



ANALYSIS OF FARMERS' AWARENESS OF SOME BIOSAFETY SMART PRACTICES AGAINST RECURRENT OUTBREAKS OF VIRAL POULTRY DISEASES IN NORTHWEST, NIGERIA

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ABSTRACT

The study examined farmers' awareness of some biosafety smart-practices against recurrent outbreaks of viral poultry-diseases in Northwest, Nigeria. A 2-stage sampling-procedure was used in selecting respondents for the study and data were collected using questionnaire and interview-schedule administered to 444 poultry-farmers across three selected states (Kaduna, Kano and Jigawa). The data were analyzed using both descriptive and inferential statistical tools. Most perceived prevalent viral poultry-diseases are Newcastle-disease ($\bar{x}=1.191\pm1.091$), Infectious-Bronchitis ($\bar{x}=1.288\pm1.135$) and Infectious-Bursal disease ($\bar{x}=1.356\pm1.164$) respectively. Main sources of information on viral-diseases of poultry are Mass-Media (97.7%), Family/Friends/Neighbors (27.3%) and Veterinary-Services (27.3%). Amongst the three-biosafety smart-components available, the respondents weren't aware of cleaning and traffic control biosafety smart-components (awareness indexes of $\bar{x}=1.491$ and $\bar{x}=1.488$). They were somehow aware of disinfection component ($\bar{x}=1.568$). Majority (61.7%) claimed very low awareness level of biosafety smart-practices. Major constraints to awareness of viral poultry-diseases are: inadequate extension-services ($\bar{x}=1.21$), inadequate information ($\bar{x}=1.22$) and low literacy level ($\bar{x}=1.25$) among others. The positive determinants of awareness of biosafety practices are: farming-experience (6.870), educational-level (0.960), flock-size (0.048) and average monthly income (0.508) at $p\leq0.05$. The study concluded that respondents were not aware of the biosafety practices against the outbreaks of viral poultry couple with low literacy level of most farmers. It was recommended that more awareness-campaign be instituted. Constraints to awareness of biosafety smart-practices be effectively handled, more pro-activeness of extension-services as well as improvement in the positive determinant factors of awareness of biosafety smart-practices against viral poultry-diseases.

Keywords: Biosafety, Farmers, Poultry, Smart-Practices and Northwest

INTRODUCTION

Poultry can be viewed as the prime group of livestock species subsidizing above 60% of animal protein and vitamins consumed in most parts of Africa and 30% globally (Kim and Jack, 2014). It is a sector epitomized by faster growth rate, industrialization as well as quick return on investment and trade than any other agricultural sector in the world. This makes poultry the most attractive livestock enterprise mostly embarked upon by vast majority of the people in rural households, urban, sub-urban areas in the World (Abraham-Oyiguh *et al.*, 2014).

In Nigeria, the twenty-five percent contribution of agricultural to GDP is from livestock sub sector which at best is chicken. Centered on employment, more than 25 million people were estimated to be commercial poultry employed. Within this, about 85 million were rural family



poultry owners, managing assets of more than ₦320 billion with estimated commercial poultry value of ₦80 billion (Kim and Jack, 2014). Hence, poultry and its products (eggs and meat), if properly harnessed, remains a sustainable source of job opportunity, income, protein for vast majority of the Nigerian common people (Oladipo *et al.*, 2020).

However, despite the major contribution of poultry production to both the individual and national economy, the challenge of infectious viral diseases cannot be overlooked considering the extent of its repeated occurrences and mayhem on farmers (Poultry Hub, 2019). Among these infectious diseases, of great concern are; bacteria, fungi, virus and protozoa. In these groups' viral pathogens of very great virulence while some are with zoonotic propensities (Malin and Britta, 2010; Sadiq and Mohammed, 2017). Viral poultry diseases (VPD) are enormous with high prevalence and virulence impacting negatively on the chicken population all over the world (Balami *et al.*, 2015; Mshelia *et al.*, 2016). The viral diseases of poultry are identified as one of the major constraints in the development of the industry causing huge economic losses, social and psychological damages to farmers, the national economy and sphere (Abraham-Oyiguh *et al.*, 2014).

