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Attitude of poultry farmers towards vaccination against newcastle disease and avian influenza in Ibadan, Nigeria

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Abstract

Newcastle disease (ND) and Avian Influenza (AI) are among the important viral diseases of poultry with very high economic implications. ND is enzootic in most parts of the world while Highly Pathogenic AI (HPAI) is an emerging zoonosis in Nigeria. This study was carried out to assess the perception and attitude of poultry farmers in the selected Local Government Areas in Ibadan towards vaccination of birds against these diseases, and to find out the types of vaccines that were available for the control of the two diseases. A total of 84 respondents out of 100 (84%) completed and returned the questionnaires administered. The results indicated that all farmers vaccinated their birds against ND. The regime for ND vaccination was not the same across the local government areas. Some 32 (38.1%) farmers operated vaccination schedules provided by hatchery technicians, while 43 (51.2%) farmers vaccinated their birds at about 4-6 weeks interval. Nine (10.7%) farmers combined hatchery and laboratory evaluation to determine schedule. Thirty nine farmers (46.4%) indicated that they were aware of national policy of non-vaccination against AI. However, 14 out of 84 farmers (16.7%) vaccinated their birds against HPAI. There is a need to continue the national policy of slaughter of HPAI infected poultry birds and compensation of farmers, albeit allowing strategic use of vaccine to effectively control HPAI outbreaks in south-western part of Nigeria.

Keywords: attitude, avian influenza, Newcastle disease, poultry farmers, disease prevention

Introduction

Newcastle disease (ND) and avian influenza (AI) are among the important viral diseases of poultry affecting both domestic and wild birds. Avian influenza is caused by influenza A viruses that infect birds (Holt, 2004; Capua & Alexandria, 2009). It is an acute highly fatal disease of chicken, turkey, pheasant, certain wild birds, ducks, shorebirds, geese and a variety of avian species. The infection was once considered to run an entirely asymptomatic course in the natural hosts, particularly water birds (Swayne & Suarez, 2000), however recent studies have shown that adult mute swans (*Cygnus olor*) are highly susceptible to the disease, producing clinical signs (Pálmai *et al.,* 2007; Kalthoff *et al.*, 2008). Few adult mute swans are recognized to have the ability to survive infection with Highly Pathogenic Avian Influenza (HPAI) virus (H5N1) (Pálmai *et al.,* 2007; Kalthoff *et al.*, 2008;). Survivors are usually older swans in good health that were infected with low viral dose. The survivors continue to shed the virus in their saliva, nasal secretions, and feces and can infect susceptible birds when they have direct contact or through

contaminated material, thus constitute outbreak risks (Swayne & Suarez, 2000).

The highly pathogenic form of avian influenza is extremely contagious and rapidly fatal, with a mortality approaching 100% in domestic fowls (Capua & Alexandria, 2009, Swayne & Suarez, 2000). Among bird species that are thought to be susceptible, some domestic poultry species including chickens, turkey, guinea fowl, quail and pheasants are known to be especially vulnerable to the sequel of infection. This zoonotic disease is responsible for outbreaks in birds and a cumulative human case fatality rate of 60.5% (Alexander & Brown, 2000; Capua & Alexandra, 2002, 2007). It is said to have the potential to develop into a global pandemic that can be devastating to humans (Capua & Alexandra, 2007). Since the introduction of the HPAI virus H5N1 into Nigeria in 2006, at least four distinct genotypes of the virus co-circulation now, enabling reassortment, high mortality losses in poultry and confirmed animal-human infection (Fusaro *et al.*, 2009). This necessitates outreach from veterinary public health practitioners to poultry farmers

to ensure teamwork for effective control of the virus. Extension education is one aspect that is required, including studies on knowledge and attitude of farmers to AI vaccination.

