

## Awareness, Knowledge, Readiness to Report Outbreak and Biosecurity Practices Towards Highly Pathogenic Avian Influenza in Kogi State, Nigeria

O.N. Ameji<sup>1</sup>, P.A. Abdu<sup>1</sup>, L. Sa'idu<sup>2</sup>, J. Kabir<sup>3</sup> and A. Assam<sup>1</sup>

<sup>1</sup>Department of Veterinary Surgery and Medicine, <sup>2</sup>Veterinary Teaching Hospital,

<sup>3</sup>Department of Veterinary Public Health and Preventive Medicine,  
Ahmadu Bello University, Zaria, Nigeria

**Abstract:** Kogi state did not report Highly Pathogenic Avian Influenza (HPAI) during the 2006-2008 outbreaks in Nigeria despite the presence of favorable factors for the occurrence of the disease. A survey was conducted among stakeholders using structured questionnaires to determine the level of awareness, knowledge and readiness to report outbreak of HPAI and biosecurity practices in Kogi state, Nigeria. Awareness was 100% but knowledge of HPAI was low (9.1%). Readiness to report HPAI outbreak to relevant authorities was high (75.3%) but about 20% of respondents were not ready to report to any authority. Biosecurity practices evaluated by the presence of movement control was 38.8%; presence of footbath was rare (11.8%); handling of sick birds by isolation and treatment was 40%; improper disposal of dead birds in refuse dump was high (85.9%) and extensive management system was high (60.76%). The study revealed high level of awareness and readiness to report HPAI but poor knowledge and biosecurity practices towards it. The failures in biosecurity measures as seen in this study will greatly enhance introduction and spread of HPAI as well as other contagious poultry diseases in the state. Knowledge directly affects readiness to report hence efforts should be made to improve poultry stakeholders' knowledge of HPAI and proper biosecurity practices.

**Key words:** Awareness, knowledge, biosecurity, highly pathogenic avian influenza, Nigeria

### INTRODUCTION

According to the Food and Agricultural Organization (FAO) study, Nigeria has the largest poultry population in Africa of over 150 million with majority of this number being rural poultry kept under extensive system of management (Adene and Oguntade, 2006). Kogi state has over 2 million poultry of which 80% are rural poultry while the rest are exotic kept in backyard and commercial farms (Kogi, 2009).

Highly pathogenic avian influenza (HPAI H5N1) was initially reported in Nigeria on a commercial farm on February 8, 2006 (Adene *et al.*, 2006) being the first in Africa. The disease later spread rapidly to over 25 states including the Federal Capital Territory (FCT) before it was brought under control through the institution of drastic prevention and control measures (AICP, 2008). Kogi state did not report HPAI during the 2006-2008 periods of HPAI H5N1 outbreaks in Nigeria though, the state is surrounded by eight states including the FCT where HPAI H5N1 outbreaks were reported (AICP, 2008). In addition, there are other favorable factors such as the presence of wetlands and two major rivers, Benue and Niger, which serve as resting points for migratory wild birds, trade in live birds and poultry by-products with most states across Nigeria. Large volume of poultry and poultry by-products pass through the state

because Lokoja, the Kogi state capital, serves as transit point for live birds moving from the north to south east as well as south west of Nigeria and vice versa (Pagani *et al.*, 2008).

Apart from the zoonotic and pandemic potential of HPAI, its prevention and control pose great danger for a vast majority of poultry kept under extensive management (Adene and Oguntade, 2006). Poultry stakeholders' awareness and knowledge on HPAI directly affect reporting of the disease and are useful tools for solving the problems associated with prevention and control strategies of the disease (Durosinslorun, 2008). The United State Department of Labour (2006) suggests advocacy and effective education of poultry farmers and other stakeholders on biosecurity measures to prevent the introduction and spread of HPAI. Biosecurity is critical in the development of poultry's disease prevention and control strategies and has been the basis of the FAO classification of the poultry production systems (Adene and Oguntade, 2006). In Nigeria, sectors 1 and 2 are rare but commonly found are sectors 3 and 4 of the poultry production systems with low or no biosecurity raising great concern about poultry and human health (Pagani *et al.*, 2008).