It has been observed that mortality is higher in poultry than other livestock during disease outbreak simply because of feebleness, fragility, and needed to be handled with great caution under expert observation (WHO, 2017). Akintunde *et al.* (2015), asserted that viral poultry diseases remain one of the imminent dangers to boosting poultry production in Africa with major diseases like the Newcastle disease (NCD), Avian influenza (AI), Infectious Bursa Diseases (IBD) among others ranking as the most dreadful affecting both the farmers, the customers, the domestic captive sector, the national and international economy on a negative note (Indiana State Poultry Association-ISPA, 2018). Antibiotics and vaccine antidotes do not guarantee a reliable cure for these viral microorganisms in Africa except adequate biosafety application, policies and practices (Obayelu, 2007; CEVA, 2011)

Biosecurity or biosafety is the management strategy which contributes to safeguarding the poultry from infectious diseases that can affect production efficiency, cause death and hence huge economic losses. Biosafety consists of a set of management practices which when followed, collectively reduces the potential for the transmission or spread of disease-causing pathogens like the Avian Influenza virus (AIV), Velogenic Newcastle Disease virus (VNDV)- onto and between sites, animals and humans (FAO, 2017; Obayelu, 2007; CIDRP, 2017). Biosafety consists of two major elements - bio-containment (prevention of spread of the virus from one infected premises to another) and bio-exclusion (measures to excluding infectious agents from uninfected sites). Biosafety is the normal way to avoid unnecessary contact between animals and viral pathogens from moving between infected animals and healthy ones (Wakawa, *et al.*, 2012).

Biosafety implies to all the management practices geared towards excluding or reducing the potential for the transmission and spread of diseases to animals, humans or an area initially free from the diseases causing agents (Halifa, 2008). This is much important to poultry farmers so much that the FAO based the classification of poultry production systems on the levels of biosafety practices and compliance (Adene and Oguntade, 2006). It stated that strict biosafety practices in addition to vaccinations are the strategic prevention and control compliance policies to keep away infectious poultry diseases (Ndegwa *et al.*, 2000). The village poultry are kept by majority of rural households and farm families as domestic safety net for assets (Dafwang, 1990; Abdu, 2007). In Nigeria, virtually every household in rural and peri-urban communities keeps poultry for meat,



supplementary income in order to meeting a wide range of social obligations (Sonaiya, and Olori, 1990; Abdulrahaman, *et al.*, 2016).

According to CEVA (2011), biosafety also applies to public health measures that reduce the contact between animals and humans in case of zoonoses. Biosafety has three major components: Cleaning, Disinfection Isolation and Traffic Control. Isolation refers to the confinement of animals within a controlled environment where the daily feeds requirements, water and adequate ventilation would be provided. A fence keeps birds in, but it also keeps other animals out. Isolation also applies to the practice of separating birds by species (Sorting). In large poultry operations, all in all-out management styles allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease. Traffic Control (human traffic as well as the vehicular traffic) includes both the traffic onto the farm and the traffic patterns within the farm. Disinfection addresses the proper sanitation of materials, people and equipment entering the farm and the cleanliness of the personnel on the farm (World Organization for Animal Health-OIE, 2017). These biosafety components are the standardized recommended hygiene practices to keep out unwanted viral pathogens from poultry especially in an endemic environment like the Northwest Nigeria where the diseases are highly prevalent. The general objective of the study is to examine the awareness of farmers on some biosafety practices against the recurrent outbreaks of viral poultry diseases in Northwest, Nigeria. The specific objectives are to;

- (i) describe the perceived prevalent viral poultry diseases in the study area;
- (ii) identify the respondents' source(s) of information on biosafety smart-practices;
- (iii) determine the level of awareness of the respondents on poultry biosafety smart-practices;
- (iv) Examine socioeconomic determinants of awareness of biosafety practices among poultry farmers
- (v) identify the respondents' constraints to awareness of biosafety smart-practices.

