Available online at http://www.journalcra.com

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

International Journal of Current Research
Vol.11, pp.166-173, December, 2010

ISSN: 0975-833X

RESEARCH ARTICLE

SOME SOCIO ECONOMIC CHARACTERISTICS INFLUENCING THE AWARENESS OF AVIAN INFLUENZA AMONG FARMERS IN ABIA STATE, NIGERIA

Udeh, [1]N. E., Nwachukwu, [2]I., Odoemelam, [2]L. and Akinmutimi, [3]A.

[1]Department of Veterinary Physiology and Pharmacology, Michael Okpara University of Agriculture, Umudike.
[2]Department of Agricultural Extension and Rural Sociology; Michael Okpara University of Agriculture Umudike
[3]Department of Animal Nutrition and Biochemistry, Michael Okpara University of Agriculture, Umudike.

ARTICLE INFO

Article History:
Received 15th August, 2010
Received in revised form
13th September, 2010
Accepted 18th October, 2010
Published online 28th December, 2010

Key words:
2,4-quinolinediol,
Solvent effect

ABSTRACT

This study was carried out among farmers who raise poultry in Abia State, Nigeria, to determine the socio economic characteristics influencing their awareness of avian influenza. Three hundred and sixty poultry farmers were selected using multi-stage sampling procedure for the study. Data were collected by the use structured questionnaire and analysed using descriptive statistics and regression analysis. Results showed that 73.30% of the poultry farmers in the state were merely aware of the bird flu disease, while 26.7% of the respondents were not aware. A majority (87.5%) of the farmers knew only one to three of the ten symptoms of bird flu. Age, sex, level of education and extension contact were highly significant ($P<0.01$). The coefficients of household size and membership of cooperative society were also significant ($P<0.05$) implying that these variables were important determinants of the level of awareness of bird flu disease and its control methods. Thus, development and planning of avian flu awareness strategies should take cognisance of these factors that affect the farmers' level of awareness to ensure that they receive adequate information on the avian flu scourge.

INTRODUCTION

Highly pathogenic avian influenza (HPAI), a viral disease affecting the digestive, nervous and respiratory system of all domestic and wild birds was first reported in Italy, 1878, South Africa 1961, USA 1971, England 1979, Ireland 1983, Mexico 1994, Pakistan 1994 and Australia 1995. The epidemics of HPAI H5N1 subtype in Nigeria started in Sambawa farm in Kaduna State (Kumbish *et al*., 2006). HPAI viruses are members of the Family Orthomyxoviridae and Genus Influenza. The influenza viruses that constitute this family are classified into types A, B or C based

***Corresponding author:** udehnkiru3@yahoo.com

on differences between their nucleoprotein and matrix protein antigens (Kumbish *et al*, 2006). Avian influenza viruses are further categorized into subtypes according to the haemagglutinin (H) and neuraminidase (N) antigens. There are 15 haemagglutinin and 9 neuraminidase subtypes of influenza A virus (Armin *et al*., 2004). Avian influenza is infective for almost all commercial, domestic and wild avian species. Chickens and turkeys are highly susceptible to infection and clinical disease, and duck and geese although susceptible to infection with all Avian Influenza virus strains, suffer clinical disease from only highly virulent strains (Kumbish *et al*, 2006). Pigs and humans are equally susceptible to infection by the HPAI virus while pigs serve as a potential mixing vehicle for re-assortment (WHO, 2006 ;Trevor *et al*, 2004).

H5N1 has evolved into a flu virus strain that infects more species than any previously known flu strain, and continues to evolve becoming both more widely spread and more deadly. According to Andrew (2006), it has been estimated that a mutated human to human bird flu could kill between 5million and 150million, hence increasing the chances of repeating the gruesome history of the Spanish flu pandemic of 1918. Unlike normal seasonal influenza, where infection causes only mild respiratory symptom in most people, the disease caused by H5N1 follows an unusual clinical course with rapid deterioration and high fatality (WHO, 2006). Highly pathogenic H5N1 avian influenza in humans is far worse, killing over 50% of humans that catch it. The majority of cases having occurred among children (10 – 19 years old) and adults aged less than 40 years old (CDC, 2006). Hence, health experts have expressed concerns that the extensive close human contact with poultry, slaughtering, defeathering, butchering and preparation for consumption of diseased poultry among many village households in Nigeria could easily precipitate a human outbreak of the disease.

