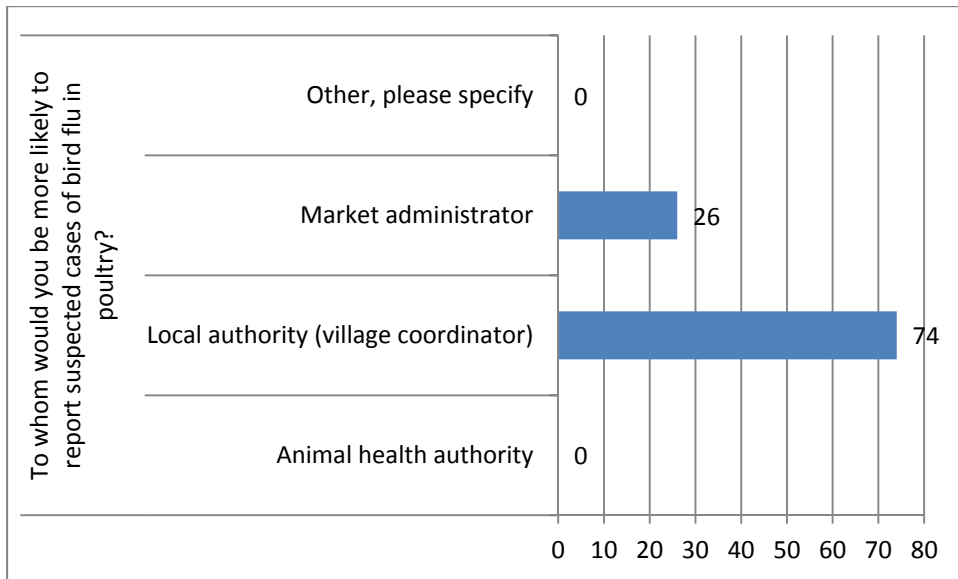
Q15 : In your opinion, what would you do to prevent HPAI when handling/slaughtering live poultry?



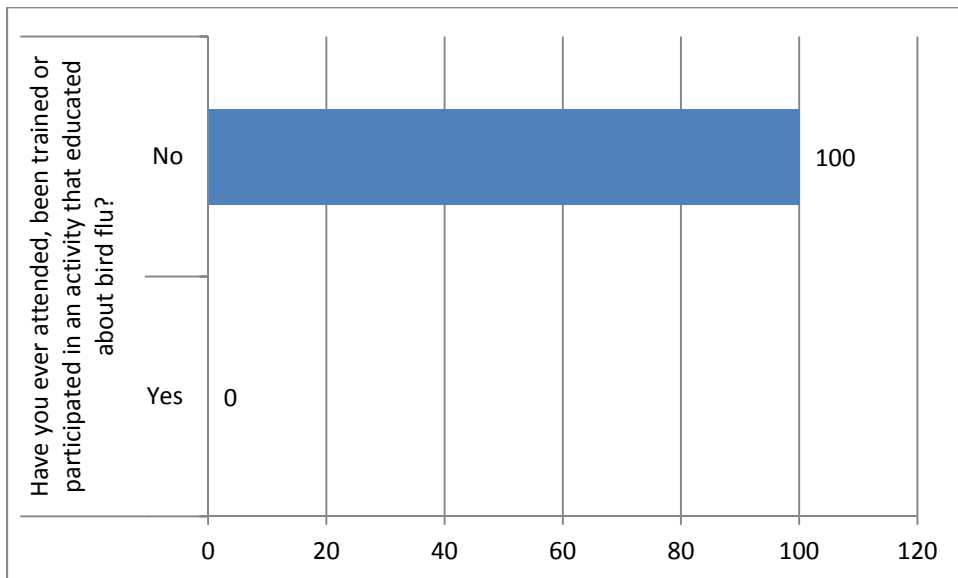
Q16 : If you thought you had a HPAI case in your poultry would you report it?