Hypothesis:

H₀₁: Farmers' socioeconomic factors have no significant influence on the level of awareness of biosafety smart-practices against the recurrent outbreaks of viral poultry diseases in the study area;

MATERIALS AND METHODS

The Study Area

The study was carried out in Northwest Nigeria, with a total geographical area of 923,768 square kilometers, is located between latitudes 4°N and 14°N and longitudes 2°2' and 14°30' East where in the Northwest zone is contained. It is bordered in the north by the Republics of Niger and Chad, in the south by Atlantic Ocean, in the east and west by Republics of Cameroon and Benin respectively. Based on regional distribution (according to farming systems research and extension zones) of agricultural resources and potentials, the northwest has 500-1200 mm of rainfall; largest potential for irrigation with important crops include sorghum, maize, rice, groundnut, cotton, vegetables, onions, tomatoes tomato and livestock to other parts of the country. The climate is semi-arid in the north. The rainfall patterns are marked by distinct wet and dry seasons having about 5 220 mm. Rainfall is concentrated in the period June-September. Deficiency in total annual precipitation is a problem in this part of the country (FAO, 2005). They are leading in cattle, sheep,



and goats' production with high potential for artisanal fish production and fadama agriculture. There are high risks of desert encroachment. It consists of seven states as follows; Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara. The agro-ecological zones manifest correspondingly varied environmental characteristics such as length of growing period, which for instance is 151-180 days for the northern Guinea Savanna (Jagtap, 1995).

Sampling Procedure and Sample Size

The study was carried out in the Northwest, Nigeria which consisted of seven states namely; Sokoto, Zamfara, Kebbi, Kaduna, Kano, Katsina and Jigawa. The study involved the use of a 2-stage sampling technique. The first stage involved a purposive selection of three states; Kano, Jigawa and Kaduna based on high occurrence of viral poultry diseases outbreak and high population of poultry farmers (Okpukpara, 2015; Agricultural Industry, 2017). The list of registered poultry farmers of the Poultry Association of Nigeria (PAN) in the 3 selected States' Chapters were obtained from their respective state Agricultural Development Program (ADP) offices. At the second stage, from list obtained, a proportionate random sampling technique was used to select 60% of the registered poultry farmers in each state's chapter.

From the sample frame of 88, 172 and 490, a sample sizes of 53, 103, 294 respondents were selected for Jigawa, Kaduna and Kano respectively, thereby making a total sample size of 450 for the study. Questionnaire rate of return was 53, 100 and 291 for the three states to give a total of 444 respondents for the study.

Analytical Techniques

The statistical analyses entail the use of descriptive statistics such as frequency counts, means, percentages, standard deviation and tabulation to describe, summarize, and categorize the awareness level as well as the biosafety components, constraints to awareness of biosafety practices, sources of information and perceived prevalent viral diseases, while the inferential statistical components used included ordinal regression analysis;

Ordinal Logistic Regression

X_1, X_2, \dots, X_k : Independent variables Ordinal regression model was used to analysed the effect respondents' awareness of biosafety smart-practices and socioeconomic factors. This ordinal regression model was implicitly specified with the following relation;

$$\log[P(Y \leq j) / P(Y > j)] = \theta_j - (\beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k) \quad \dots(1)$$

Where:

Y: Ordinal dependent variable (Number of Biosafety smart-practices awared)

j: Category level (1, 2, ..., J-1)

θ_j : Thresholds or intercepts for each category

$\beta_1, \beta_2, \dots, \beta_k$: Coefficients of predictors

Where:

X_1 = Sex (1=male, 0=female),

X_2 = Poultry farming Experience (Years),

X_3 = Education (years),

X_4 = Membership of Association (Yes=1, No=0),

X_5 = Age of respondents (Years)

X_6 = Household size (Number of persons)

X_7 = Flock Size (Number).

X_8 = Average income (Naira).

