

Socio-demographic Status and Mode of Transmission of Avian Influenza among Poultry Farm Workers

Islam SS¹, Rahman MF², Sarker MAS³, Begum M⁴, Kabir SMH⁵, Alam MJ⁶, Uddin MJ⁷, Banu S⁸, Rahman MB⁹

Abstract

Introduction: Avian influenza is considered as serious global public health problem for poultry industry. Literature suggests that when HPAI/H5N1 Avian influenza (AI) outbreaks, humans are prone to increased risk of transmission. The recent pandemic caused by highly pathogenic AIA (H5N1) in domestic poultry is currently rated phase-3 by the World Health Organization on the pandemic alert scale. Every year 244 species of migratory birds visit Bangladesh in the winter season (October-March) of which approximately 21 species may carry the H5N1 or HPAI (Highly Pathogenic Avian influenza) virus.

Objective: To assess socio demographic status and knowledge on mode of transmission of avian influenza among the poultry workers of selected poultry farms in Dhaka city.

Materials and Methods: This was a cross-sectional study carried out among the poultry workers of selected poultry farms in Dhaka city. The study was conducted over a period of six months from January 2008 to June 2008. A total of 150 poultry workers aged 9 years and above irrespective of sexes were interviewed face to face by using semi-structured questionnaire.

Results: Majority of the respondents were male (92%) and nearly 78% of the respondents had educational level from Class-V to SSC. About three fourth of the respondents (68%) mentioned that avian influenza was transmitted by

direct contact. Eighty percent (80%) of the respondents had the knowledge on transmission from poultry to human whereas 63% had the knowledge on transmission from human to human. Good, fair and poor knowledge on mode of transmission of avian influenza was found in 21.33%, 42.67% and 36% of the subjects respectively. Among the respondents belonging to <3 years and 3-5 years duration of service, 12% and 13.33% had poor knowledge followed by 14% and 9.33% had fair knowledge whereas 4% and 4.67% had good knowledge.

Conclusion: From the study it was revealed that one third of the workers had poor knowledge on mode of transmission of avian influenza. The study also found that the level of knowledge was found to be good among the older age group having higher educational level and longer duration of service.

Key-words: Socio-demographic status, Mode of transmission, Avian Influenza, Poultry workers.

Introduction

Avian influenza is considered as serious global public health problem to poultry industry. Literature suggests that when HPAI/H5N1 Avian influenza outbreaks, humans are prone to increase a risk of transmission¹. The recent pandemic caused by highly pathogenic AIA (H5N1) in domestic poultry is currently rated phase 3 by the World Health Organization on the pandemic alert scale². A pandemic occurs when a new influenza virus emerges

1. Lt Col Sheikh Shahidul Islam, MBBS, MPH (PHA), MPhil (Micro), ARTDOC, Momenshahi Cantonment
2. Maj Gen Md Fashiur Rahman, ndc, MBBS, MPH, LLB, FCGP, MBA, MSS, PhD fellow, Commandant, AFMC, Dhaka Cantonment
3. Dr Md Abu Sayeed Sarker, DVM, MS (Vet Med), PhD, Upozilla Livestock Officer, Gouripur Upozilla, Mymensingh
4. Dr Masuda Begum, BDS, DDS, Assistant Professor and Head, Department of Oral Anatomy and Physiology, Marks Medical College, Dental Unit, Mirpur 14, Dhaka
5. Col SM Humayun Kabir, MBBS, MPH, MPhil, Assistant Director Medical Services, Shaheed Salahuddin Cantonment, Ghatail
6. Professor Dr Md Jahangir Alam, MBBS, MPhil, FCGP, WHO Fellow, Principal, Cox's Bazar Medical College
7. Brig Gen Md Jalal Uddin, MBBS, MPH, Director of CMCH, Chittagong
8. Selina Banu, BSc (Hons), MSc (Micro), LLB, Plant Manager, Essential Latex Plant, EDCL, Pargacha, Modhupur, Tangail
9. Professor Dr Md Bahanur Rahman, DVM, MSc, PhD, Professor of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh.