This study was designed to assess the awareness, knowledge and stakeholders' readiness to report HPAI

outbreak as well as biosecurity practices that can assist in preventing the introduction and spread of the disease in Kogi state.

**MATERIALS AND METHODS**

**Study area:** The study was carried out in six of the 21 local government areas (LGAs) of Kogi state. Kogi state lies between latitude 6°44'N-7°36'N and longitude 7°49'E-8°27'E. It is situated at a height of about 789 km above sea level. The estimated poultry population is above 2 million out of which, 80% are rural and 20% backyard poultry (Kogi, 2009). The vegetation is guinea savannah with two major rivers, Benue and Niger passing through the state and converged at a point to form a confluence. The human population of the state is put at 3,278,487 and the major economic activities of the people are farming, fishing and trading (Kogi, 2009).

**Administration of questionnaires:** A structured questionnaire was distributed to targeted poultry stakeholders. The stakeholders were veterinary personnel and extension agents employed by the state government, rural poultry farmers, backyard poultry farmers and live bird marketers in each of the six LGAs. A total of 85 respondents answered questions on their demographic data, flock ownership, sources of birds for rearing or consumption, awareness of HPAI, knowledge about HPAI, readiness to report HPAI outbreak, preventive and control measures for poultry diseases in practice and the methods by which they handle sick and dead poultry.

**Data analyses:** Data obtained from the 85 questionnaires returned were entered into Excel (2003) and retrieved for analyses using Statistical Package for Social Sciences Version 17 (SPSS Inc. Chicago, IL., USA). Analyses were done by descriptive statistics to calculate the frequency, percentages and chi square (P<sup>2</sup>) values by cross tabulations. Values of p<0.05 were taken as significant.

**RESULTS**

A total of 105 questionnaires were administered to respondents out of which 85 (81.0%) were returned and analyzed. The 85 respondents that returned their

questionnaires included 19 (22.4%) rural poultry farmers, 30 (35.3%) backyard farmers, 30 (35.3%) live bird marketers and 6 (7.1%) veterinary personnel and extension agents. Based on occupation, the respondents consisted of 11 (12.9%) civil servants, 30 (35.3%) poultry farmers, 6 (7.1%) housewives, 30 (35.3%) live bird marketers and 8 (9.4%) students. Children and women (93.3%) owned rural chickens mainly while elderly women (16.7%) were involved in the trade of live poultry in most LBMs.

All the respondents (100%) indicated that they have heard of bird flu but only 9.1% had knowledge of the common clinical signs of bird flu (Table 1). The TV accounted for the highest medium of awareness followed by the radio. The TV had 28.2% of stakeholders made of backyard poultry farmers and live bird marketers while the radio had 22.4%, made of live bird marketers and rural poultry farmers. Awareness through rumor was 15.3%, made of rural poultry farmers and live bird marketers. TV and radio combined were the highest sources of awareness with 13.0% followed by TV, radio and bulletin with 10.6%; radio and rumor with 5.9%; TV, radio and friends with 3.5% respectively (Table 2). There were significant differences between the various media of awareness especially between TV and rumor as well as radio and bulletin in favor of TV and radio.

About 80% of respondents indicated readiness to report bird flu outbreak. However, 45.9% of these respondents who were backyard poultry farmers and extension agents would report outbreak to veterinarians and 27.1% who were live bird marketers to local government authority. In addition, 4.7% who were rural poultry farmers to rural head and 2.4% who consisted of backyard poultry farmers and live bird marketers to

Table 1: Poultry stakeholders' level of knowledge of the common signs of avian influenza in Kogi State

Clinical signs	NOR	%	Cum.
Depression and nervous signs	1	1.2	1.2
Cyanosis of the comb and wattles	1	1.2	2.4
Haemorrhages of shanks/feet	1	1.2	5.6
Facial oedema/swollen head	1	1.2	6.8
Respiratory signs/egg drop	2	2.3	9.1
No knowledge	79	92.9	100.0
Total	85	100.0	

