

Adoption of Vaccination against Newcastle Disease by Poultry Farmers in Yola North and South Local Government Areas of Adamawa State, Nigeria

¹Usman, I. S. and ²Hannison, M.I.

¹Department of Agricultural Economics and Extension,
Modibbo Adama University of Technology Yola, Nigeria

²Post graduate Programme, Department of Animal Science,
Modibbo Adama University of Technology Yola, Nigeria

Abstract

The study analyzed the adoption of Newcastle disease vaccination among poultry farmers in Yola North and South Local Government Areas of Adamawa State, Nigeria. Primary data which were obtained through the use of questionnaires and personal interview administered to 107 respondents were used for the study. The results of the analysis revealed that 65.42% of the respondents were between 21 and 50 years of age with an average age of 35 years, 81.31% were female and married with an average household size of 7 members. The average farming experience of the respondents was 9 years and about 94.00% of the respondents have more than 100 birds of chickens with 58.88% of the respondents were visited by extension worker once in a year. Result on the adoption of Newcastle disease vaccination showed that 88.79% of the respondents adopted the vaccine. The coefficient of multiple determinations (R^2) was estimated at 0.86 indicating that 86.00% of the variation in Newcastle disease vaccination adoption was explained by the variables included in the model. The variables of Age (X_2) is significant but negatively (-2.7109) related at 1% level of probability, while Education (X_3 :2.4680), Family size (X_4 : 0.6022), experience (X_5 :1.6477) and extension contact (X_7 :3.8122) were positive and significant at 1% level of probability, related with the adoption of Newcastle disease vaccination. The major problems encountered by the respondents were low capital, long distance to the source of vaccine, high cost of feeds and poor market for products. The results of study revealed that the adoption of the vaccination among poultry farmers is high but there is need for extension workers to put more efforts towards 100% adoption. It is therefore recommended that agricultural credit schemes should ensure the implementation and supply of feeds through the stakeholders at the right time with control prices.

Keywords: Adoption, Newcastle disease, poultry vaccination.

Introduction

Poultry are domesticated birds kept for production of eggs, meat and feathers or used for fighting (Adler and Lawler, 2012). These birds are most typically members of superorder Galloanserae (fowl), especially the order Galliformes (which includes chickens, quails, pigeons and turkey). Poultry is the second most widely eaten type of meat in the world, accounting for about 30% of total meat production worldwide (United State Department of Agriculture [USDA], 2014). The largest producers were the United States (20%), China (16.6%), Brazil (15.1 %) and the European Union (11.3%) (USDA, 2014). The poultry industry has witnessed a steady growth level in Africa recently. It continues to be a huge contributor to the economies of some African countries, providing income and employment for people in the region. The largest poultry meat producers are South Africa, Egypt, Morocco and Nigeria, steadily

producing on a yearly basis, 1.5 million metric tonnes, 799,000 metric tonnes, 610,000 metric tonnes, and 288,000 metric tonnes respectively on yearly basis (FAO, 2014). With Nigeria, having about 10% of the abled population engaged in poultry farming, either on a small or medium scale basis (Adebayo and Adeola, 2005). Poultry farmers in Nigeria typically practice the traditional free range system which requires low input, with the few commercial farms practicing the intensive systems mostly in the southern states of the country (Adeyemo and Onikoyi, 2012).

The Nigerian poultry industry has been rapidly expanding in recent years. The industry has undergone a significant transformation since the early fifties, from a backyard; peasant and primitive household-oriented husbandry of indescendant breeds of semi-wild chickens, to the cash oriented, modern and large-scale. It is therefore one of the most commercialized (capitalized) subsectors of Nigerian agriculture (USDA, 2013). The popularity of poultry

production can be explained by the fact that poultry has many advantages over other livestock. Poultry birds are good converters of feed into usable protein in meat and eggs also the production cycle is quite short, so capital is not tied up over a long period (Aboki, Jongur and Onu, 2013). Therefore, farmers need a relatively small amount of capital to start a poultry farm. Poultry meat is also very tender and acceptability to consumers is high, regardless of tribe or religious beliefs (Aboki *et al.*, 2013). Poultry industry in Nigeria occupies a prominent position as a major source of animal protein supply to the citizen. USDA (2014) reported that commercial poultry production in Nigeria was estimated at about USD 800 million. The sector contributed about 25% of the agricultural domestic products of the Nigerian economy (FAO, 2012). Despite this, Nigeria is far from meeting her domestic demand when compared with developed countries that involved in poultry production.