and starts spreading as easily as influenza by coughing and sneezing. Because the virus is new, the human has no pre-existing immunity. This makes it likely that people who contact pandemic influenza will have serious disease than that caused by seasonal influenza. An important implication for human health, of far greater concern, is the risk that the H5N1 virus if given enough opportunities will develop the characteristics it needs to start influenza pandemic. The virus has met all prerequisites for starting of a pandemic except one: an ability to spread efficiently and sustainably among humans. While H5N1 is presently the virus of greatest concern, the possibility that other avian influenza viruses known to infect humans may cause a pandemic cannot be ruled out. People at highest risk of catching the disease are those who routinely come into close contact with infected poultry and other animals in their daily lives. They include: people who raise poultry and animals for their livelihood, or keep them for domestic use; people who handle poultry and animals during slaughter; people working in live animal and wet markets and people handling raw food at any time during food preparation. It is essential that people living in areas with outbreaks of avian influenza understand how they can protect themselves and their families to stop the further spread of the disease. Studies in H5N1 affected areas have shown a direct relation between the handling of dead or sick poultry and the occurrence of human infections, suggesting that infected domestic poultry is a primary source of human H5N1 infection³⁻⁸. Bangladesh has 115,000 small and large poultry farms producing 250 million broilers and 6 billion eggs annually, with an annual turnover of \$750 million⁹. As 60 lakhs Bangladeshis are directly or indirectly associated with poultry farming, efforts should be made to protect the industry from bird flu. Bangladesh is in a susceptible situation as it lies on the major route of migratory birds. According to United Nations, Avian Influenza and Pandemic Influenza Preparedness and Response Plan have been prepared. In Bangladesh, 244 species of migratory birds visit Bangladeshevery year in the winter season (October-March) of which approximately 21 species may carry the H5N1 or HPAI (Highly Pathogenic Avian influenza) virus. The dense population and close living quarters increase potentials for virus transmission¹⁰. The knowledge on mode of transmission of avian influenza among the

workers of poultry farms will help us to face the future threat and will reduce the loss of life of both birds and human.

Materials and Methods

Poultry workers in poultry farms irrespective of sexes in the Uttar Khan area of northern part of Dhaka City were the study population. It was a descriptive cross-sectional study where the study area was selected purposively for the research. The study was conducted in a period of 6 months starting from January 2008 to June 2008. The researcher interviewed the workers of 50 (fifty) poultry farms of large and small size where on an average of 3 (three) respondents were taken from each farm and finally a total of 150 respondents were interviewed face to face by using a semi structured questionnaire and observational checklist. The questionnaire was pretested initially then modified and finalized. Usual introduction of the researcher and the purpose of study were explained clearly to the respondents. After collection of data it was checked, verified and edited for consistency. Then the results were tabulated. Statistical calculations and analysis were done by SPSS to fulfill the objectives of the study. Results have been presented in the tables/graphs. In this study, knowledge refers to the understanding about mode of transmission of avian influenza infection among the poultry workers. The level of knowledge on avian influenza was ascertained by arbitrarily given score of '1' for yes and '0' for no according to Cornell Medical Index (CMI). The respondent's knowledge on avian influenza was categorized as: good knowledge (score >33 i.e.>80%), fair knowledge (32-21 i.e 50% to <80%) and poor knowledge (<21 i.e. <50%). The total score considered was 42. (The ability to recognize and accurately interpret or justify the message available to any individual was considered as knowledge. Whether the respondents knew about mode of transmission of avian influenza was assessed by CMI, calculating If yes- score=1, If no- score=0 and Total score=1.)

Results

Figure-1 shows that the mean age of the respondents was 30.43 ± 11.643 years ranging from 9-66 years. Highest number i.e. 49(32.7%) of the respondents were in the age group of <25 years followed by 33(22%) in the age group of 25-30 years and lowest i.e. 12(8%) in the age group of 30-35 years.

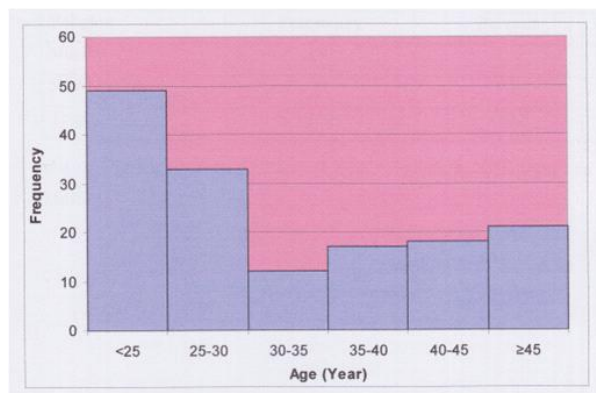


Fig-1: Distribution of respondents by age

Majority of the respondents were male 138(92%) and the rest were female 12(8%) as shown in Figure-2.

