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Effect of Avian Influenza on Household Consumption of Poultry Products: Evidence from First Outbreak in Ogun State, Nigeria

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Abstract

The study examined the effect of Avian Influenza (AI) on the household consumption of poultry products during the first outbreak of the disease in Ogun State, Nigeria. Furthermore, determinants influencing poultry products consumption during the outbreak were identified. A multi-stage sampling procedure was used to select 120 households and a well structured questionnaire was used for data collection. The data collected were analyzed using descriptive statistics, independent t-test and regression techniques. Egg consumption reduced significantly dropping from an average of 40 eggs/month to 29 eggs/month (p=0.038) during the AI outbreak. The average chicken expenditure/month dropped significantly from ₦1116.44 to ₦991.96 (p=0.019). Awareness of AI, educational level and amount spent on food consumption were the significant factors that contributed to the consumption of poultry products during the AI outbreak. The study therefore recommended that members of the public should be properly sensitized on safety precautions that should be cultivated before the consumption of poultry products especially during outbreaks of diseases.

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Introduction

Agriculture is an important sector of the Nigerian economy employing about three quarters of the total nation's workforce.[1] The Nigerian poultry industry is one of the highly commercialized subdivisions of the Nigerian agricultural sector.[2,3] Poultry production is very popular in Nigeria because of its low production costs, wide acceptability among people of different religious extractions, good source of protein, and affordability among others3.

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A major challenge confronting poultry production at both the subsistence and commercialized levels in Nigeria is the high incidence of infectious diseases. Others are inadequate funding and poor management practices.[4,5] A well-funded poultry business will have enough resources to adopt better management practices which will ultimately lead to very low incidence of infectious diseases on the farm. Most of these diseases have viral origin and are very deadly.[6,7] Avian Influenza (AI) also known as "Bird Flu" is one of the most important viral diseases that have continued to infect poultry production throughout Africa. There are three main types of influenza viruses namely; A, B, and C. AI is usually caused by Type A influenza viruses of the Orthomyxoviridae family. Wild birds in aquatic environments are their natural reservoir hosts, but domesticated poultry and other birds can also be infected.[8-10] AI virus subtypes are differentiated by the haemagglutinin and neuraminidase antigens (glycoproteins) that protect the virus surface. Sixteen forms of haemagglutinin (H1-H16) and nine classes of neuraminidase (N1-N9) antigens have been identified in wild bird populations and each viral subtype is characterized by the particular antigen combination it possesses e.g. H5N1 or H8N6.[11,12]

AI viruses that cause only mild disease in poultry are referred to as Low Pathogenic Avian Influenza (LPAI) viruses. Moreover, Highly Pathogenic Avian Influenza (HPAI) viruses can develop from certain LPAI viruses, usually while they are circulating in poultry flock.[13] HPAI viruses can kill up to 90-100% of the flock. They spread rapidly, devastating the poultry industry.[14-16] As part of measures to contain outbreaks of HPAI virus, the FAO/ OIE gave specified internationally acceptable standards which include movement restriction, import control, rapid laboratory diagnoses, vaccination, compensation, sustained active and passive surveillance, compartmentalization among others.[38-41]

In 2006, cases of AI infections in poultry and wild birds were widely reported in many countries including Iraq, Azerbaijan, Bulgaria, Greece, Italy, Slovenia, Iran, Austria, Germany, India, France, Bosnia and Herzegovina, Slovakia and Switzerland.[17,18] African countries also experienced multi¬ple outbreaks, infection, and re-infection affecting mil¬lions of birds with the resultant huge effect on the economy of these nations.[21-24]

The HPAI, subtype H5N1 was officially reported in Nigeria in February, 2006.[19] There was a confirmed

Table 1: Summary of Avian Influenza outbreak in Nigeria (as at May, 2006)

S/N	State	Number of Confirmed Cases	Number of Local Government Areas (LGA)	Total number of dead birds
1	Anambra	1	1	500
2	Bauchi	13	4	65,085
3	Benue	1	1	594
4	FCT	3	3	3
5	Jigawa	2	1	1
6	Kaduna	15	5	76,149
7	Kano	8	3	77,465
8	Katsina	9	4	325
9	Lagos	2	2	14,400
10	Ogun	1	1	94,000
11	Nassarawa	2	2	1,760
12	Plateau	36	2	12,053
13	Rivers	1	1	700
14	Yobe	1	1	3,368
	Total	95	31	335,612

Source: [25]

case in human in Lagos in 2007.[20] Table 1 gives a breakdown of reported cases of AI outbreak in Nigeria as at May, 2006 while Table 2 shows five major locations of the outbreak in Ogun State.