According to Adei and Asante (2012), diseases and parasites were among the serious problem hindering the growth of the poultry industry in Nigeria. They went further to reveal that the mortality rate of these birds as a result of diseases is alarming and this has limited the supply of poultry meat and egg production. Diseases could be caused by bacteria, parasite or virus, but viral infection most especially acute tend to have a devastating effect on productivity and the investment in poultry productions. Among the viral diseases affecting poultry, Newcastle is endemic in tropical and temperate regions of the world. This disease was first reported in Newcastle, England in 1926. The disease has since then assumed an important viral disease of poultry all over the world (Marte, 2018). In Nigeria, the disease is seasonal and the prevalence becomes very high during the harmattan period. It causes a major setback and there is no treatment for Newcastle disease yet, vaccination is the only major measure for the control of the disease (Marte, 2018).

In Adamawa state, poultry production is practiced especially broiler production, there are over 300 registered producers within the state (Buba, Maurice and Umaru, 2016). The state is one of the leading poultry producing states in North-eastern Nigeria. But the industry is constrained by diseases among other problems. Several studies were

conducted on poultry production in the state. The studies were mainly on resource use efficiency of broiler production, analyses of factors affecting poultry production, marketing of poultry, economics of poultry production among others (Buba *et al.*, 2016; Anthony, 2012; Usman and Gabdo, 2007; Talatu, 2014). None of these studies was conducted on diseases affecting the industry most especially Newcastle disease which is the most serious disease constraining the poultry production in the area. The study therefore, was designed to provide answers to the following research questions:

- i. What are the socio-economic characteristics of the respondents?
- ii. What are the adoption patterns of the respondents to the vaccination programme?
- iii. Do the socio-economic factors of the respondents influencing the adoption of the vaccination against Newcastle disease?
- iv. What are the constraints to adoption of Newcastle vaccination programmes?

Objectives of the Study

The main objective of the study was to analyze the adoption of vaccination against Newcastle disease by poultry farmers in Yola North and South Local Government Areas of Adamawa State, Nigeria. The specific objectives of the study were to;

- i. describe the socio-economic characteristics of the respondents;
- ii. identify the adoption pattern of the vaccination;
- iii. ascertain the socio-economic factors that influence the adoption of the vaccination against Newcastle disease; and
- iv. identify the constraint to adoption of Newcastle vaccination programmes

Materials and Methods

Study Area

The study was conducted in Yola North and Yola South Local Government Areas of Adamawa State. The area is located between latitude 9° to 12° N and longitude 11° to 12° E and land area of about 8,068 square kilometers and has an altitude of about 185.9 m above sea level (Adebayo and Tukur, 1999). The study area has two distinct seasons, rainy and dry season with an annual average rainfall of 759 mm, the rainy season starts from May and ends October, while the dry season commences in November to April. The mean annual temperature is about 34.6°C; the coldest

and driest months were December and January with an average temperature of about 11.11°C and relative humidity drops to 13% during these periods. The hottest months were March and April, which have average temperature of about 42.8°C (Adebayo and Tukur, 1999). The study area has a population of 257,706 inhabitants (NPC, 2006). The main occupations of the people in the study area were farming, fishing, trading and civil service (Adamawa State Diary, 2018).

Source of Data

The primary data was obtained with the aid of a well-structured questionnaire which was administered to 111 registered poultry farmers. The questionnaire contained the socio-economic characteristics of the respondents (which include age of the farmer, gender, level of education, poultry farming experience, household size and number of birds); adoption pattern of the vaccination and the constraint to adoption of vaccination of new castle vaccine.

Sampling Procedure

X_6 = Number of birds (in number)

X_7 = Extension contact (number)

Results and Discussion

Table 1 revealed that majority (65.42%) of the poultry farmers were between 21 and 50 years of age with an average age of 35 years. This implies that a high percentage of the poultry farmers were within economically productive age and can still be very active in adopting any technology that will improve their productivity. Mostly (81.31%) were female and married with an average household size of 6 persons. Household members form one of the sources of family labour. This finding corroborates the findings of Aaron (2011) who reported an average family size of seven persons among poultry farmers in Ekiti State, Nigeria. Result in Table 1 also revealed that only 2.8% of the respondents have no formal education while 97.20% of the respondents had formal education (out of which 14.02% had primary, 58.88% secondary and 24.30 attained tertiary education). This could be because the study area is the state headquarters where there are many schools both private and public and many civil servants. It can be inferred from the result that with the preponderance of educated

The list of the 111 registered poultry farmers association in the study area was obtained from the officials of the association which was used as sampling frame. All the 111 registered farmers were administered with questionnaire while, 107 were retrieved.