Awareness creation is one of the activities required for emergency preparedness against future outbreaks of HPAI. It would sensitize the general public and the poultry farmers in particular to respond promptly to government policy on control measures when the need arises. It will also equip boundary security personnel such as the Police, Customs and Immigration services to be on the alert when they inspect transnational goods in land boundaries, air and seaports. (Nwankpa *et al*., 2006). This study seeks to identify the socio-economic characteristics of poultry farmers in the State and also identify the socio-economic characteristics that influence their awareness to bird flu disease and its control. This will ensure that awareness campaigns are successfully delivered to the farmers who need this information.

MATERIALS AND METHODS

The Study Area

The study was carried out in Abia State, Nigeria, which is divided into three agricultural zones, (Umuahia, Aba and Ohafia) for agricultural development services. The study was conducted in all the three zones in the state. Abia state has a total land area of about 8,000 square kilometers and a population of about 2,297,978 and the capital is Umuahia. It comprises seventeen (17) Local Government Areas (LGAs). The mean annual rainfall is about 2400mm. which is distributed February to December. Its mean daily maximum temperature averages 27^0c all through the year, highest from February to April, but does exceed 35^0C. The relative humidity is highest at 0.900 hours (Nigerian time) and usually between 90% and 95% in most parts of the state for the greater parts of the year. Majority of the people in the state are farmers either part- time or full-time while others are traders, businessmen and women and civil servants.

Sources of data

The data on which this study was based were collected from a random sample of 360 farmers who raise poultry in the State. The respondents were interviewed using structured interview schedule. The questions on the instrument were designed to obtain information on farmers' socio-economic characteristics, awareness of the bird flu disease and its clinical signs, farmers' personal characteristics and involvement in poultry farming.

The different signs inquired from the farmers were:

(i) Loss of appetite
(ii) Severe depression
(iii) Swollen head and face
(iv) Discoloured and Swollen leg
(v) Bluish wattle and comb
(vi) Difficulty in breathing
(vii) Sneezing and Ruffled feather
(viii) High Number of deaths
(ix) Sudden death
(x) Discharge from nose, eyes, mouth.

The different control methods of bird flu disease as disseminated to the farmers were as follows:

(i) Treatment with Antibiotics
(ii) Early identification
(iii) Containment strategies
(iv) Possible depopulation
(v) Surveillance of nearby poultry farm
(vi) Vaccination

Sampling Procedure

Multi stage sampling technique was used for the study. Abia State is made up of three agricultural zones, namely Aba, Ohafia and Umuahia. These zones in turn have seven, five and five Local Government Areas (LGAs) respectively. In the first stage, two LGAs were randomly selected from each of the three agricultural zones. In the second stage three blocks were randomly selected from each Local Government Area while in the third stage, 20 poultry farm families were randomly selected from each block, making a total of 360 poultry farm families.

Data Analyses

Data were subjected to both descriptive and inferential statistics using SPSS software Descriptive statistics were mainly frequency counts, percentages. Inferential statistics used was linear regression analysis using the model.

$$Y=a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7 +b_8X_8 + \mu$$

Where; Y is level of Awareness of bird flu and its control methods (dependent variable), a is intercept, b_{1-8} are slopes of the different equations, showing the rate of change of Y per unit change in X, X_{1-8} are independent variables : X_1 is age of farmer in years, X_2 is sex, X_3 is the educational status, X_4 is membership of cooperative societies, X_5 is extension contact, X_6 is the household size, X_7 is the flock size, X_8 is the farming experience in years and μ is the error term.

RESULTS AND DISCUSSION

Socioeconomic characteristics of poultry farmers

Age

A significant percentage (31.40%) of the respondents in the study areas were between 40-50 years (Table 1). This distribution was associated with active age of strength, which can be channeled into effective agricultural production. This finding was also observed by Agwu *et al.*, 2008 and Raufu *et al.,* 2009, who reported that most poultry farmers in Enugu and Ogun State, Nigeria were in the age bracket of 41-50 years. The sociological implication of this result is that there is a high prospect for increased awareness of the bird flu disease and its control methods among poultry farmers. This is because majority of the farmers are still in their productive ages and would be more receptive to new and modern technologies especially in the control methods of bird flu.