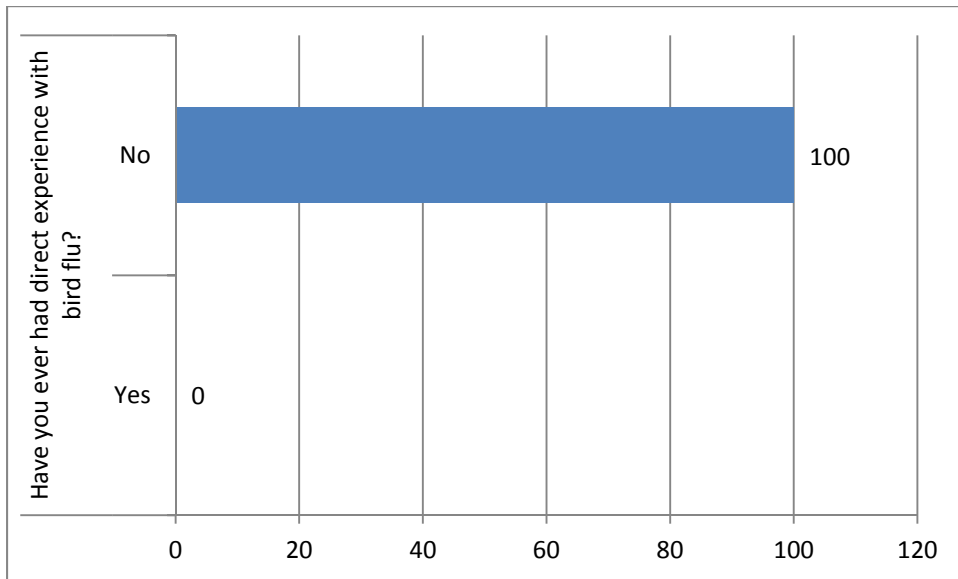
Q17 : To whom would you be more likely to report suspected cases of HPAI in poultry?



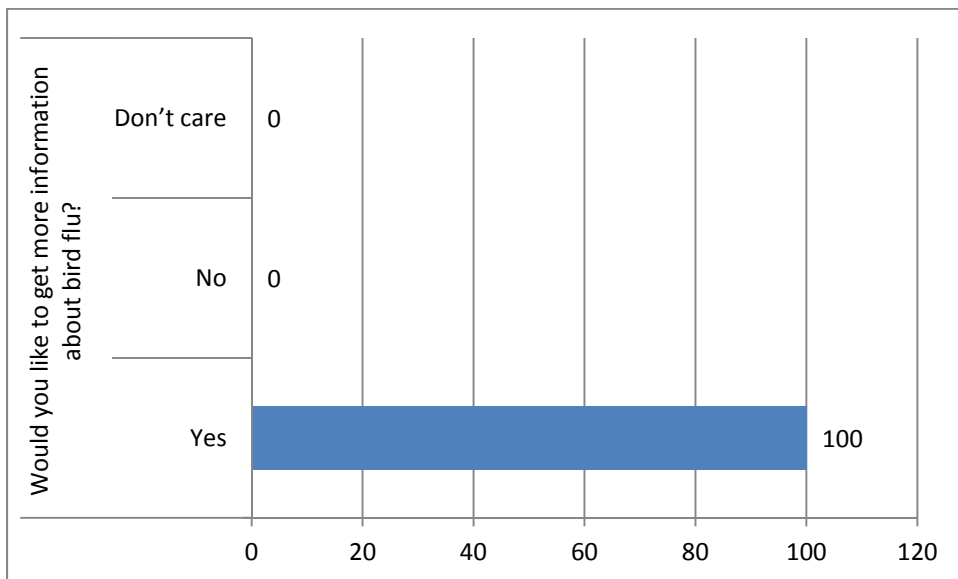
Q18 : Have you ever attended, been trained or participated in an activity that educated about HPAI?



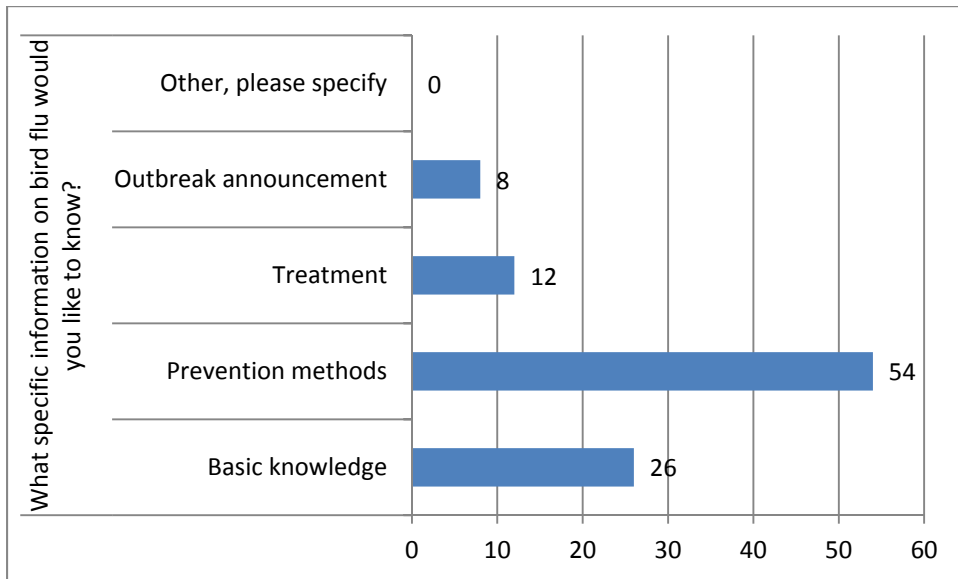
Q19 : Have you ever had direct experience with HPAI?