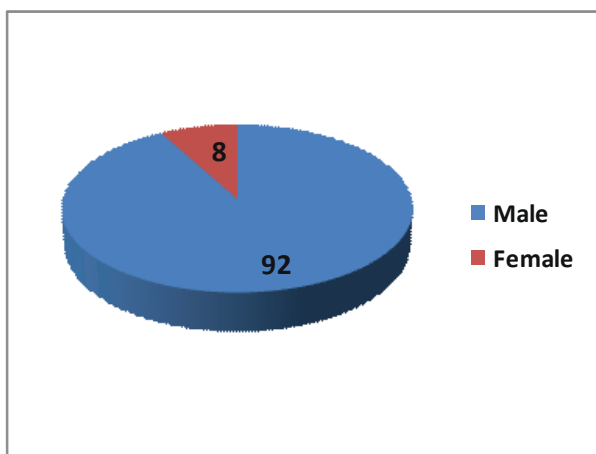


Fig-2: Distribution of respondents by Gender

Among the respondents, nearly 78% had qualification from class-V to SSC; class-V qualified were 42(28.0%), Class-VIII were 39(26%), SSC were 35(23.3%), HSC and above were 13(8.7%) whereas 21(14%) were found to be Illiterate (Figure-3).

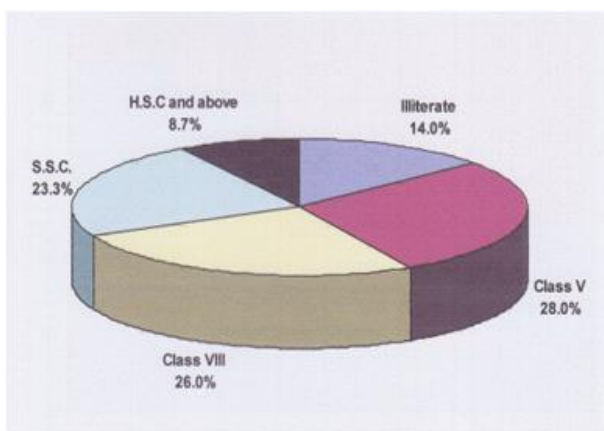


Fig-3: Distribution of respondents by level of education

The mean duration of service was 4.92 ± 4.74 years. It was found that 45(30%) of the respondents had duration of service of <3 years, 41(27.3%) had 3-5 years, 32(21.3%) had >5-7 years, 24(16%) had 9 years or more whereas 8(5.3%) had 7-9 years of service (Figure-4).

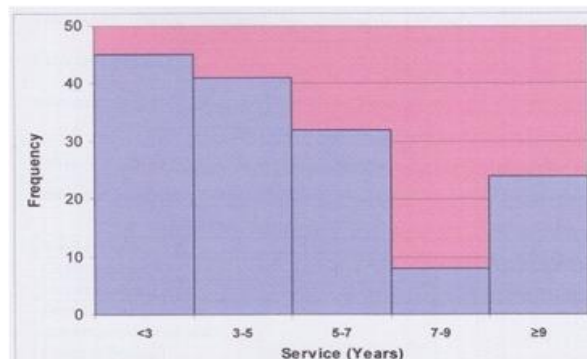


Fig-4: Distribution of respondents by duration of service

Out of 150 respondents, 124(82.7%) reportedly corrected mentioned that it was caused by virus; among them 19.3% gave wrong answer whereas 9.3% did not know about the cause of avian influenza (Figure-5).

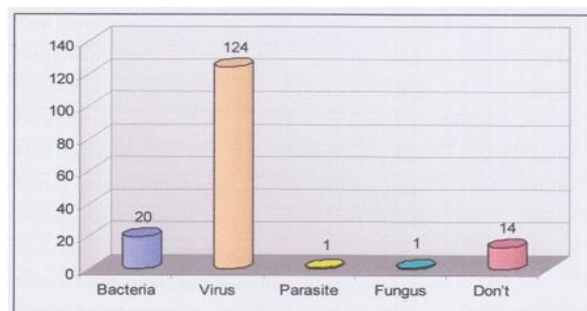


Fig-5: Distribution of respondents by knowledge on causative agent of avian influenza

Analysis of the data indicated that good level of knowledge on mode of transmission of avian influenza in human was observed among the respondents of age group of ≥ 45 years (38.1%), fair level was found among the respondents of aged group of 35-40 years (58.8%) whereas poor level was observed among <25 years (46.9%) (Table-I).