Gender

Results showed that majority of the respondents were males (55.3%).Akpabio *et al.,* 2007 also reported the dominance of the male gender among poultry egg farmers in Akwa Ibom State. This is indicative of the dominance of the male gender in the poultry production in the country as a whole. Therefore, for poultry production specifically, conscious efforts will need to be put on ground to address the issue of the female gender in agricultural development. This calls for definite rural development policies to encourage gender participation in agricultural and rural development activities. It could also be indicative of the lack of

will by the women to learn through mistakes, which poses another research challenge for rural development practitioners. More so, some factors like gender – bias in socio-cultural issues, inadequate information on women farmers and their problems, inadequate female extension officers and inaccessibility to mass media (Nwachukwu, 2003) could have contributed in discouraging some of the women from engaging in poultry production.

Household sizes of poultry farmers

The findings revealed that the majority of them (54.2%) had family size ranging from 5–9 members. This was also observed among farmers in Enugu State (Agwu *et al*, 2008). The high proportion of family size is an indication of available cheap labour. This invariably would be an advantage to awareness. Furthermore, the findings suggest that if they had many children, farmers would be compelled to engage more in agricultural and rural development activities, which would mean that they would have less time for restiveness and this would affect positively their socio-economic well being.

Educational Level

Education according to Doss and Morris, 2001 is important in determining farmer's ability to understand and manage unfamiliar technology. The result showed a relatively high level of poultry farmers' education as majority (28.1%) of the respondents had tertiary education. In other words, majority of the poultry farmers were well educated and this could positively affect their ability and willingness to accept new information on bird flu if this was presented to them. Educated farmers were more likely to use more of printed publications on new technologies resulting in higher awareness than illiterate farmers (Ironkwe, 2005). Furthermore, the literacy level of poultry farmers in Abia State was a good indication of their potential ability to understand most of the means of communication either through the electronic or print media. Policy makers could therefore utilize all the available means of information dissemination in carrying out awareness campaigns on avian flu in the State.

Flock Size of poultry farmers

Majority (76.9%) of the respondents had less than 30 birds. Also, 11.4% had between thirty and sixty birds as flock size. This shows that farmers were in the subsistence level of farming. According to Nwachukwu (2003), farming at this level is not likely to promote awareness of innovations. The small-scale farmers will be reluctant to take risk due to the fact that expected productivity and income would be low (relatively and absolutely), and consequently, the farmer is averse to risky undertakings. This finding also portrays the lack of commercial poultry production in the State and is in agreement with the recent statistics on poultry population which revealed that Abia state has a total poultry population of 1, 409,389 out of which, 1, 282,050 are raised as backyard poultry (Federal Ministry. of Agriculture and Rural Development, 2006).

Farming experience

Results indicated that a majority of the respondents had between one and ten years experience in farming making up 62.20% of the total number of farmers (Table 1). This was followed by those with 11-20 years of farming experience which were 17.50% The implication of this result is that farmers in the study area could easily be trained on the improved systems and methods of poultry farming and they also may adopt any improved technology given to them.

Membership of Cooperative Societies

It was determined that 82.2% of the respondents were non-members of agricultural cooperative while 17.8% were members of cooperative society (Table 1). This has also been reported elsewhere (Agwu *et al.*, 2008). This implies that few of the poultry farmers who belonged to cooperative/farmers organisation are more likely to be aware of the bird flu disease and its control methods unlike the majority who did not belong to cooperative/farmers organisation. Furthermore, farmers who belonged to cooperative and other farmer's organisation were likely going to have more access to information relating to farming practices. It will also expose them to various

sources of farm credit and help to remove the conservative tendencies in them through association with other farmers. This finding lays bare the unwillingness of farmers to join co-operative groups which is meant to benefit them in the long run.

Table 1: Socio economic characteristics of poultry farmers.

Characteristic	Frequency (n=360)	Percentage
Age		
18-28	39	10.8
29-39	81	22.5
40-50	113	31.4
51-61	87	24.2
Above 61	40	11.1
Gender		
Male	119	55.3
Female	161	44.7
Household size		
1-4	138	38.3
5-9	195	54.2
10-14	72	20
Above 15	5	1.4
Level of education		
No formal education	20	5.56
Primary incomplete	5	1.39
Primary complete	6	1.78
Secondary incomplete	99	27.5
Secondary complete	71	19.7
Tertiary education	101	28.1
Flock size		
<30 birds	277	76.9
30-60	41	11.39
61-90	9	2.5
91-120	5	1.39
121-150	6	1.67
Above 151	23	6.39
Years of farming experience		
< one	36	10.0
1-10	224	62.2
11-20	63	17.5
Above 21	37	10.3
Membership of cooperatives		
Member	64	17.8
Non member	296	82.2
Extension contact		
None	301	83.6
Once	25	6.9
Twice	17	4.7
More	17	4.7