Analytical techniques

Descriptive statistics such as frequency counts, percentages and mean were used to analyze objectives i, ii and iv while, logit regression analysis was used to analyze objective iii. The explicit form of the model was shown as:

$$Y = b_0 - b_1x_1 - b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + u$$

Where:

Y = Adoption of recommended vaccination (adopted = 1; Non-adopted = 0)

B_0 = Coefficient of the model

b_1 - b_5 = Coefficient of selected socio-economic factors

X_1 = Sex (Male = 1; Female = 0)

X_2 = Age (years)

X_3 = Education (years)

X_4 = Family size (in number of people living and feeding together)

X_5 = Farming experience (in years)

poultry farmers, education may not be a barrier to the adoption of vaccination against Newcastle disease as the respondents can read and understand the instructions on the vaccines and the technique in handling and use of the recommended vaccines with little guidance. Buba *et al.* (2016) reported that education plays a significant role in skill acquisition and knowledge transfer, which enhances technology adoption and ability of the farmers to plan and take risks thereby bringing self-actualization and improved quality of life.

About 72.90% of the respondents had between 10 and 14 years of poultry farming experience with the mean years of experience being 9 years. This result shows that respondents were well experienced in poultry farming. Experience brings more knowledge that increased farmers' rationality in adoption of innovation. Majority (58.88%) of the respondents had access to extension services. This implies that majority of them had access to advisory services and adequate information on improved poultry management techniques. This could be because the respondents were within the state headquarters

where most of the extension service providers (both the state government and other social

intervention agencies) reside.

Table 1: Socio-economic Characteristics of the Respondents (n = 107)

Age (years)	Frequency	Percentage	Mean
21-30	7	6.54	35
31-40	16	14.95	
41-50	47	43.93	
51-60	24	22.43	
>60	13	12.15	
Sex			
Male	20	18.69	
Female	87	81.31	
Educational level			
Non formal education	3	2.80	
Primary	15	14.02	
Secondary	63	58.88	
First degree and above	26	24.30	
Farming experience			
< 5	9	8.41	9
5-9	11	10.28	
10-14	78	72.9	
>14	9	8.41	
Marital status			
Married	87	81.31	
Single	13	12.15	
Widowed	7	6.54	
Family size			
1-5	39	36.45	7
6-10	63	58.88	
>10	5	4.67	
Number of birds			
< 100	7	6.54	
100-149	11	10.28	
150-199	63	58.88	
200-249	8	7.48	
> 249	18	16.82	
Extension contact			
Once in 4 months	16	14.95	
Once a year	47	43.93	
Not at all	44	41.12	

Source: Field survey data, 2019.

Adoption pattern of Newcastle vaccination Programme by the respondents

The result in Table 2 indicated that 88.79% of the respondents adopted the use of Newcastle vaccine while 8.41% adopted the use of the vaccine along with ethno-veterinary treatment while, 2.8% adopted ethno-veterinary alone. It means that some farmers do not solely depend on the Newcastle vaccination alone but complement with the use of ethno-veterinary in the prevention and treatments of Newcastle

disease. The findings was in line with the findings of Usman (2016), who observed that traditional veterinary care among the livestock producers in Nigeria plays significant role in animal health care delivery as most of the clinical cases presented to the veterinarian would have been first treated with traditional remedies. Inadequate and high cost of vaccines could be responsible for the use of ethno-veterinary methods.

Table 2: Adoption pattern of Newcastle vaccination programmes by the respondents

Adoption pattern	Frequency	Percentage
Adoption of the vaccine only	95	88.79
Adoption of the vaccine with ethno-veterinary practices	9	8.41
Adoption of ethno-veterinary practice only	3	2.8
Total	107	100.00

Source: Field survey, 2019.

Relationship between socio-economic factors and adoption of vaccination

The socio-economic characteristics affecting the adoption of vaccination against Newcastle disease by poultry farmers were determined by

Logit regression analysis, which was presented in Table 3. The R^2 was found to be 0.86, which means that 86 percent of the variation in the dependent variable was explained by the various independent variables in the model.