The impact of the AI was huge going by the mortality rate in Ogun state alone.[27,28] reported that the state government compensated affected farmers that reported such cases to encourage other farmers to report suspicious cases to appropriate authorities so as to safeguard the health of her citizens and to reduce the impact of the economic loss and encourage them to remain in the poultry business. Also,[29] reported that about 80% of the consumers of poultry products in Kwara State changed their demand pattern by shifting to other protein rich animal products.[30] Conducted a 10-year (2003-2012) retrospective study of some viral poultry diseases, including AI, in Nigeria and concluded that AI affected mostly adult chickens (20 weeks and above).[31] Retrospectively examined the impact of the 2006 AI outbreak on stakeholders in the poultry industry in Jos, Plateau state, Nigeria and concluded that the outbreak affected stakeholders including toll millers and commercial feed distributors among others. Therefore, this study seeks to explore albeit retrospectively, the effect of Avian Influenza on household consumption of poultry products in Abeokuta metropolis, determine the level of awareness of the households on the prevalence of the outbreak in the study area, determine the level of consumption of poultry products among the households before and during the outbreak and to also determine the factors affecting the consumption of poultry products in the area during the outbreak.

Theoretical Framework

The economic theory underpinning this paper is the theory of consumer behaviour, which is based on the concept of consumer preference and assumed existence of consumer utility function. The theory has, as its point of departure, the assumption that when a consumer is faced with alternative "baskets" of commodities, each of which has some amount of utility content (satisfaction), the consumer will prefer a basket with the highest utility content.[32] The theory of consumer behaviour can be presented from two main approaches. The first is the ordinal approach which asserts that consumer is assumed to be rational enough to, at least, be able to rank commodity bundles in an order of preference. This means that utility can be ranked qualitatively. The second approach is cardinal approach which postulated that utility is measurable on a cardinal scale. This means that consumers are assumed to assign numerical utility values to alternative bundles of commodities and that these numerical values represent measurements on interval scale or equal-ratio scale.[32] The cardinal approach believes that apart from the fact that consumers are rational and aim at maximizing their utility subject to his constraints, the amount of money payable on a commodity is directly proportional to additional satisfaction from the consumption of such commodity. The income level of the consumers is also important in determining their consumption level. According to Engel, the percentage of income allocated for food purchases reduces as income increases. As household's income rises, the percentage of income expended on food reduces but the proportion spent on other goods (especially, luxury goods) rises.

Table 2: Breakdown of Avian Influenza Outbreak in Ogun State (2006)

S/N	Name of farm	Location	Number of dead birds
1	Sobowale Animasaun Farms	Akute (Ifo LGA)	85,000
2	Omoti farms (Backyard)	Akute (Ifo LGA)	50
3	Mrs Sobowale Odutola Farms (Backyard)	Ijebu-Ode (Ijebu-Ode LGA)	149
4	Mr Akinwunta Farms (Backyard)	Agbara (Ado-Odo/Ota LGA)	282
5	Grace Farms (Mr Adimula)	Ode Remo/Remo North LGA	2,884

Source: [26]

Materials and Methods

The study was carried out in Abeokuta, Ogun State. Abeokuta is located within latitude $3^{0}30^{1}$ to $4^{0}30^{1}$N and longitudes $6^{0}30^{1}$E to $7^{0}30^{1}$E.[33] It is bounded on the north by Oyo and Osun State, in the south by Lagos State, in the east by Ondo State and in the west by Cotonou, Benin Republic. Ogun State has a population estimated at 3,728,098.[34] The principal inhabitants of Abeokuta are Yorubas while agriculture and trading are their major occupations.

Two-stage sampling procedure was employed in the selection of the respondents. The first stage was the classification of Abeokuta metropolis into high, medium and low brow areas while the economic status of the residents of these areas were respectively classified as high, medium and low income groups. The second stage was the random selection of 40 households from each stratum giving a total of 120 households in the study area. An adult female/male member of each household was interviewed using a well structured questionnaire. Data were collected on socioeconomic variables, awareness level of AI, food expenditure per month, total household income (per month) before and during the outbreak, poultry products expenditure before and during the outbreak among others. 115 questionnaires were found useful for the purpose of data analysis. Relevant descriptive statistics, independent samples t-test and multiple regression analysis were employed in the statistical analysis. The response variable Y was the amount spent on poultry products in Naira/month while the explanatory variables were:

X_1= Educational level of household head (years spent in school)
X_2= Household size (number)
X_3= Total Income of household (Naira/month)
X_4= Awareness of AI (Aware =1, otherwise = 0)
X_5= Amount spent on food consumption (Naira/month)
X_6= Age (years)