Newcastle disease (ND) on the other hand, is an acute infectious and highly contagious disease (Adu *et al.*, 1985; Abdu & Garba, 1989; Awan *et al.,* 1994; Ohore *et al.,* 2002; Saidu *et al.,* 2006). It is caused by ND virus (NDV) which is a paramyxovirus. The disease varies greatly in morbidity and mortality depending on virulence of strain and susceptibility of the host. The lentogenic and mesogenic strains usually kill few birds. Mortality rate in mesogenic strain is about 10% and negligible in lentogenic strain. The velogenic virus however, produces a severe disease with morbidity and mortality rates approaching 100% in unvaccinated chickens, being similar to HPAI (Adu *et al.*, 1985; Awan *et al.,* 1994; Alexander, 2001; Capua & Alexander, 2009). Outbreaks of virulent Newcastle disease have a tremendous impact on backyard chickens in developing countries, including Nigeria, as well as on large scale (commercial) poultry farms, especially those that practice poor vaccination programme (Adu *et al.*, 1985; Awan *et al.,* 1994; Alexander, 2001; Oladele *et al.*, 2002). Previous reports on ND in Nigeria have therefore shown a continuous presence of Newcastle disease virus in poultry populations in Nigeria since it was first reported by Hill and colleagues in Ibadan, in 1953 (Saidu *et al.,* 2006).

There is therefore a need to intensify public health and preventive medicine attention, towards these two diseases that have many similarities, using effective farmer-friendly extension services. The virulent Newcastle disease and HPAI share some epizootic and clinical features, including high morbidity and mortality rates, respiratory signs (gasping, sneezing, nasal discharges, coughing), nervous signs (depression, inappetence, muscular tremor, drooping wings, torticollis and paralysis), swelling of tissues around the eyes and neck, greenish, watery diarrhea, misshaped, rough- or thin-shelled eggs and reduced egg production or cessation of production (Awan *et al.,* 1994; Alexander, 2002).

We conducted this study in Ibadan, Nigeria to assess the perception and attitude of poultry farmers toward vaccination of chickens in controlling these diseases in view of a national policy of non-vaccination against HPAI. Since these two diseases

have some common clinical signs in domestic chicken, and could be easily confused at clinical level of observation, especially when laboratory confirmation is not done. This co-investigation was thus preferred to provide background information on current practices in the control of ND and AI in Ibadan city and its environs in south-western Nigeria.

**Materials and methods**
Study area
Study areas were farms in suburbs of Ibadan, capital city of Oyo State (Latitude 7° 23' N and Longitude 3° 56' E), (Figure 1). The main hub of the poultry industry in Nigeria is located within the south-western states of the country (Oyo, Osun, Ogun and Lagos). Ibadan is a major central city in the south-western hub. Thus, the city is important in the national production and distribution of most poultry commodities, ranging from chicks to point-of-lay pullets, spent layers, commercial broilers and poultry inputs such as drugs, vaccines and feed ingredients. The city is well known for backyard rearing of chicken and live-poultry markets. The city has 11 local government areas (LGAs). Five of these are in the main city and 6 are in the suburbs. Most poultry production activities take place in the suburb LGAs of Akinyele, Ido, Oluyole, Ona Ara, Egbeda and Lagelu (Figure 2).