RESULTS AND DISCUSSION

Farmers' Perceived Prevalent Viral Poultry Diseases in the Study Area

The perceived prevalent viral poultry diseases in the study area was presented in Table 1. This was measured on a binomial scale of prevalent (PN=1) and Not Prevalent (NP=2) against the different available viral diseases in the study area. The mean value (\bar{x}) was obtained and used to make judgement on the prevalent viral poultry diseases in the study area. The most perceived prevalent viral diseases of poultry in the zone was Newcastle disease (\bar{x} =1.191). Next in order is Infectious bronchitis (\bar{x} =1.288), Infectious bursa diseases (\bar{x} =1.356) and Fowl Pox (\bar{x} =1.448). However, Egg Drop Syndrome (\bar{x} =1.547), Marek's Disease (\bar{x} =1.732) and Avian influenza (\bar{x} =1.836) were perceived not prevalent in the study area. Currently since 2014 to date there have been recurrent outbreaks of Newcastle disease in Kano, Jigawa, Katsina and Kaduna (Abdulrahman *et al.*, 2016). This finding is also in agreement with the submission of Ibitoye, Jimoh and Mungadi (2013); Jibril *et al.* (2016) and Lawal *et al.* (2019) who found that Newcastle diseases, Infectious Bronchitis and infectious bursa diseases were the most prevalent poultry diseases in Northwest Nigeria.

Table 1: Distribution of the respondents according to perceived prevalence of viral poultry diseases in Northwest, Nigeria

Variables	P. N	N.P	Mean (\bar{x})	S. D	R
Newcastle Disease	359 (80.9)	85 (19.1)	1.191	1.091	1 st
Infectious Bronchitis	316 (71.2)	128 (28.8)	1.288	1.135	2 nd
Infectious Bursa Disease	286 (64.4)	158 (35.6)	1.356	1.164	3 rd
Fowl Pox	245 (55.2)	199 (44.8)	1.448	1.203	4 th
Egg Drop Syndrome	201 (45.3)	243 (54.7)	1.547	1.244	5 th
Marek's Disease	119 (26.8)	325 (73.2)	1.732	1.316	6 th
Avian Influenza	73 (16.4)	371 (83.6)	1.836	1.355	7 th

Source: Field Survey (2025). $\bar{x} \leq 1.000$ Most Prevalent

Sources of Information on Biosafety Smart-Practices against Viral Poultry Diseases

The sources of information of the respondents on biosafety practices against the occurrence of viral poultry diseases in the Northwest, Nigeria is depicted in Table 2. This was measured on a scale of yes or no. The main source of awareness is mass media (97.7%) like Radio, Television, Newspaper, Postal, Hand bills and others. This may probably be because media facilities are the cheapest readily available and closest to farmers whether literate or not. Most of the rural farmers in Nigeria source information on health, farming activities, livelihood and markets are from either Radio or Television.

Table 2: Distribution of the respondents based on sources of information on biosafety smart-practices against VPD

Variables	Yes (Frequency)	Percentage (%)	Rank
Mass Media	434	97.7	1 st
Family/Friends/Neighbors	420	94.6	2 nd
Veterinary Personnel	121	27.3	3 rd
Extension Agents	76	17.1	4 th
Public Health & Environmental Officers	9	2	5 th

Source: Field Survey (2025)

This was followed by Family/friends/neighbors (94.6%) and Veterinary Personnel (27.3%). Family/friends/neighbors became important because information through individual contact is very common among farmers on a daily basis. Extension agent can be seen not to be proactive in

information and innovation spread among farmers in the study area. This implies that improved practices, innovations on biosafety practices will not get to farmers adequately, timely and effectively. This result corroborates the position of UN-FAO (2017) and Alhaji and Suleiman (2017) that the major source of information of farmers on poultry diseases in Nigeria was Mass-Media.