Three functional forms were considered for the regression analysis. They were:

1. Linear Model

$$Y= b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + \varepsilon \quad .....(1)$$

2. Semi-log Model

$$\ln Y= b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + \varepsilon \quad .....(2)$$

3. Double-Log Model

$$\ln Y= lnb_0 + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + b_5 lnX_5 + b_6 lnX_6 + \varepsilon \quad .....(3)$$

Results and Discussion

The findings revealed variations in the socioeconomic characteristics of the households. The mean household size was 4 implying a fairly smaller household size in the study area. The mean amount spent on food consumption monthly stood at ₦12,560.44 which constituted 31.4% of the average income of the households. The mean amount spent on poultry products was ₦4, 219.70 and this showed that households spent about 10.54% of their monthly income on the purchase of poultry products. Figure 1 showed that fewer households (11 and 12 households for egg and chicken respectively) agreed that AI awareness had a significant influence on their consumption pattern compared to other households that opined that the awareness had moderate (54 and 55 households for egg and chicken respectively) and low (50 and 48 households for egg and chicken respectively) influence on their consumption pattern. The mean household consumption of eggs was 40 before the outbreak but reduced to 29 eggs during the outbreak. In figure 2, 51 households consumed 30-44 eggs per month before the outbreak while it reduced to 40 households during the outbreak. This finding agreed with the studies of.[22,28,29] Conversely, the number of households that consumed 15-29 eggs per month rose sharply from 17 before the outbreak to 34 during the outbreak. This might not be unconnected with the fact that households perceived

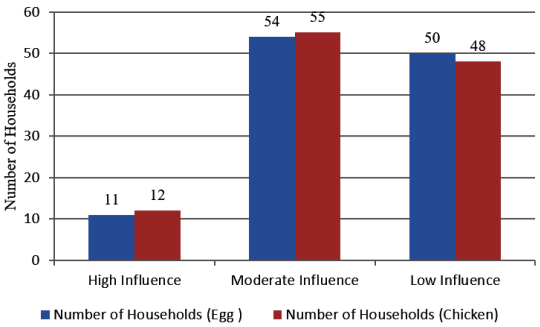

Fig.1: Influence of AI awareness on poultry products consumption

Table 3: Descriptive statistics of Respondents

Characteristics (N =115)	Frequency	Percent
Age (in years)		
20-30	38	33.0
31-40	50	43.5
41-50	21	18.5
51-60	4	3.5
>60	2	1.7
Total	115	100
Gender		
Male	54	47.0
Female	61	53.0
Total	115	100
Educational Level		
Primary School	3	2.6
Secondary School	15	13
National Diploma	4	3.5
NCE	13	13.3
First Degree/HND	71	61.3
MSc/PhD	9	7.9
Total	115	100
Household Size		
1-3	46	40.0
4-6	59	51.3
7-10	9	7.8
>10	1	0.9
Total	115	100
Mean	4	
Occupation		
Teaching	34	29.6
Trading	16	13.9
Student	8	7.0
Farming	10	8.7
Civil Servant	42	36.5
Artisan	5	4.3
Total	115	100
Total monthly Income (₦)		
<20,000	45	39.1
20,001– 40,000	29	25.2
40,001 – 60,000	15	13.0
60,001 – 80,000	11	9.6
80,001 – 100,000	6	5.2
>100,000	9	7.8
Total	115	100
Mean	₦42,020	
Amount spent on food consumption (₦)		
< 5,000	19	16.5
5,000 – 15,000	63	54.8
15,001 – 25,000	23	20
25,001 - 35,000	8	7.0
>35,000	2	1.7
Total	115	100
Mean	₦12,560.44	
Marital Status		
Single	41	35.7
Married	74	64.3
Total	115	100
Amount spent on poultry products (₦)		
<2,000	24	20.9
2,001 – 6,000	72	62.6
6,001 – 10,000	17	14.8
>10,000	2	1.7
Total	115	100
Mean	₦4, 219.70	
Awareness of AI		
Yes	115	100.0
No	0	0
Total	115	100

eggs as products from poultry birds with minimal AI impact. The average expenditure of households' consumption of poultry products (chicken) before the outbreak stood at ₦1116.44 while it dropped to ₦991.96 during the outbreak, indicating 11.15% drop in the study area. From figure 3, majority of the households (86) spent between ₦500 to ₦1500 on chicken consumption per month before the outbreak while 63 households spent the same amount during the outbreak. This finding agreed with the studies of.[22,28,29,35]