Table-I: Distribution of respondents by level of knowledge on mode of transmission of avian influenza in human and age (n=150)

Age (Years)	Level of knowledge on mode of transmission of avian influenza in human						Total
	Poor		Fair		Good		
	No	%	No	%	No	%	
<25	23	46.9	19	38.8	7	14.3	49
25-30	11	33.3	16	48.5	6	18.2	33
30-35	5	41.7	5	41.7	2	16.7	12
35-40	3	17.6	10	58.8	4	23.5	17
40-45	4	22.2	9	50.0	5	27.8	18
≥45	8	38.1	5	23.8	8	38.1	21

Mean \pm SD = 30.43 ± 11.643

Good level of knowledge on mode of transmission of avian influenza in human was found among the respondents having academic qualification of HSC and above (46.2%), fair level was observed among the respondents having academic qualification of Class-VIII (53.8%) whereas poor level was found among the respondents having academic qualification of Class-V (45.2%) (Table-II).

Table-II: Distribution of respondents by level of knowledge on mode of transmission of avian influenza in human and literacy (n=150)

Literacy Level	Level of knowledge on Transmission of avian influenza in human						
	Poor		Fair		Good		Total
	No	%	No	%	No	%	
Illiterate	8	38.1	8	38.1	5	23.8	21
Class-V	19	45.2	16	38.1	7	16.7	42
Class-VIII	15	35.5	51	53.8	3	7.7	39
S.S.C	10	28.6	14	40.0	11	31.4	35
H.S.C and above	2	15.4	5	38.5	6	46.2	13

Analysis of the study results indicated that good level of knowledge on mode of transmission of avian influenza in human was found among the respondents having 7-9 years (37.50) service, fair level was observed among those having more than 9 years of service (58.3%), whereas poor level was observed among those having 3 - 5 years (48.8%) of service (Table-III).

Table-III: Distribution of respondents by level of knowledge on mode of transmission of avian influenza in human and duration of service

Duration of service	Level of knowledge on mode of transmission of avian influenza in human						
	Poor		Fair		Good		Total
	No	%	No	%	No	%	
<3 years	18	40.0	21	46.7	6	13.3	45
3-5 years	20	48.8	14	34.1	7	17.1	41
5-7 years	9	28.1	12	37.5	11	34.4	32
7-9 years	2	25.0	3	37.5	3	37.5	8
≥9 years	5	20	14	58.3	5	20.8	24

Mean±SD = 4.92±4.74

Among the respondents, 68% reportedly mentioned that it is transmitted by direct contact and by eating half cooked meat and 63.3% believed that it can be transmitted by eating half boiled egg whereas 58% believed that it can be transmitted by contact with wild animal, 56.0 % by handling of raw meat and 50% by contact with saliva and faces of infected poultry.

Table-IV: Distribution of respondents by knowledge on mode of transmission of avian influenza from poultry to human

Communicative agent	Frequency	%
Oral route	28	18.7
Respiration	93	62.0
Direct contact	102	68.0
food born	34	22.7
Half cooked meat	102	68.0
Eating of half boiled egg	95	63.3
Handling of raw meat	84	56.0
Handling of half boiled egg	81	54.0
Contact with saliva and feces of infected poultry	75	50.0
Contact with infected poultry	67	44.7
Contact with infected rodents	59	39.3
Contact with wild animal	87	58.0
Don't know/Multiple responses	33	22.0

Out of 150 respondents, 80.0% had knowledge on mode of transmission of avian influenza from poultry to human and 18.0% respondents answered wrongly whereas 2.0% of the respondents had no knowledge about the transmission (Table-V).

Table-V: Distribution of respondents by knowledge on transmission of avian influenza from poultry to human

Poultry to Human	Frequency	Percent
Can be transmitted	40	80.0
Cannot be transmitted	9	18.0
Do not know	1	2.0
Total	50	100.00

Out of 150 respondents, 89.3% of the poultry workers reportedly mentioned that it is a communicable disease; 90.7% believed that it is a preventable disease and 6.0% opined as non-preventable disease. However 5.0% of the respondents did not know whether it is preventable disease or not (Table-VI).