NOR = No. of Respondents, % = Percentage, Cum. = Cumulative

Table 2: Distribution of the media of awareness of respondents about avian influenza by local government areas (p = 0.010; Chi<sup>2</sup> = 94.522)

Local government area	TV (%)	Radio (%)	Rumor (%)	TV and radio (%)	TV, radio and bulletin (%)	Radio and rumor (%)	TV, radio and friends (%)
Adavi	12.5	12.5	37.5	18.8	6.3	6.3	0.0
Ankpa	40.0	40.0	6.7	6.7	6.7	0.0	0.0
Dekina	46.2	38.5	0.0	0.0	7.7	7.7	0.0
Kabba/Bunu	35.7	21.4	21.4	14.3	7.1	0.0	0.0
Lokoja	14.3	7.1	7.1	28.6	14.3	7.1	21.4
Okene	23.1	15.4	15.4	7.7	23.1	15.4	0.0
Total	28.2	22.4	15.3	13.0	10.6	5.9	3.5

Table 3: Presence of barriers used to control movement of visitors from poultry premises employed by farmers and other stakeholders in Kogi State

Movement control barrier	No. of respondents	Percentage
Farm gate and pen house	10	11.8
Pen house/wire cages	23	27.0
No barrier	52	61.2
Total	85	100.0

Table 4: The use of footbath by poultry stakeholders as a means of preventing poultry diseases in poultry premises in Kogi State

Poultry stakeholder	Yes (%)	No (%)	Total (%)
Backyard poultry farmer	4 (13.3)	26 (86.7)	30 (100.0)
Rural poultry farmer	0 (0.0)	19 (100.0)	19 (100.0)
Live bird marketer	0 (0.0)	30 (100.0)	30 (100.0)
Government agent	6 (100.0)	0 (0.0)	6 (100.0)
Overall	10 (11.8)	75 (88.2)	85 (100.0)

veterinarian and local government authority. While 20% of the respondents made of some fractions from rural poultry farmers and live bird marketers indicated that, they would not report to any authority.

About 61.2% of respondents had no means of movement control on their poultry facilities while the remaining 38.8% who were backyard poultry farmers and live bird marketers had one form of barriers to check movement of visitors (Table 3). Only 11.8% of respondents who were backyard poultry farmers and government agents had footbath or knew its importance in their poultry facilities while 88.2% had none (Table 4). On the methods of handling sick birds, 31.8% who were live bird marketers will sell out sick birds, 24.7% who were backyard poultry farmers will call a veterinarian, 17.6% who were rural poultry farmers and live bird marketers will never call a veterinarian for their sick birds. The remaining 9.4% of the respondents, who are rural poultry farmers, would eat their sick birds (Table 5). On the methods of disposal of dead birds, 85.9% made of all the categories of respondents would throw them away in the refuse dump. However, of the remaining backyard poultry farmers, 9.4% would bury and 2.4%

Table 5: Various ways in which poultry stakeholders handle sick birds in Kogi State

Poultry stakeholder	Call a veterinarian (%)	Eat (%)	Isolate (%)	Never call a veterinarian (%)	Not isolated (%)	Sell out (%)	Total (%)
Backyard farmers	66.7	0.0	20.0	10.0	3.3	0.0	100.0
Rural poultry farmers	5.3	26.3	0.0	63.2	0.0	5.3	100.0
Live bird marketers	0.0	10.0	3.3	0.0	0.0	86.7	100.0
Government agents	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Overall	24.7	9.4	15.3	17.6	1.2	31.8	100.0

Table 6: Poultry stakeholders' ways of disposal of dead birds in Kogi State

Poultry stakeholder	Ways of disposal of dead birds					Total (%)
	Bury (%)	Burn (%)	Eaten by farm workers (%)	Thrown away (%)	Used to feed fish (%)	
Backyard farmers	1 (3.3)	1 (3.3)	1 (3.3)	26 (86.6)	1 (3.3)	30 (100.0)
Rural poultry farmers	1 (5.3)	0 (0.0)	0 (0.0)	18 (94.7)	0 (0.0)	19 (100.0)
Live bird marketers	0 (0.0)	0 (0.0)	0 (0.0)	29 (96.7)	1 (3.3)	30 (100.0)
Government agents	6 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (100.0)
Overall	8 (9.4)	1 (1.2)	1 (1.2)	73 (85.9)	2 (2.4)	85 (100.0)