Awareness of the respondents on biosafety Smart-Practices against Viral Poultry Diseases

The distribution of the respondents according to their awareness of biosafety smart-practices against viral poultry diseases is shown in Table 3. Biosafety practices against the outbreaks of viral poultry diseases are divided into three components; Cleaning, Disinfection, Segregation & Traffic Control respectively (FAO, 2006, 2007; CEVA, 2011). These components were further broken down into subcomponents of biosafety practices. The awareness of these biosafety practices was analyzed using a three-point likert scale of Not Aware (NA=1.000), Somehow Aware (SA=2.000) and Fully Aware (FA=3.000) against some selected standard biosafety practices. Weighted Mean Score (\bar{x}) as well as Awareness Index Score (\bar{x}) were generated for each component to ascertain the awareness status of each. Awareness has five stages (Unaware=1, Problem Aware=2, Solution Aware=3, Product Aware=4 and Most Aware=5).

From the Table 3, it revealed that the respondents were not aware of most of the subcomponents of cleaning except: hand washing after toileting ($\bar{x}=2.516$) and use of low-pressure washer ($\bar{x}=1.973$). This may not be unconnected with the fact that knapsack sprayer is a low-pressure washer much familiar with by most farmers as well as hand washing after toileting being a normal hygiene precaution. The grand total of cleaning is $\bar{x}=9.865$, which implies $9.865/7=1.491$. The proportion of those who shows awareness of this component of biosafety are $4.21/9.865=0.427$. that is only about 42.7% of the respondents were aware of the cleaning subcomponents of biosafety practices. This result is in line with that of Okpukpara (2016) who reported that poultry farmers may be aware of some biosafety practices and at the same time may not be aware of the subcomponents representing each. The implication of biosafety cleaning practices on viral diseases of poultry is that it is indispensable to the success of any poultry production without which there will be low production, economic losses coupled with socio-psychological damages on the lives of farmers. Thus, with farmers not aware of most of the sub-components there would be continued recurrent outbreaks of viral poultry diseases in the study area.

In the disinfection component of biosafety, the respondents similarly were aware of only covering of feeds in the store ($\bar{x}=1.721$), manure management ($\bar{x}=1.791$) and removal of dead carcasses ($\bar{x}=2.079$). This may also be because manure is a means of generating revenue for the farm and the workers. Dead carcasses are source of manure to the soil if buried. The other three subcomponents were not known to the farmers. The grand total of disinfection component is $\bar{x}=8.708$, which implies $9.408/6=1.568$. It indicated that the respondents were somehow aware of this component of biosafety practices. It shows that the proportion of those who are aware of the subcomponents of disinfection biosafety is $5.591/9.408=0.594$ which implies that majority (59.4%) of the respondents shows some degree of aware of this component of biosafety practices. This was also observed by Okpukpara (2016); Wakawa *et al.* (2014) that poultry farmers may be aware of some components of biosafety and may not aware of all the sub-components of the biosafety practices. The implication of this is that without full awareness of all the sub-components of disinfection, poultry farmers have inadequate knowledge of some of these subcomponents and

thus they will continue to experience a repeated attack of viral disease on their farms. There is therefore, need for constant training and awareness of this component.

In the traffic control, the respondents were aware of; strict control of entrance and exits (\bar{x} =2.529), all in all out (\bar{x} =2.099), Annex to other poultry for biosecurity implementation (\bar{x} =2.691) and permanent housing of birds on farm (\bar{x} =2.482). They were not aware of other subcomponents of traffic control. The grand total of this component is \bar{x} =14.878, which implies $14.878/10=1.488$. The proportion of those that are aware of these subcomponents are $7.11/14.878=0.478$ which implies that only 47.8% of the respondents were aware of the subcomponents of traffic control. This is in agrees with the submission of Wakawa *et al.* (2014); Mshelia *et al.* (2016) that most of the poultry farmers were not aware and does not comply with the use of biosafety practices because of lack of adequate awareness. This result is in support of the position of Alhaji and Suleiman (2017) who found that most of the poultry farmers closely interacted with wild birds and other livestock which invariably implies that they do not comply with the standard biosecurity practices of keeping viral pathogens away from their farms.