Table 3: Relationship between socio-economic factors and adoption of Newcastle vaccination programmes

Variable	Coefficient	Standard Error	t- statistic
Gender (x_1)	-0.1838	1.0697	1.51Ns
Age (x_2)	-2.7109	0.5134	2.15**
Education (x_3)	2.4680	1.5693	3.38*
Family size (x_4)	0.6022	0.3475	3.71*
Farming experience(x_5)	1.6477	0.0385	3.71*
Number of Birds (x_6)	0.4928	1.0155	2.28**
Extension contact (x_7)	3.8122	1.9453	3.35*
Constant	5.036		2.70**
F- Value	7.246		
R^2	0.864		
Adjusted R^2	0.840		

Source: Field survey, 2019

The results also revealed that Age (X_2) was significant and negatively related (-2.7109) at 5% level of probability. This implies that as farmers advance in age, it is more likely that their adoption rate of Newcastle vaccine will decrease. This finding agrees with that of Paschal (2018) who reported that increase in one's age decreases his chances of putting more labour in agricultural production because physically he is reducing in strength. Education (X_3) was significant and positively (2.4680) related to adoption of the vaccine at 5% level of significance. It implied that the higher the attainment of a respondent of formal education by a respondent, the more the probability of adopting Newcastle vaccine. This could be because education enhances farmer's ability to know alternatives and also to know why, when and where to buy vaccine, read the instructions and make use of it efficiently. A better educated farmer is more

likely to know what prices are likely to prevail in equilibrium and can therefore bargain better (Marte, 2018). Family size (X_4) had a positive significant effect (0.6022) at 1% level of significance. As the number of household members' increases there is probability of adopting Newcastle vaccine by the farmer. Farming experience (X_5) is significant at 1% level and positively (1.6477) related to adoption of new castle vaccination programmes by the respondents. This implies that as farmer's experience in farming increases their possibility to adopt poultry vaccination programmes increases. Farmers with many years of farming experience tend to adhere to productive strategies than those with less experience. This may be because farming experience brings about specialization and adherence to production activities (Usman and Gabdo, 2007).

The coefficient of Number of Birds (X_6) was positive and statistically significant at 5% level (0.4928) of probability. This indicates that as the number of poultry birds owned by the respondent's increases the more the likelihood of the farmer using vaccine against new castle disease. This could be due to fear of mortality rate if there is outbreak disease in the farm. Similarly, the coefficient of extension contact (X_7) was found to be positive and significantly related to the use of vaccination against Newcastle disease at 5% level of probability. The interpretation of this is that, the higher the number of contact with extension agents by the respondents, the more the tendency of the respondents to adopt vaccination against Newcastle disease. Extension contact could affect adoption of vaccinations positively because extension agents help in educating

farmers on adoption of innovations. This argument was supported by the findings of Ogunbameru (2001) who asserted that extension agents helps in creating awareness among farmers to comprehend procedures in and use of modern practices.

Constraints to Adoption of Newcastle Vaccine among Poultry Farmers in the Study Area

Results in Table 4 revealed that 94.39% poultry farmers indicated that low capital was the common constraint which affects the rate of adoption of Newcastle vaccination practices. This was because low capital hinders farmers to buy feeds, vaccines or payment of veterinary services. Paschal (2018) reported that low capital affects expansion and improvement of poultry production.

Table 5: Constraints Militating Against Adoption Newcastle Vaccination programmes

Constraints	Frequency	Percentage
Low capital	101	94.39
Long distance	87	81.31
Difficulty in obtaining loan	84	78.50
High cost of feeds	82	76.64
Poor market for products	80	74.77

Source: Field survey data, 2019.

*Multiple responses

Other constraints include long distance to the source of vaccine (81.31%), high cost of feeds (76.64%) and poor market for products (74.77%). Most of the respondents had to sell their poultry products on credit and at the end they find it difficult to retrieve their money. According to Marte (2014), producers in developing countries often lack access to appropriate and good vaccine and good marketing channels. About 79% of the respondents complained of difficulty in obtaining loan. Access to credit is of core importance to all aspects of the poultry industry as these may hinder effective poultry production (Marte, 2014).

Conclusion

Based on the empirical findings emanating from the study, it was revealed that poultry farming is mostly dominated by female, married with average family size of seven. Most of the poultry farmers were in their active and productive years. The level of literacy of poultry farmers was high in the study area and most of the poultry farmers

had an average period of poultry farming experience of nine years. A majority of the respondents had access to extension services delivery. Age of the poultry farmer had a negative effect on the adoption Newcastle vaccine while other factors such as years of formal education, household size, years of poultry farming experience, access to extension services delivery and number of birds had positive significant effect on the adoption of Newcastle vaccination. The results from the study also showed that the level of adoption of Newcastle vaccine in the study area was high. It is recommended that agricultural credit schemes be strengthened to provide adequate investible funds and eliminate undue restrictions on small scale farmers' access to fund. The extension agents should periodically sensitize farmers on the need to always to buy vaccine from reliable source (Veterinary Research Institute Office). Researchers of veterinary drugs should form a collaborative study to identify active ingredients and test efficacy of the ethno-veterinary herbs use by

poultry farmers in prevention and treatment of Newcastle disease so as to reduce the cost of

the modern vaccine.

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