Sampling of poultry farms
Poultry farms within the suburb LGAs of Akinyele, Ido, Oluyole, Ona Ara, Egbeda and Lagelu only were included in this study. This purposive selection was used to focus the study on areas within Ibadan that were well known for large number of poultry farms. There were an estimated 320 poultry farms within the 6 LGAs combined. Most of these poultry farms were not registered with Oyo State Branch of Poultry Farmers Association of Nigeria. Sample size of 100 poultry farms only was used for this study. The poultry farms in the catchment area were stratified into commercial and breeder stock categories. Stratified simple random sampling method was used to select the farms surveyed in each category (stratum). Thus, only 15-20 farms were targeted from each LGA (Table 1). Eventually, 84 (84%) farms completed and returned the questionnaire distributed. Their responses were statistically evaluated. Four LGAs had less than 15 respondent farmers.
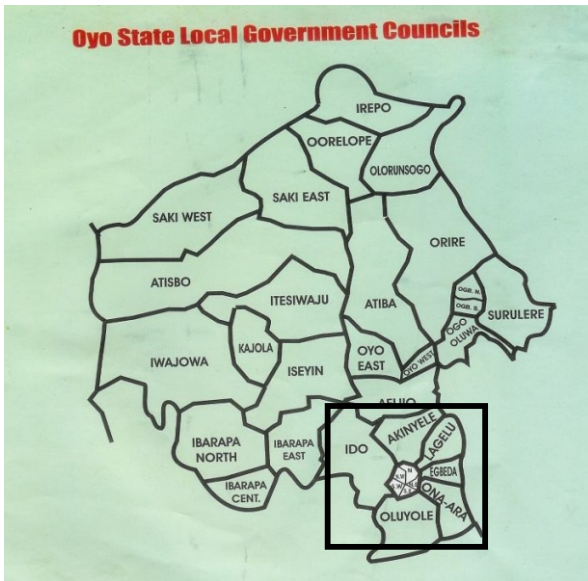
Figure 1: Map showing 32 local government areas in Oyo state, with six of them in the suburbs of Ibadan city, shown within the box. Ibadan city is the central circle within the box (Source: Oyo State Government).
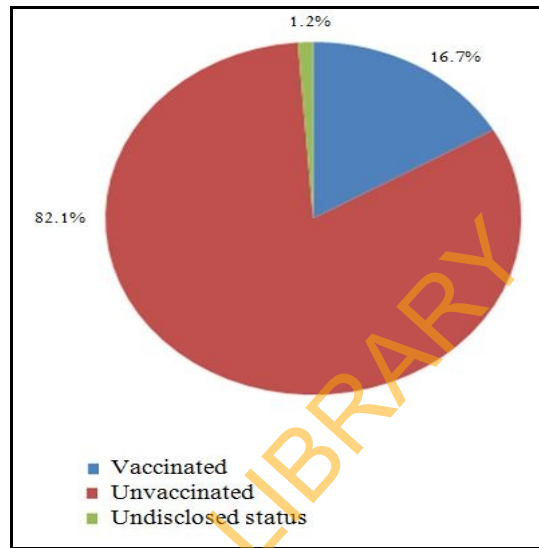
Figure 3: Vaccination status of poultry farms against highly pathogenic avian influenza in suburbs of Ibadan, Nigeria,
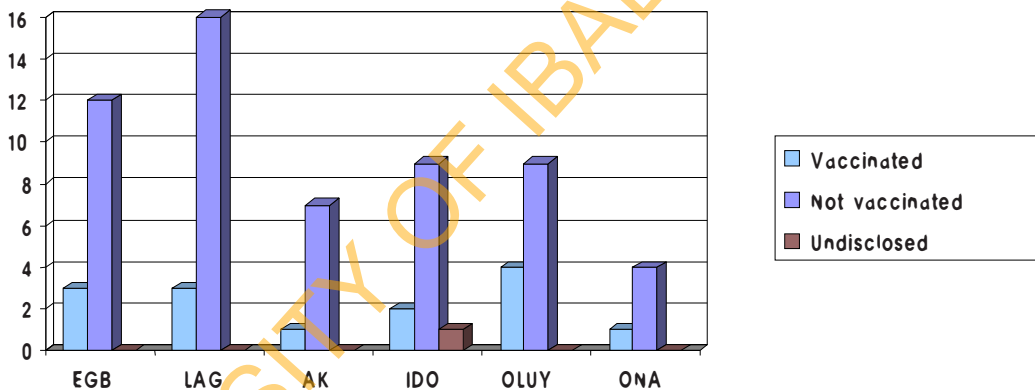
Figure 2: Practice of vaccination against highly pathogenic avian influenza among farmers in six local government areas in the suburbs of Ibadan city, Nigeria (April, 2011)

Survey conducted among poultry farmers
Questionnaire was provided to the owners of selected poultry farms who completed forms that were analyzed using Microsoft Excel®. An individual questionnaire was served in April, 2011 so as to obtain information on farm practices, with focus on vaccination against ND and AI, using structured questionnaire. Age at vaccination, farm record of ND and/or AI outbreak(s), use of laboratory diagnostic support before birds were vaccinated against ND were enquired. Reasons for failure to vaccinate birds were also requested. Other questions sought to know the opinion of farmers on local and imported vaccines, as well as about injectable (Komarov) and oral (lasota) vaccines. Knowledge and opinion of farmers on the national policy on HPAI control were also requested. A follow-up questionnaire was administered to major vaccine distributors to request for brands of ND and AI vaccines available on sales in their stores and how often farmers patronized these vaccines in comparison with other vaccines used in poultry. Chi squared test was used to evaluate statistical significance of some of the findings.