Table 3: Distribution of the respondents based on awareness of biosafety smart-practices

Biosecurity	NA	SA	FA	\bar{x}	S. D	R
Cleaning Components						
High Pressure Washer	421	09	14	1.083	1.18	NA
Medium Pressure Washer	423	11	10	1.070	1.16	NA
Low Pressure Washer (Knapsack Sprayer)	150	9	285	1.973	2.15	SA
Clean shoes and equipment with soap and water	420	16	08	1.072	1.17	NA
Hand Washing after Toileting	101	13	330	2.516	2.06	FA
Visitor Cleaning Entry Protocol	424	9	11	1.070	1.16	NA
Vehicular Cleaning Entry Protocol	423	6	15	1.081	1.17	NA
Mean Index of Cleaning				1.409		
Disinfection Components						
Shower with change of cloth and footwear	431	3	10	1.352	1.14	NA
Use of controlled verification	440	3	1	1.211	1.10	NA
Covering of feed stored	275	18	151	1.721	1.87	SA
Manure Management	255	27	162	1.791	1.95	SA
Removal Dead Carcasses from poultry houses	143	93	198	2.079	2.27	SA
Periodic disinfection of farm	427	10	7	1.254	1.15	NA
Mean Index of Disinfection				1.568		
Segregation & Traffic Control Comp						
All in All, out (AIAO)	197	6	241	2.099	2.29	SA
Full fencing of all entrance to the farm	394	13	37	1.196	1.30	NA
Strict control of entrance & exit of outsiders	43	93	298	2.529	2.76	FA
Annex to other poultry for biosecurity implementation	401	9	34	1.173	1.28	NA
Use of separate boots & overall in farm	437	8	9	1.081	1.18	NA
Permanent housing of birds on farm	79	72	293	2.482	2.70	FA
Banning keeping of birds at home by workers	423	4	17	1.086	1.18	NA
Providing poultry PDT to worker as incentive	401	29	10	1.101	1.20	NA
Exclusion of rodents & wild bird from farm	423	6	15	1.081	1.17	NA
Presence of Buffer Areas around farm	431	4	9	1.050	1.14	NA
Mean Index of Traffic Control				1.488		

Sources: Field Survey (2025). Key: N. A=Not Aware (1.0), S. A=Somehow Aware (2.0), F. A=Fully Aware (3.0), R=Remarks, \bar{x} =Mean, S. D= Standard Deviation. Note: $\bar{x} \leq 1$ =Not Aware

Categorization of the Awareness of the Respondents on Biosafety Smart Practices

The categorization of the awareness of the respondents on biosafety smart practices against VPD is shown in Table 4. It shows that the majority (61.7%) of the respondents shows low awareness level of biosafety practices while 38.3% of the respondents shows high awareness level on some biosafety practices against the outbreaks of viral poultry diseases in the study area. This implies that the awareness level of poultry farmers is generally low about these biosafety practices to keep away viral poultry diseases in the study area. This is in consonance with the findings of Adam, Qasim and Kazeem (2014) who found that the awareness of poultry farmers on biosafety practices on infectious poultry disease was very low.

Table 4: Distribution of the respondents according to level of awareness on biosafety smart-practices

Variables	Freq	%	\bar{x}
High	170	38.3	1.027
Low	274	61.7	1.944

Source: Field Survey (2025)

Socioeconomic Determinants of Awareness of Biosafety Practices among Poultry Farmers

Table 6, shows the result of socioeconomic determinants of awareness of biosafety practices among the poultry farmers in the study area. Ordinal regression model was used to determine among the socioeconomic variables the significant one that has positive effect on awareness of biosafety practices. It shows that years of poultry farming experience (6.870), educational level (0.960), flock size (0.048) and average monthly income (0.508) were positively significant at $P < 0.05$ influence the awareness of biosafety practice. This implies that a unit increase in socio-economic factors of the respondent will lead to corresponding increase in awareness of biosafety practices among respondents in the study area. Other socioeconomic variables were not significant with awareness of biosafety practices. This is in consonance with the work of Okpupara (2016) that the positive significant socioeconomic factors of biosafety practices that help awareness of viral diseases of poultry in Nigeria are: educational level, flock size, average monthly income among others.