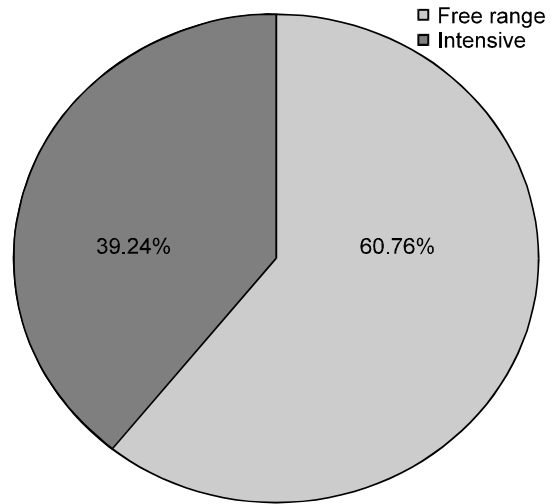


Fig. 1: Management systems used by poultry farmers in Kogi state

would use dead birds to feed fish while 1.2% would burn or give them to farm workers respectively (Table 6). On production systems, 56.96% chickens kept were rural poultry while 43.04% were backyard (semi commercial) poultry. About 39.24% of the backyard chickens were produced under intensive management while 60.76% chickens under extensive (free-range) system were both rural and exotic chickens (Fig. 1). The result also showed that many of the poultry farmers, 55.3%, obtained their stock from LBMs, 35.3% from the hatchery while 2.4% obtained theirs as gift.

## DISCUSSION

From this study, awareness of HPAI among respondents was high which agrees with the report of Igwe *et al.* (2008) in Imo state. This was because of the high coverage and impact of the TV and radio as media of awareness of HPAI for poultry stakeholders in Kogi

state. Equally, the effective HPAI campaigns at the federal, state, LGA and ward levels by the Federal Government of Nigeria in the wake of the 2006 outbreak (AICP, 2007) helped in informing poultry stakeholders about HPAI in the state. According to AICP (2007) report, the HPAI outbreaks led to an initial panic that created fear in people followed by serious socio-economic impacts on poultry production and human livelihood in both affected and non-affected states. This also helped in creating awareness in the state, which is surrounded by eight states including the Federal Capital Territory (FCT) where HPAI outbreaks were reported (AICP, 2008). The ability of most respondents to recognize HPAI was poor and did not correspond with the high level of awareness. This finding agrees with the global concern about media reporting of HPAI as being sensational, speculative and not reliable (Marinos *et al.*, 2007). The implication is that it will hamper early intervention and application of control measures because HPAI outbreak when present may be taken for any other familiar disease due to lack of the knowledge of its common clinical signs by the poultry farmers and other stakeholders.

Most of the respondents became aware of HPAI through the media. Interestingly, awareness through the television was higher than radio but the difference was not significant. Media adverts are often short in terms of air-time and do not convey the needed information required to educate viewers and listeners about the items being advertised as was also reported by Durosinlorun *et al.* (2009) on HPAI awareness.

The structure of the respondents by occupation where a few of the stakeholders were educated civil servants and students would also affect knowledge, which is often technical. Knowledge of a disease determines its recognition and reporting hence, this is a major drawback and might be the reason why HPAI was not reported in the state during the period of previous outbreaks. It also implies that control activities may not be effective in the event of an outbreak within the state unless poultry stakeholders can recognize and report immediately the occurrence of the disease.

The study showed women and children to own chickens mainly over men, a finding similar to the report of Durosinlorun *et al.* (2009) in Kaduna state but differs with the reports of Igwe *et al.* (2008) in Imo state and that of Aderinto and Adisa (2006) in Oyo state. The ownership structure may be due to the subsistence level of poultry farming in the state where the men seek for other jobs that can fetch much money thereby leaving out poultry farming to the women and children. This is also evident in some of the live bird markets visited where the fowl sellers were entirely women. This finding is a pointer to the population at risk of human infection from HPAI should outbreak occurs in rural poultry in Kogi state.