Extension contact

Results obtained from this study shows that 83.6% of respondents were not visited by the extension agents in a year. Less than 10% of the respondents were only visited once while only 4.7% were visited twice and above (Table 1). This was also the case in Enugu State where a majority of the respondents (94.7%) had no contact with extension agents (Agwu *et al*, 2008). This points at the inadequacy in the number of extension agents per farmer ratio, which has been reported to be 1:3480 as against World Bank stipulation of 1:500 (Unamma, 2003). This gross inadequacy may have led to inadequate extension – farmer contact. Under this circumstance the only possible options left to the farmer to obtain information relating to bird flu disease and its control method will be through mass media, farmer's organisation, and friends/fellow farmers. However, access to mass media for agricultural information may also be grossly unavailable.

Level of awareness

The percentage level of awareness of poultry farmers to existence of bird flu is presented in Table 2. Results show that 73.3% of the poultry farmers in the State were merely aware of the bird flu disease while 26.7% of the respondents were not aware of the bird flu disease. A similar study carried out in Senegal showed that 35% of Senegalese farmers were aware of avian influenza (http://senegal.usaid.gov/news/releases/2008/08_02_26_avian_flu.html). A vast majority (87.5%) of farmers knew one to three of the ten symptoms enumerated above, while 12.5% knew four to ten of these symptoms. The implication of this result is that farmers were merely aware of the existence of the disease and do not know much about the disease itself or what to do when confronted with the disease. This obviously means that the information that the farmers have about the disease is not enough. This calls for more effective communication channels that would disseminate information on bird flu to the grass roots.Similarly, 81.9% of farmers in the state were not properly aware of the control methods of bird flu disease while only 18.1% were fairly aware of the control methods of bird flu disease. This result is not surprising since it has earlier been established that the respondents were not aware of the symptoms of the disease. The implication of this result is that the majority of the poultry farmers were still ignorant of the specifics of this disease. It therefore implies

Table 2. Knowledge of Poultry farmers to bird flu

Parameter	*No of respondents (N=360)*	*Percentage of respondents*
Not aware	96	26.70
Aware	264	73.30
1-3 signs	315	87.50
4-10 signs	45	12.50
1-2 control methods	295	81.90
3-6 control methods	65	18.10

Table 3. Regression analysis of the variables influencing the level of awareness of bird flu disease and its control measures (Linear model)

Variables	**Y_1 Mere Awareness**	**Y_2 Awareness of Disease Symptoms**	**Y_3 Awareness of Control Methods**
Constant	6.057***	5.339***	0.222
	(.030)	(.606)	(.023)
Age (X_1)	-2.606***	-2.631***	1.217
	(-.056)	(-.057)	(0.26)
Sex (X_2)	2.785***	2.698***	0.778
	(-.077)	(.075)	(.784)
Household size (X_3)	2.098**	1.859*	0.433
	(.010)	(.009)	(783)
Education (X_4)	5.365***	5.728***	0.32
	(0.90)	(.096)	(.015)
Flock Size (X_5)	0.504	.635	1.854*
	(.0000230	(.000022)	(.083)
Membership of Cooperative (X_7)	2.049**	2.096**	0.496
	(.064)	(.066)	(-0.15)
Extension Contact (X_8)	(2.571)***	2.637***	-0.316
	0.078	(.080)	(.003)
R^2	0.228	0.235	0.19
R	0.478	0.485	0.139
F-Ratio	12.981	13.501	0.869

***Statistically significant at 1% level; **Statistically significant at 5% level;
*Statistically significant at 10% level

that in a situation of disease outbreak now, the farmers would not know what to do.

Relationship between the socio-economic characteristics of poultry farmers and their level of awareness to bird flu

The regression analysis of the variables influencing the level of awareness of bird flu disease and its control measures (Table 3). Results showed that age, sex, level of education and extension contact were highly significant (P<0.01). The coefficients of household size and membership of cooperative society were also significant (P<0.05) implying that these variables were important determinants of the level of awareness of bird flu disease and its control methods. The coefficient of age was significant (P<0.01) and negatively associated with the awareness of bird flu disease and its symptoms. This implied that with increase in age, the farmer may become less receptive to new ideas and is less likely to accept new technologies than the younger people. Research findings have confirmed that age affects the way a person receives a message (Nwachukwu, 2003). The sex of the respondent was significant (P<0.01) and is positively related to the level of awareness of bird flu disease and its symptoms. This exposes the gender inequality in access to information. In the typical African setting, men are usually more involved with reading of newspapers and listening to evening news on the television and radio while women

prepare the dinner and breakfast for the household. This will make the men to have more knowledge about avian flu than the female poultry farmers. Hence, women should be encouraged to listen to news and read dailies the more to help them in accessing information about bird flu.