Table I: Sample size and data collection among poultry farms in six local government areas of Ibadan Nigeria (April 2011)

Location	Commercial	Breeder Stock	Mixed Stock*	Total
Akinyele	10	0	1	11
Egbede	17	0	2	19
Ido	9	2	1	12
Lagelu	20	2	0	22
Oluyole	5	5	4	14
Ona-Ara	5	0	1	6
Total	66	9	9	84

* Mixed stock means both breeder and commercial laying flocks are present on the same farm

Table II: Farm practice of vaccination against Newcastle disease and Avian Influenza among poultry farmers in Ibadan, Nigeria (April 2011)

Location	Number of Farms investigated	Farms that vaccinate against ND*	Proportion (%)	Farms that vaccinate against AI**	Proportion (%)
Akinyele					
Commercial	10	10	100	1	10
Breeder stock	0	0	0	0	0
Mixed stock	1	1	100	0	0
Egbede					
Commercial	17	17	100	3	17.6
Breeder stock	0	0	0	0	0
Mixed stock	2	2	100	0	0
Ido					
Commercial	9	9	100	1	11.1
Breeder stock	2	2	100	1	50
Mixed stock	1	1	100	0	0
Lagelu					
Commercial	20	20	100	1	5
Breeder stock	2	2	100	2	100
Mixed stock	0	0	0	0	0
Oluyole					
Commercial	5	5	100	1	20
Breeder stock	5	5	100	1	20
Mixed stock	4	4	100	2	50
Ona-Ara					
Commercial	5	5	100	1	20
Breeder stock	0	0	0	0	0
Mixed stock	1	1	100	0	0
Total	84	84	100	14	16.7

* ND – Newcastle disease   **AI – Avian influenza

Results

Among the 84 (66 commercial, 9 breeder stock, and 9 mixed stock) farmers (Table 1), 46 (54.8%) indicated that their farms had experienced an outbreak of ND before. None of the farmers indicated that they ever recorded an outbreak of HPAI. All farmers practiced vaccination against ND (Table II). Only 14 out of 84 respondents (16.7%) indicated that they vaccinated their birds against AI (Table II). Sixty nine (82.1%) farmers indicated that they did not vaccinate against AI. One (1.2%) farmer

was undecided on whether or not he had vaccinated his stocks against AI. Compliance with vaccination schedule provided by hatchery source of their chickens was practiced by 32 (38.1%) farmers. They also indicated that the schedule could however be adjusted based on situations on the farm. Some 43 (51.2%) farmers vaccinated their birds at strictly 4-6 weeks interval and would not use hatchery schedule. The remaining 9 (10.7%) farmers used partly hatchery schedule strictly combined with laboratory advice to vaccinate at variable intervals. Newcastle disease vaccines were available on sale in stores in Ibadan city during this investigation. Distributors for the National Veterinary Research Institute (NVRI)-produced local brands of Lasota and Komorov ND vaccines did not have the products on sale during this investigation. NDV was rated as most patronized vaccine by product sales outlet. AI vaccines were available in 2 of 7 vaccine sales outlets questioned in Ibadan. AI vaccines were rated as least patronized by one of the two stores, while the other store rated it as second most patronized by all poultry farm categories. ND vaccine preferences among farmers ranged from the locally produced NVRI LaSota and NVRI Komorov brands to imported LaSota and Komorov brands of Izovac[TM], Biovac[TM], Avinew[TM], Neuva[TM], Abic[TM], R2B[TM], Bestar[TM] and Calavac[TM].

Among the 14 farms that indicated a practice of vaccination against HPAI, 8 (57.1%) were commercial layer farms, 4 were breeder farms (32.6%), 2 (14.3%) were of mixed stocks (Table II). There were divergent opinions among farmers on frequency and what factors should inform time of vaccination against ND in particular. Nineteen (22.6%) indicated that they strongly know that poultry birds should be vaccinated against ND based on results obtained from laboratory test that shows low antibody levels against the disease in birds. Another 33 (39.3%) farmers agreed to wisdom in use of laboratory test but may not wait for them before vaccinating their stock. Two (2.4%) farmers were undecided, but 28 (33.3%) others totally disagreed with idea of laboratory guidance.