Table-VI: Distribution of respondents by knowledge regarding of avian influenza whether it is communicable or preventable disease

Variables	Frequency	Percent
Communicable	134	89.3
Not communicable	12	8.0
Don't know (whether communicable or not communicable)	4	2.7
Preventable	136	90.7
Not Preventable	9	6.0
Don't know (whether preventable or not preventable)	5	3.3

Discussion

The respondents in this study were the poultry workers engaged in working as an employee of the poultry farm as well as owner of the farm and the workers were engaged in all types of works required to rear chickens and also those engaged in selling and slaughtering. The respondents were high risk group who may be infected by avian influenza due to risky environment and risk behaviour. A panic due to recent (2007-2008) outbreak of avian influenza was prevailing among workers.

People involved in poultry farming and poultry business were mostly from poor socio economic class and their educational level was very low. Most of the respondents especially the employee group was low paid and lived from hand to mouth. Majority of the respondents crossed the primary level of education and many of them were illiterate. The owner groups were found mostly to be from lower middle class. Some of the small holder's farms were found to be attached to their living room. A co-existence of human with the poultry was prevailing there. Many small holders have taken the poultry rearing as an source of additional income. The recent outbreak of avian influenza caused enormous loss to the small holders and affected the overall solvency. In many farms it was found that children were involved in feeding the poultry and collecting eggs. The house wives and all other members of the family were involved in looking after them.

The mean age of the respondents were 30 ± 11.64 years with age ranging from 9 years to 65 years. Among the respondents, 92% were male and 8% were female (Figure-2). This finding is almost similar to the result of the study conducted by Nipa FS¹¹ where mean age of the respondents was 36 ± 10.9 and children's involvement in working in the farm was also evident. UNICEF Report¹ showed that 7.8% of the respondents were below 20 years of age.

In the present study, it was evident that 89.3% (Table-VI) of the respondents were found to be aware about the communicability of the disease and 90.7% believed that it could be prevented by adopting personal protective measures. This result is little dissimilar with the findings of Nipa FS¹¹ where 95.2% knew about the communicability and 70.5% believed that it was preventable. This difference may be due to the difference of educational, social and economic status of the respondents between the two defined studies.

The low educational level (Figure-3) of the respondents found in this study is almost similar to the findings of UNICEF Report¹² where the poultry workers had little or no education. The educational level is the reflection of the poor socioeconomic condition of the respondents involved in poultry farms. It is also a barrier to follow the health message and instructions regarding prevention of avian influenza. Multivariable logistic regression models revealed that poultry workers with higher levels of education and longer duration of employment in poultry industry were linked with an increased awareness of the respondents regarding AI. This study showed that among poor knowledge holders 45.2% and 28.6% belonged to primary and SSC level education (38.1% and 40% fair knowledge holder whereas 16.2% and 31.4% had good knowledge). Regarding duration of service 12% and 13.33% belonged to <3 years and 3-4.99 years among poor knowledge holder followed by 14% and 9.33% among fair knowledge holder whereas 4% and 4.67% among respondents who had good knowledge.

In the present study, respondents reportedly mentioned that avian influenza can be transmitted by direct contact with infected bird (68%), eating of half boiled egg (63.3%), eating of half cooked meat (68%), respiration (62%), handling of half boiled egg (54%), contact with infected poultry (44.7%) (Table-IV) whereas the result of the study conducted by Nipa FS¹¹ showed that transmission from bird to human caused by direct contact (48.6%), ingestion of uncooked meat and eggs (13.3%), and by inhalation (1%). The dissimilarity of the result may be due to increased awareness in last one year of time due to massive awareness program.

The present study found good, fair and poor knowledge on mode of transmission of avian influenza in human 21.33%, 42.67% and 36% of the respondents. That means one third of the study subjects had poor knowledge. Zoonotic transmission of H5N1 has adversely affected the poultry industry in many developing countries including India and this directly and indirectly impacts both economic and social well-being. They also observed that awareness regarding AI is inadequate. Most poultry workers believed that AI is preventable and not a serious condition. Not surprisingly, their quest for additional knowledge was correspondingly low. In particular, workers in live bird markets were less likely to perceive risk than those who worked in farms. These workers also reported less receptiveness to additional

information regarding AI. A similar study conducted in Italy with poultry workers also found inadequate knowledge regarding AI¹³. Other studies^{14,15} have found continued high-risk behaviour through surveys of residents of rural Thailand and Laos during AI outbreaks due to low perception of susceptibility in population of the district/ country.