The coefficient of level of education was significant (P<0.01) and positively related to the level of awareness of bird flu disease. This shows that the educational qualification of the farmer was a factor in his/her ability to acquire knowledge about bird flu disease. This is because a literate farmer is able to listen to news in foreign language and also avail himself of the print media in order to obtain information This finding is in agreement with that of Nwachukwu (2003) who reported that the level of education one had, affected the way one received a message, and that the highly educated men were more willing to accept messages that they discover was better than the ones previously held. According to him, the highly educated are more objective and less pessimistic The coefficient of extension contact was significant (P<0.01) and positively related to the level of awareness of bird flu disease. This means that the higher the level of extension contact with the livestock farmers, the higher the farmers level of awareness of the bird flu disease. According to Egbaidomeh *et al*., (2006) extension officers should educate farmers and consumers of poultry products on the symptoms and control measures of bird flu disease. Increased extension contact tends to enhance farmers level of awareness of agricultural innovations. It will encourage them to gain access to agricultural education and mutually facilitate a cordial relationship among the farmers.

The coefficient of household size was significant (P<0.05) and positively related to the level of awareness of bird flu disease. The result indicates that the respondents with larger household were more aware of bird flu disease and its symptoms. An increase in farming responsibility occasioned by large family size increases the farmer's explorative capacities. This will definitely encourage their awareness of new agricultural innovations. The coefficient of membership of Cooperative Societies was weakly significant (P<0.10) and positively related to the level of awareness of bird flu disease. This implies that as the number of farmers in Agricultural Cooperatives increases, the level of awareness of bird flu disease increases. The coefficient of livestock size was also weakly significant (P<0.10) and positively related to the awareness of the control method of bird flu disease. This result indicates that the more the size of the livestock farm the respondent has and rears, the more the increase in knowledge of the control methods of bird flu disease.

Conclusion and Recommendation

The study revealed that majority of the poultry farmers were in the active age of 40-50 years. It indicated the curiosity and willingness of this age bracket to be involved in poultry production in the State. Majority of the household size was 5 – 9. The house hold size of most poultry farmers is a major public health concern in the event of human pandemics. It buttressed the importance of awareness of control measures of bird flu to guard against transmission of the virus to the house hold. Most of the poultry farmers had tertiary education while 5.6% had no formal education. This suggests that they can accept, understand and implement information if disseminated to them. Hence educational level may not constitute a significant barrier in the type of communication medium that is selected for the dissemination of information on avian flu. Majority of the respondents were not members of agricultural cooperatives. The formation and participation in cooperative societies that will comprise mainly of poultry farmers is a major avenue for the dissemination of information to members of such cooperatives. Abia poultry farmers should be encouraged to form such Cooperatives for easy dissemination of information on avian flu .Most farmers in the State were at the subsistence level of poultry production. Consequently, the State Government should commence issuance of loans to unemployed people to start poultry production. This will in no small measure, check youth restiveness, which is fallout of the massive unemployment in the State and the country at large. A vibrant crop of well trained Extension Agents should be engaged as a matter of serious urgency to help carry and disseminate information on bird flu symptoms and control measures to the farmers, especially those in the

rural areas using interpersonal contact. This is important in the face of massive illiteracy and lack of electricity that is prevalent in the rural areas. Training of existing agents can also be done in the short term to make them better equipped with current trends in the control of bird flu, so they can effectively disseminate such information to poultry farmers. These measures will be helpful in achieving a greater level of awareness to bird flu by poultry farmers in Abia State.

ACKNOWLEDGEMENT

This research project, EEG/O7/01, was funded by the Directorate of Research and Development of the Michael Okpara University of Agriculture, Umudike. The authors wish to thank the Management of the University for this Grant.