Some 30 (35.7%) farmers preferred locally produced NVRI vaccine brands to imported ones. Another 22 (26.2%) were undecided, while 30 (35.7%) farmers preferred to use imported varieties. A significant (P < 0.05) association was found between frequency of disclosed vaccine brands used by the farmers and available brands on sale at period of purchase by farmers. Nine (10.7%) farmers indicated that they strongly know that oral vaccines were not as potent as injectable type. They would purchase injectable brand of ND vaccine if the two varieties were available for sale. Some 30 (35.7%) farmers agreed to preference for injectable vaccines. Some 11

(13.3%) others were undecided, while 23 (27.7%) farmers disagreed and 10 (12.1%) others strongly disagreed with this concept.

Some 39 out of 84 farmers (46.4%) agreed that there was a national policy that poultry farmers were not permitted to vaccinate their birds against avian influenza in Nigeria. Another 27 (32.1%) disagreed that there were no such policies. However, 18 (21.4%) were undecided about knowledge of a national policy. On whether parent stock farmers should be permitted to vaccinate their birds against HPAI or not, 48 farmers (57.1%) supported this view while 17 (20.2%) disagreed and 19 (22.6%) were indifferent about it.

Discussion

This study provides background information on current practice of vaccination against Newcastle disease and highly pathogenic avian influenza in Ibadan city and its environs in south-western Nigeria, known as the hub of poultry production in the country, using structured questionnaire, and revealed a rate of 100% usage of vaccine against ND and 16.7% usage of vaccine against HPAI in poultry farms within the suburbs of the city. The results also indicated that ND is enzootic among poultry population in the suburbs of the city, where more than half of the farms had experienced outbreak of ND at least once. This finding corroborates earlier reports by Adu *et al.*, 1985 and Echeonwu *et al.*, 1993.

The practice of vaccination against AI among farmers in this city is a significant finding since the use of HPAI vaccine for its control is not approved by the Animal Health Authorities in Nigeria. This study reveals that farmers have a tendency of holding back information on the use of HPAI vaccine, especially to persons considered to be connected to government agencies, since it is an illegal practice. This situation may account for the undecided posture of one of the farmers in this study. The importance of undisclosed vaccination of chickens against HPAI in Nigeria is an evidence of farmers' evasion of a national policy. Perception of farmers' that informs this attitude is critical information. The World Organization for Animal Health (OIE) recognized this tendency and provided guidelines for the use of vaccines alongside the stamping out procedure to safeguard national poultry industry (OIE, 2007) and the health of the general public against HPAI.

Since the first epizootic of HPAI in Nigeria in 2006, farmers with high investments in poultry have been mindful of the risk to their farms (Fasina *et al.*, 2009), and would adopt vaccination, contrary to national policy against this practice. Farmers consider this policy an expression of insensitivity to

their challenges. This may not only be an issue in Ibadan. It may well represent the situation in other cities of the country. The OIE expert committee on AI reported that the control of HPAI has become a more complex issue than in the past (OIE, 2007). "The unprecedented and almost worldwide spread of HPAI infections, and the related serious animal and human health implications have increased the need to develop control strategies complementary to a stamping out policy, which has traditionally been used to eradicate this disease" (OIE, 2007). Thus, guided use of recommended vaccines has been suggested to countries. Based on our findings in this study, there may be need for the Animal Health Authorities to review the present policy.

Many farmers in this study showed little trust in what the federal government offers in terms of compensation in the event of HPAI outbreak. Some farmers claimed that they knew about their colleagues paid compensation by the government at N250 per bird, however when such compensations were not paid on time it also lead to frustrations on the part of farmers. Others claimed that some farmers around them vaccinated their stocks and considered it a good idea. Some farmers with commercial layers and breeder stocks claimed that they vaccinated their stocks in order to safeguard their investments. These claims reinforce the rationale behind the practice adopted by farmers in the use of vaccines. There is likelihood that more farmers were involved in this practice than was disclosed. Results of our market survey of patronage of HPAI vaccines in the city also corroborate this view. Another farmer erroneously claimed that '*breeder stock farmers were the only group permitted to vaccinate their birds,*' hence he felt it was legitimate.