Most respondents were ready to report HPAI outbreak, which is similar to the reports of Durosinlorun (2008)

and Assam (2010) both in Kaduna state. This is a good indicator for control, it should be encouraged through provision of incentives to smallholder poultry farmers as well as adequate compensation for losses and depopulated birds by government. However, that a substantial percentage of the respondents were not ready to report HPAI outbreak is more worrisome and a serious drawback on the effectiveness of control and eradication. This percentage saw no gain in the readiness to report HPAI outbreak, as they assumed that because of their small flock size, government might not do anything to help them.

The occurrence of HPAI is an "all or none situation" making a little leakage in the prevention and control chains a disaster. The interest of smallholder rural poultry farmers should be considered in drawing out compensation plan in order to encourage their reporting HPAI outbreak and death. Also, there is need to review the disease reporting system to suit the informal traditional system because some of the rural poultry farmers that are not educated prefer to report HPAI outbreak to community leaders (Pagani *et al.*, 2008).

Biosecurity is considered the first line of defense against entry and spread of disease agents (AICP, 2009). There is serious compromise of biosecurity measures such as poor movement restriction, disinfection, handling of sick and dead birds even in backyard farms as seen in this study which may be due to lack of the knowledge and importance of biosecurity. The cost involved in instituting biosecurity may also be the reason for its non-existence or lapses because most of the poultry farmers are low-income earners that engage in poultry production at subsistence level. The habit of eating dead or culled birds because of HPAI by rural poultry farmers and villagers has been reported elsewhere (Permin and Detmer, 2007). This is a risky practice, which may further enhance the chances of human infection by HPAI virus and the loss of human lives.

From the study, most respondents source their birds for rearing or consumption from the LBMs, which serve as pools for holding various types of birds from different places. In spite of the implication of migratory birds in HPAI transmission, trade and movement of poultry within LBMs have been the major routes of entry into Africa in the first indexed cases (Brown, 2006; Ducatez *et al.*, 2006). Equally, Aye (2010) reported on the role of the LBM in the epidemiology of HPAI in Kaduna state. In some of the markets, live birds are sold in open space or under tree shades to provide shelter from harsh weather. These trees may as well serve as resting points for feral or migratory birds that often contaminate the environments with their faeces, which are sources of pathogens for the live poultry.

Adene and Oguntade (2006) reported that the vast majority of poultry in Kogi state are rural poultry kept under extensive system or free-range management. This study agrees with that report but it indicates the paucity of biosecurity and threats of free roaming birds to

themselves as well as the commercial poultry under intensive system in the spread of diseases. Free roaming birds observe no boundary and freely interact with wild and other domesticated birds especially, around wetlands, which may lead to exchange of disease pathogens. It is also difficult to observe biosecurity under an extensive system of management where there is no adequate housing and the feeding of birds cannot be monitored as they scavenge for feeds in areas of biosecurity risks.

This study reveals that awareness and readiness to report HPAI outbreak are high but the lack of knowledge of the disease under scores the fact that a lot of effort is still needed to educate poultry farmers on how to recognize it. Equally, the need to institute biosecurity measures is seen in every aspect of the poultry management practice in the state. There is need to adapt biosecurity and control activities to suit the traditional system of rural poultry management as is being done at present in LBMs by the Nigerian government and FAO (AICP, 2009).

#### ACKNOWLEDGEMENTS

The authors wish to acknowledge the immense assistance of Dr. Isah M. Ochepea, Kogi state Ministry of Agriculture; the Area Desk Officers/NADIS agents in the six LGAs visited as well as the respondents that participated in the study.

#### REFERENCES

Adene, D.F. and A.E. Oguntade, 2006. The structure and importance of the commercial and rural based poultry industry in Nigeria. FAO (Rome) study. October, 2006, pp: 1-70.