Good proportion of farm workers were reasonably informed and aware about the avian influenza including its causative agent, communicability and preventive measures but practically they did not practice those preventive measures while working in the farm. This is alarming that lack of adequate practice may bring serious health hazards and unbelievable loss of life. This may bring serious economic burden to the individual as well as the state also. Another alarming incident observed in this study is the frequent contact of poultry workers with poultry may facilitate assortments of the virus and results in emergence of a novel virus in Bangladesh which may cause pandemic influenza. In Bangladesh, small holder and backyard farmers did not use any precautions while they handle their poultry, which is a great risk. Involvement of children and teenagers with little or no knowledge and awareness is serious threat for them of being infected. So, all nations including Bangladesh should adopt an emergency preparedness plan to tackle the threat of pandemic. Necessary measures should be taken so that farm workers become more aware of practicing those personal protective equipments. International dissemination of accurate information, adoption of WHO provided strategic plan by all nations may be the key to prevention.

Conclusion

This study revealed that majority of the respondents were from poor socio-economic background and low educational status and they knew that avian influenza is a communicable disease. Observation in this study raised concern about a clear need to find out the optimal way of correcting those deficiencies by developing and implementing public health policies, priorities for tailored educational and promotional strategies to combat avian flu. Encouragingly, respondent's interest in learning more about avian influenza was high in this survey. Therefore, designing and implementing avian influenza educational program and measuring their effectiveness should be given priorities to take population in active role.

Foreseeing future avian influenza pandemic, finding of this study highlighted the need for intensified health education program amongst poultry workers in Bangladesh to deal with this serious public health problem.

References

1. Rashid KM, Rahman M and Hyder S. Rashid Khabir Hyder's Text Book of Community Medicine and Public Health. 4th ed. RKH publishers, Dhaka 2004:565-9.
2. Kumar SC, Ramesh N, Sreevatsan S et al. Knowledge, attitudes and poultry-handling practices of poultry workers in relation to avian influenza in India. *Indian J Occup Environ Med* 2013; 17(1):16-21.
3. Dinh PN, Long HT, Tien NT et al. Risk factors for human infection with avian influenza A H5N1, Vietnam, 2004. *Emerg Infect Dis* 2006; 12(12):1841-7.
4. Olsen SJ, Laosiritaworn Y, Pattanasin S et al. Poultry-handling practices during avian influenza outbreak, Thailand. *Emerg Infect Dis* 2005; 11:1601-3.
5. Ly S, Van Kerkhove MD, Holl D et al. Interactions between humans and poultry, Rural Cambodia. *Emerg Infect Dis* 2007; 13:130-2.
6. Mounts AW, Kwong H, Izurieta HS et al. Case-control study of risk factors for avian influenza A (H5N1) disease, Hong Kong, 1997. *J Infect Dis* 1999; 180(2):505-8.
7. Kung NY, Morris RS, Perkins NR et al. Risk for infection with highly pathogenic influenza A virus (H5N1) in chickens, Hong Kong, 2002. *Emerg Infect Dis* 2007; 13(3):412-8.
8. Wang M, Di B, Zhou DH et al. Food markets with live birds as source of avian influenza. *Emerg Infect Dis* 2006; 12(11):1773-5.
9. Raha SK. Poultry Industry in Bangladesh: Present Status and Future Potentials. <http://bea-bd.org/site/images/pdf/084.pdf>
10. Perkins LE, Swayne DE. Pathogenicity of a Hong Kong-origin H5N1 highly pathogenic avian influenza virus for emus, geese, ducks and pigeons. *Avian Dis* 2002; 46(1):53-63.
11. Nipa FS. Knowledge and practice about bird flu among broiler workers in broiler houses in a selected area of Dhaka city corporation (Dissertation). Dhaka: *NIPSOM* 2007:41-67.
12. Mitra A. Knowledge, Attitude and Practice (KAP) Survey Avian Influenza among the General Public and Poultry Farmers in Bangladesh. UNICEF, Bangladesh, Dhaka 2007:5-9.
13. Abbate R, Giuseppe G, Marinelli P et al. Knowledge, attitudes and practices of AI in poultry workers, Italy. *Emerg Infect Dis* 2006; 12(11):1762-5.
14. Olsen SJ, Laosiritaworn Y, Pattanasin S et al. Poultry handling practices during avian influenza outbreak, Thailand. *Emerg Infect Dis* 2005; 11(10):1601-3.
15. Barennes H, Martinez-Aussel B, Vongphrachanh P et al. Avian influenza risk perceptions, Laos. *Emerg Infect Dis* 2007; 13(7):1126-8.