An earlier study (Fasina *et al.*, 2009) associated reasons for low level of poultry farmers' perception of human health risk potentials of avian influenza in Nigeria to poor risk communication performance of Animal Health Authorities. However, the report also indicated some steady improvement in the situation in 2009. While bureaucracy within public sector of Nigeria may be part of the problem, the current situation requires a quick response to ensure monitoring of vaccine use against AI in the country. Beyond the economic implication is the human health risk of HPAI (Capua & Alexander, 2002, 2007, 2009). Following confirmed human morbidity and fatality due to HPAI in Nigeria (Fasina *et al.,* 2009; Fusaro *et al.,* 2009), farmers would likely easily adopt vaccination as a means of preventing this disease to their stocks, their personal and also family health.

Vaccine sales shops that had AI vaccines in stock have brought them into the country through illegal means, since the vaccine is not approved for use in the country. This is another report of influence of market forces in farm animal diseases in Nigeria. Olugasa & Ijagbone (2007) had reported the case of trade influence on African swine fever pattern of spread earlier in south-western Nigeria. Bio-security practices are poor in poultry farms in Nigeria, and with backyard free-roaming chicken that further exposes poultry population in Nigeria to continual risks of ND and AI (Awan *et al.,* 1994; Anon, 2006). To enable strategic use and monitoring of vaccines as recommended by the World Organization for Animal Health (OIE), the current policy on AI control may be revised.

Government policy on AI surveillance and control in Nigeria was subtly preempted as follows: *''Compensation and Economic Recovery: the following three areas highlight the compensation issue:*

(i) Establishment of a national compensation policy and national compensation fund: Early detection and reporting as well as rapid response depend critically on the incentives for poultry owners to report sick and/or dead poultry to their veterinarians, and adequate compensation arrangements are absolutely essential. The existing Animal Diseases Control Act (1988) provides for compensation wherever mandatory stamping-out/ depopulation of diseased animals/birds takes place. However, appropriate guidelines for implementation have to be worked out, including financing, fiduciary aspects, eligibility criteria, payment arrangements, flow of funds, and transparency.

(ii) Support to economically vulnerable groups:

(iii) Alternative livelihoods for affected stakeholders" (Source: FGN, 2007). Saliently, however, the document also indicated that the Federal Government of Nigeria does not accept vaccination against AI in the country. Thus, on page 9, the document reads; "*The adoption of a poultry vaccination policy for HPAI is still being considered by the Federal Government of Nigeria (FGN), in the context of local poultry production systems.*"

Recommendations

In view of the current situation and the importance of timely and effective preventive measures against Newcastle disease on one hand, which has been persistent in Nigeria since it was first reported in Ibadan in 1953, the same city in which this present study was conducted, and HPAI on the other, the following measures are recommended to stakeholders in poultry production for more effective control of both diseases:

1. Periodic monitoring of the antibody levels against these diseases in poultry birds, with emphasis on pre-vaccination and post-vaccination antibody levels needed to determine optimal timing for vaccination schedule in individual flocks at different locations.

2. Performance of serologic profiling of day-old chicks at hatcheries in order to determine optimal schedule for batch vaccination.

3. Laboratory capacity building in veterinary faculty within each of the six geo-political zones of Nigeria to permit comprehensive monitoring of field and vaccine strains of AIV and ND to ensure effective surveillance to mitigate pandemic emergence from Nigeria.

4. Support for quality vaccines to farmers as an essential link to which more licensed veterinarians could play active role. The production, importation and distribution chains for these vaccines thus being quality assured to safeguard the industry and public health.

5. There is need for effective extension services to farmers on ND and AI biosecurity measures in Ibadan and its environs for teamwork in efforts to control these diseases.

6. Although it is good to continue the national policy of destroying HPAI infected poultry birds and to compensate affected farmers, nevertheless, it is advisable to allow strategic use of vaccine to more effectively contain the HPAI virus in south-western Nigeria.

7. The policy on AI control should essentially be revised to enable vaccination.

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