Table 6: Socioeconomic factors that influence of the respondents' level of awareness of biosafety smart-practices

Variables	Coefficient	Standard Error	Sig.	D
Sex	0.052	0.030	0.087	NS
Years of Poultry Experience	6.870*	2.276	0.003	S
Educational Level	0.960*	0.333	0.004	S
Membership of Association	-0.287	0.166	0.084	NS
Age of respondents	-0.047	0.080	0.555	NS
Household Size	0.506	0.939	0.590	NS
Flock Size	0.048*	0.015	0.001	S
Average income from Poultry	0.508*	0.231	0.028	S

Source: Field Survey (2025). *= Significance level at 5%.

Constraints of the Respondents to Biosafety Practices

The constraints to awareness of biosafety practices were measured among the respondents in the study area. Mean value (\bar{x}) was used to ascertain the severity of the constraints as shown in Table 5. The most severe constraints of the respondents on awareness of biosafety practices are;

inadequate extension services activities involvement ($\bar{x}=1.21$) and lack of proper spread of information through various awareness medium ($\bar{x}=1.22$). these was followed by low literacy level of most farmers in the awareness channels & understanding ($\bar{x}=1.25$), availability and use of Ethno veterinary medicines ($\bar{x}=1.32$) and poor knowledge and understanding of these viral diseases and it actions ($\bar{x}=1.33$). Others are; sociological perception that viral diseases are natural occurrences in nature ($\bar{x}=1.37$), over dependence on vaccines & drugs as the only sustainable solution ($\bar{x}=1.39$), lack of periodic training on current status & levels of viral diseases ($\bar{x}=1.41$), poor infrastructure development of the study area in helping advocacy ($\bar{x}=1.43$) and over dependence on some traditional remedies against viral diseases ($\bar{x}=1.46$) while cultural practices ($\bar{x}=2.06$) was not seen as major problem among the respondents in the study area. This agrees with the findings of Abdulrahman *et al* (2016) that awareness of biosafety practices was constrained by literacy level of the poultry farmers, over dependence on ethno veterinary medicines and lack of extension among others in Nigeria among other key constraints.

Table 5: Distribution of the respondents based on constraint to awareness of biosafety smart-practices

Variables	\bar{x}	S. D	R
Inadequate extension services activities and involvement in the study area	1.21	1.10	1 st
Lack of proper spread of information through various awareness medium	1.22	1.10	2 nd
Illiteracy level of most farmers in the awareness channels & understanding	1.25	1.11	3 rd
Availability and use of Ethno veterinary medicines	1.32	1.15	4 th
Poor knowledge and understanding of these viral diseases and it actions	1.33	1.15	5 th
Sociological perception that viral diseases are natural occurrences in nature	1.37	1.17	6 th
Over dependence on vaccines & drugs as the only sustainable solution	1.39	1.18	7 th
Lack of periodic training on current status & levels of viral diseases	1.41	1.19	8 th
Poor infrastructure development of the study area in helping advocacy	1.43	1.20	9 th
Dependence on some traditional remedies against viral diseases	1.46	1.33	10 th
Cultural Influences	2.06	1.45	11 th

Source: Field Survey (2025). $\bar{x} \leq 1.0$ = Severe

CONCLUSION AND RECOMMENDATIONS:

Based on the findings of the study, it was concluded that respondents were not aware of the biosafety practices against the outbreaks of viral poultry diseases and the main sources of awareness of viral poultry biosafety practices was Mass Media (97.7%) in the study area. The most perceived prevalent viral poultry disease in the study area was Newcastle diseases ($\bar{x}=1.191 \pm 1.091$) among others. Socio-economic factors such as average monthly income, educational level, flock size and poultry farming experience significantly influence awareness of biosafety practices on viral poultry diseases outbreaks in the study area The major constraints to awareness of biosafety practices was low literacy level of most farmers in the awareness channels & understanding ($\bar{x}=1.25$).

It was recommended that most of the medium of awareness/information should be proactive to help spread the information on biosafety practices to farmers. Other constraints to biosafety awareness should be enhanced through adult education to assist understanding. Positive determinant factors of awareness should be improved for more awareness on biosafety as well as more involvement of extension service delivery system in the study area.



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