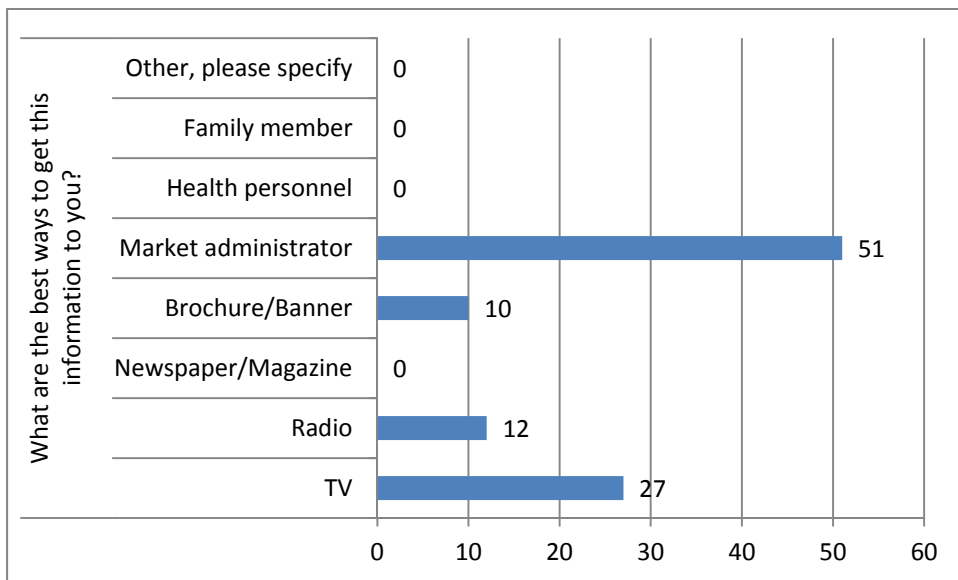
Q20 : Would you like to get more information about HPAI?



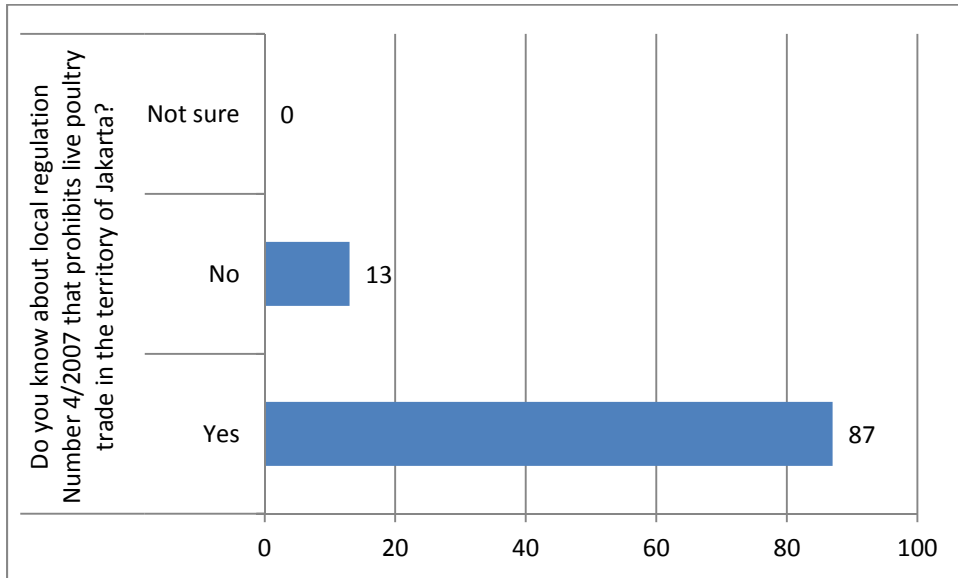
Q21 : What specific information on HPAI would you like to know?