Adene, D.F., A.M. Wakawa, P.A. Abdu, L.H. Lombin, H.M. Kazeem, L. Sa'idu, M.Y. Fatihu, T. Joannis, C.A.O. Adeyefa and T.U. Obi, 2006. Clinico-pathological and husbandry features associated with the maiden diagnosis of avian influenza in Nigeria. Nig. Vet. J., 27: 32-38.

Aderinto, A. and A.T. Adisa, 2006. Poultry farmers' knowledge of management practices involved in the prevention and control of bird flu in Ibadan/Ibarapa agricultural zone, Oyo state. Proceedings, 11th Annual Conference of Agricultural Economics Society of Nigeria (AESON) 3rd-6th April, 2006.

Assam, A., 2010. Assessment of local poultry health, biosecurity risks, farmers' media use, access and understanding to avian influenza communication materials. MSc. Thesis, Ahmadu Bello University, Zaria - Nigeria, pp: 1-113.

Avian Influenza Control Programme (AICP), 2009. What you need to know about biosecurity in large and backyard poultry settings. *Bird flu Watch*. Vol. 1 No. 2, April, 2009, pp. 12.

Avian Influenza Control Programme (AICP), 2008. Highly pathogenic avian influenza surveillance and recent updates. *Bird flu Watch*., 1: 10.

Avian Influenza Control Programme (AICP), 2007. National integrated and pandemic influenza control preparedness plan. AICP Communication Component Document. March, 2007, pp: 4.

Aye, L.A., 2010. The role of live bird markets in the epidemiology of highly pathogenic avian influenza (H5N1) in northern Kaduna state, Nigeria. M.Sc. Thesis, Ahmadu Bello University, Zaria-Nigeria, pp: 1-56.

Brown, D.J., 2006. Poultry not wild birds most often carry deadly avian flu to Africa. *The Washington Post*, 16 February, 2006.

Ducatez, M.F., C.M. Olinger, A.A. Owoade, S. De Landtsheer, W. Ammerlaan, H.G. Niesters, A.D. Osterhaus, R.A. Fouchier and C.P. Muller, 2006. Avian flu: Multiple introductions of H5N1 in Nigeria. *Nature*, 442: 37.

Durosinlorun, A., 2008. Avian influenza LPAI (H5N2) antibodies in rural chickens and awareness level of highly pathogenic avian influenza in Kaduna State. MSc. Thesis, Ahmadu Bello University, Zaria - Nigeria, pp: 1-91.

Durosinlorun, A., P.A. Abdu, J.U. Umoh and I. Ajogi, 2009. Knowledge, awareness and readiness to disclose outbreak of highly pathogenic avian influenza (HPAI) among rural poultry farmers in Kaduna state, Nigeria. 5th International Poultry Conference 10-13 March, 2009. Taba-Egypt.

Igwe, K.C., C.O. Nwadinigwe and O.R. Iheke, 2008. Awareness of the incidence and sources of prevention of bird flu disease among poultry Farmers in Imo State, Nigeria. In: Proceedings, 13th Annual National Conference, AESON [8th-11th April, 2008].

Kogi, 2009. Kogi state agricultural development projects. In: Encyclopaedia Britannica. <http://www.britannica.com/kogistate/agric/index.html> Accessed November 10, 2009; 8pm.

Marinos, G., I. Vasileiou, A. Katsargyris, C. Klonaris, C. Georgiou, J. Griniatsos, O.P. Michail, K. Vlasis and A. Giannopoulos, 2007. Assessing the level of awareness of avian influenza among Greek students. *Rural Remote Health*, 7: 739.

Pagani, P., Y.J.E. Abimiku and W. Emeka-Okolie, 2008. Assessment of the Nigerian poultry market chain to improve biosecurity. FAO Consultative Mission on Poultry (Nigeria) Study. November, 2008, pp: 1-65.

Permin, A. and A. Detmer, 2007. Improvement of management and biosecurity practices in smallholder poultry producers: General concept. FAO (ECTAD/AGAP), February 1, 2007, pp: 1-56.

United State Department of Labour, 2006. Avian influenza: Protecting workers at risk Safety and Health Information Bulletin - [www.cdc.gov/homepage/htm](http://www.cdc.gov/homepage/htm). Accessed 13th November, 2009, 3 pm.