The regression results on factors influencing the consumption of poultry products among households in the study area during the outbreak were displayed in Table 4. Double-log model (equation (3)) was selected considering values of R^2, F-value, number of significant variables and a priori expectations. Educational level, awareness of AI and amount spent on food consumption were the significant variables influencing household consumption of

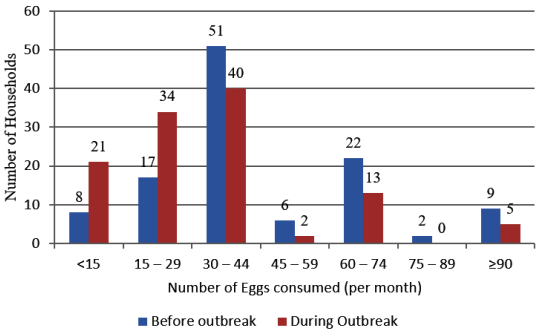

Fig. 2: Households' egg consumption before and during the outbreak

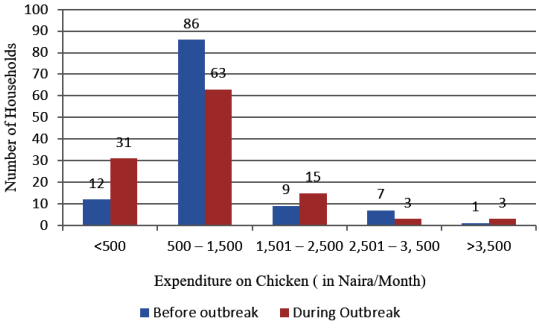

Fig. 3: Households' chicken consumption expenditure before and during the outbreak

Table 4: Determinants of poultry products consumption

Variables	Linear	Double-log	Semi-log
Constant	0.704 (0.010)	3.536*** (49.773)	-26350.1***(-5.623)
Education level	0.130**(2.453)	0.078*(1.966)	-0.002(-0.027)
Household size	0.048(0.642)	-0.001(-0.023)	0.087(1.354)
Total income	-0.005(-0.054)	0.062(0.984)	0.066(0.731)
Awareness level	0.124**(-2.447)	0.075* (-1.976)	-0.020 (-0.166)
Amount spent on food consumed	0.760***(8.751)	0.809***(12.406)	-0.097(-1.613)
Age	0.003(0.047)	0.049(0.892)	0.726***(5.775)
R^2	0.747	0.858	0.655
Adjusted R^2	0.733	0.850	0.635
F-Stat	53.163***	108.477***	33.817***

Note: The t-values are in parenthesis. *, ** and *** are significant at 10%, 5% and 1% levels respectively.

Table 5: Independent t-test results of significant difference between poultry products consumption expenditure before and during the outbreak

Hypothesis	p-value	Decision
H_0: There is no significant difference between egg consumption expenditure before and during the outbreak H_1: There is significant difference between egg consumption expenditure before and during the outbreak.	0.038	Reject H_0
H_0: There is no significant difference between chicken consumption expenditure before and during the outbreak. H_1: There is significant difference between chicken consumption expenditure before and during the outbreak.	0.019	Reject H_0

poultry products. With R^2 = 0.858, the independent variables accounted for 85.8% of the total variation in the dependent variable. Awareness of AI negatively affected the amount households spent on poultry products ($p<0.1$) implying that increase in the level of awareness led to a decrease in the amount spent on poultry products. This agreed with the findings of [28] who reported that stated account of the health risks associated with HPAI resulted in a significant reduction in the demand for poultry products. It was also in line with the works of.[22,29,35,36,37] The educational level of respondents had a significantly positive influence on the amount spent on the consumption of poultry products($p<0.1$). This implied that households with higher education background spent more on poultry products because they understood the health benefits of these products in their diets. These findings were in line with the works of.[28,35] Amount spent on food consumption equally had a significantly positive ($p <0.01$) influence on the amount spent on consumption of poultry products. The independent sample t-test result (Table 5) showed that there were significant differences in the amount spent on consumption of poultry products (eggs and chickens) before and during the outbreak of AI in the study area. This was in line with the studies of.[28,29,35,36,37]

Conclusion and Recommendations

From the results, Avian Influenza disease outbreak posed a serious threat to poultry business in the study area. Awareness of AI, education of respondents and amount spent on food consumption significantly influenced household consumption

of poultry products. There were vivid differences between the consumption patterns of poultry products (eggs and chicken) before and during the outbreak of AI in the study area.

The findings revealed that households still consumed poultry products during the outbreak. Therefore, government should ensure that poultry products are safe for human consumption through strict monitoring of birds' environment by veterinary personnel. Also, members of the public should be properly sensitized on safety practices and precautions that should be cultivated before the consumption of poultry products.

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