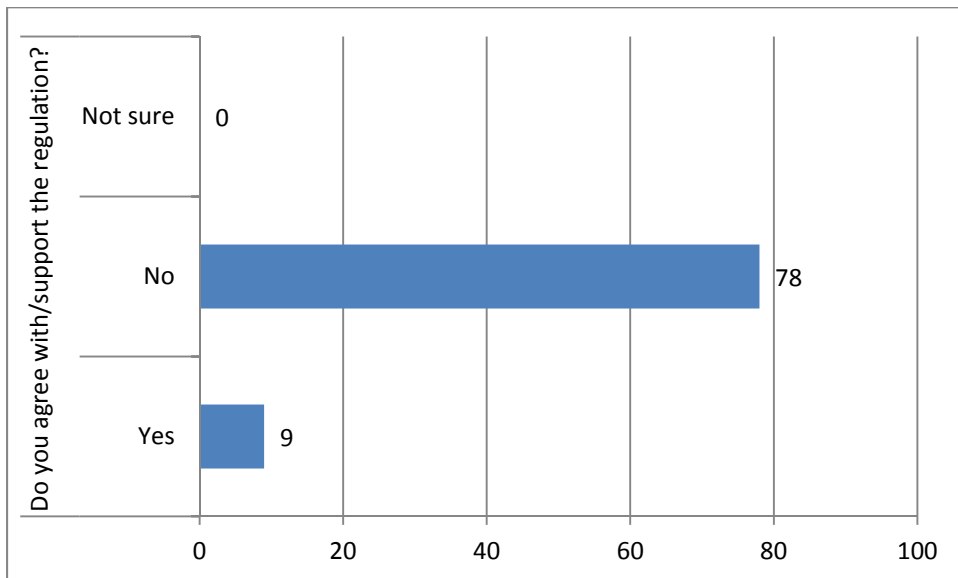
Q22 : What are the best ways to get this information to you?



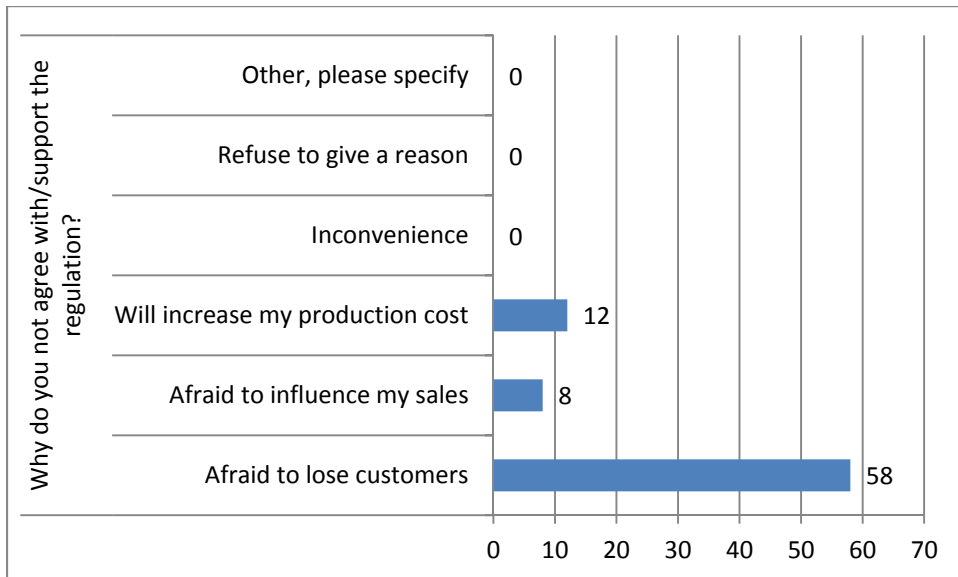
Q23 : Do you know about local regulation Number 4/2007 that prohibits live poultry trade in the territory of Jakarta?



Q24 : Do you agree with/support the regulation?



Q25 : Why do you not agree with/support the regulation?



Q26 : Do you actively protest against the government on the new regulation related to LBM relocation?