REFERENCES

Agwu, A. E., Ekwueme, J. N., and Anyanwu, A. C. 2008. Adoption of improved agricultural technologies disseminated via radio farmer programme by farmers in Enugu State, Nigeria. African Journal of Biotechnology. 7 (9): 1277-1286

Akpabio I. A., Okon, D. P., Angba, A. O. and Aboh, C. L. 2007. Avian influenza scare and poultry production in Uyo Urban, Nigeria. International Journal of Poultry Science. 6 (4): 298-301.

Andrew, Cavanagh 2006. History of Birdflu. http://www.historyofbirdful.com . Assessed on 11/22/2007.

Armin, R.W.E, Bert, K. and Guus, K. 2004. Performance of Gross Lesions at Postmortem for the detection of Outbreaks during the avian influenza. A virus (H7N7) epidemic in the Netherlands in 2003. Avian Pathology, 33(4), 418-422.

CDC, 2006. Avian influenza, Current situation.

http://www.cdc.avianinfluenza/currentsituaiton.com. Assessed on 14th September 2007.

Doss and Morris, M.L. 2001. How does gender affect the adoption of Agricultural Innovation. The case of improved Maize Technology in Ghana. In Agricultural Economics. *Journal of International Association of Economists*, Vol. 1.13. No. 1.

Egbaidomeh, S.A., Ogedengbe, M.E., Zwandor, N.I., Banyigyi, S.A., Ngulukan, S., Ekon, P., Egbuji, A.N., Nuraina, A., Irokanulo, E.A., Chukwukere, S., Mohammed, M., Mohammed, L.U., and Shamaki, D. 2006. Emergency Preparedness against future outbreaks of HPAI caused by the virus subtype H5N1 in Nigeria. In: Vom, Journal of Veterinary Science. Special edition, 51–61.

Federal Ministry of Agriculture and Rural Development, Federal Department of Livestock and Pest Control Services 2006. Avian Influenza standard operating procedures. http://senegal.usaid.gov/news/releases/2008/08_02_26_avian_flu.html. Assessed on 18th November, 2009.

Ironkwe A. G. 2005. Adoption of Yam Miniset Technology by Women Farmers in Abia State, Nigeria.

Kumbish, P.R., Bello, M.K., Jambalang, A.R., Hussani, B.H., Solomon, P., Ekong, P.S., Damina, M.S. Elisha, I.L., Chukwukere, S., Bako, B., Nanbol, D., Akanb, B.O., Joannis, T.M., Ularamu, H.G., Shittu, A.I., and Sulciman, L.K. 2006b. Bacterial and Parasitia Agents associated with Outbreaks of Highly Pathogenic Avian Influenza (H5N1) in Nigeria. In: Vom Journal of Veterinary. Special edition. 23 – 31.

Nwachukwu, Ike 2003. Agricultural Communication, Principles and Practice. Lambhouse Publisher. P.39.

Nwankpa, N.D., Ta'ama, L., Ocholi, R.A., Akalusi, Y., Ehizibolo, D. Ibu, J., Abechi, A.S., Banyigyi, S.A., Kaikabo, A.A., Chukwu, C.O.O., Ogo, N., Molokwu, J.U., Aliyu, A.M., Abdulguadeer, M., Salifu, D.A and Enurah, L.U. 2006. Outbreak of Highly Pathogenic Avian influenza caused by the virus sub – type H5N1 in Nigeria in 2006. Prospects for control. In: Vom Journal of Veterinary Science. Special edition, November, 67 – 71.

Raufu, M. O., Oyeowo, I.O., Oyedele, T. S. and Ogunlana, O. E. 2009. Economic implication of Avian Influenza on poultry farmers in Ogun State, Nigeria. The Social Sciences. 4(6):644-648.

Trevor, M. Ellis, Barr, R. Bousfield, Lucy, A. Bissett, S.T. Tsim, Katharine Sturm – Ramirez, Robert G. Webster, Yi Guan and Malik Peiris, J.S. 2004. Investigation of Outbreaks of Highly Pathogenic H5N1 Avian Influenza in Waterfowl and Wild Birds in Hong Kong in late 2002, Avian Pathogens 33 (5): 492:505.

Unamma, R.P.A 2003. Gender Impact in Agricultural Technology Adoption and Commercialization. REFILS Experiences in Nigeria. Paper Presented at FAO/IITA Workshop on Gender Impact of Commercialization of Smallholder Agriculture, 14th – 16th May, IITA, Ibadan.

WHO 2006. Avian influenza: Significance of Mutation in the H5N1 virus. 20th February 2006.

Wikipedia, 2007. http://www.avianflu.htm assessed on 14th September 2007.