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Attitude and Perceptions of Farmers in Moyamba and Bonthe Districts to New Castle Disease Vaccination

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Abstract

This study is conducted to investigates indigenous chicken vaccination, challenges, attitudes, and perception of chicken rearers in the Moyamba District. A pre-tested questionnaire survey was carried out to obtain information from 232 randomly selected participants in two districts. The results of the finding revealed that more than sixty percent of the farmers know that there is a vaccine for the control and prevention of ND in poultry but less than twelve percent of them in each district (Bo, Moyamba) have acknowledged vaccinating their chickens. Majority of the farmers (68.1%) requested vaccination services as it was considered to be the best option in controlling ND. The type of management system adopted (traditional), uncontrolled movement of chicken, cost of vaccine recovery, and wrong period of vaccination were reasons why few farmers considered rural chicken vaccination as an ineffective measure. Some farmers rejected vaccination as they thought it may cause infection and death in chickens, reduce fertility rate and taste, and above all might lead to human health problem. The main challenges associated with rural chicken vaccination among others were the low level of education/awareness, agricultural farming season, poor community access and reception, small flock size, and conservation of vaccine. For effective control and elimination of ND in the study areas, there is a need for routine vaccination by strengthening veterinary and extension opportunities, determine the extent to which the virus has spread in other chiefdoms and districts, and restrict the uncertified movement of animals within the country.

Keywords: Awareness. Traditional, Livestock, Vaccination, Sierra Leone, Challenges, Newcastle disease.

Introduction

In most developing countries, native chickens are important contributors to both national and rural development including meeting the livelihood of rural farmers and some urban traders. Indigenous chickens for several decades have been part of traditional and societal development by contributing to food security, poverty reduction, economic growth, curtailing malnutrition, promoting academic achievement, and ensuring gender equity and equality between the rich and the poor (Mtileni et al. 2009, Guèye, 2005, Meseret, et al. 2011, Jacques, 2012).

Sierra Leone is an agrarian country where a greater part of its population entirely depends on agriculture. Agriculture is the driving force for the country's economy that provides approximately 50% of its GDP and employs more than 70% of the work force (SLSFMF, 2017). Although livestock production is not the primary source of livelihood, it contributes immensely to the domestic welfare of millions of Sierra Leoneans particularly those in the rural areas. The livestock sector constitutes mainly of sheep, goats, cattle, poultry, and swine although rabbits, guinea fowl, and pigeon, in their small number, are reared in few areas within the country. The current chicken population in Sierra Leone is approximately 4,316,349 with a majority (3,406,293) found in the rural areas (SSL, 2015). Chickens in rural settings are mainly kept under the traditional system due to low input requirements, and highly adaptive and tolerance features to hostile environments and certain diseases.

Local chicken production (LCP) in Sierra Leone is facing numerous challenges that inhibit productivity and growth. Challenges like persistent disease outbreak, predators, lack of animal healthcare, theft, poor market, and high mortality remained widespread among poultry farmers (Conteh and Sesay, 2019). The major disease affecting LCP is Newcastle disease (ND) causing an unquantifiable number of deaths among chickens. ND is a fatal and rapidly transmissible but vaccine-preventable viral infection of poultry that presents a serious problem to the poultry industry especially village poultry. The high pathogenicity of ND among unprotected flocks in endemic zones has caused a total loss in production. ND is well recognized by the majority of the chicken rearers due to its apparent clinical presentation.

ND vaccination has been reported as the most successful intervention in controlling, eliminating or preventing the virus. This method of disease control has been adopted in many countries in Africa and beyond leading to scheduled annual vaccination programs for healthy and profitable production. On the contrary, the Sierra Leone livestock sector is among the most deprived sector with animal healthcare services and good husbandry practices, particularly in the village settings. In Sierra Leone, there is no study on rural poultry vaccination, knowledge, attitudes and perception which impedes fruitful and continuous vaccination programs. It is on this backdrop that this study was conducted to investigate the current status of free-range local chicken vaccination in Moyamba and Bo districts, as well as the challenges, and farmers' attitude and perceptions.

Research Methodology

Description of the study area

This current study was undertaken in the southern province of Sierra Leone in two districts (Bonthe and Moyamba districts) with coordinates 8°00' N and 12°15' W. The southern province has an area of 19,694 Km^2 and comprise of four districts (Bo, Bonthe, Moyamba, and Pujehun). The total population in the region is 1,441,308 people, which is 20.3% of the country's population [7,092,113 (SSL, 2015)]. Whilst 80.3% of the populace dwells in the rural areas, 19.7% are found in urban settings. More than half of the population (51.3%) are women with 48.7% being male. Although English is the official office and academic language, Mende, Sherbro, Temne and broken English (Krio) etc. are the native spoken languages. The major occupations of the people are mining (gold, rutile, and diamond), agriculture as well as trading. Eighty-six percent of the southerners are engaged in crop farming with rice, cash crops, root crops, and oil palm as the main crops grown. Seventy-five percent practice animal husbandry with chickens, goat, sheep, duck, and pig forming the major livestock reared. The region accounts for the second-largest chicken population (24.7%) in the country after the northern region (48.6%). The poor local chicken vaccination of village chicken production, poor attitudes of poultry rearers towards vaccination, and a large number of native free-range chickens in the province and districts were reasons why the study was conducted in these areas.

Study sites

Moyamba and Bo districts have a total population of 22.1% and 39.9% of people respectively (SSL, 2015). They are located on latitude 7°53'52'' N, longitude 11°44'17'' W (Bo) and latitude 12°26'0'' N and longitude 8°09'38'' W (Moyamba). Agriculture forms the major part of the people's livelihood followed by mining, trading, and formal jobs. Moyamba district has the largest number of chickens (32.5%) rear followed by Bo district (28.9%) in the south. In addendum to the aforementioned selection criteria, easy access to study locations willing of the farmers to participate in the study were reasons for selecting the districts. Moyamba District is located along many rivers including the Atlantic Ocean which might be a possible reason for farmers to experience a high influx of migratory birds especially during the dry season which might be the main cause of frequent ND outbreak.

Data collection techniques

Following a selective national vaccination exercise in the southern region, a research topic was developed to investigate the culture of vaccination in the two districts (Moyamba and Bo). Eight villages (four villages per district) were arbitrarily selected across the two districts. 116 participants (29 respondents per study site) were randomly selected in each of the studied districts making a total of 232 interviewed individuals. A semi-structured questionnaire was

designed, pre-tested and administered to obtained quantitative primary data for a period of two months (April-June). Chicken rearers were visited house to house obtaining information from them through direct interviews after the consent of the community stakeholders and the individual chicken rearers. Information like farmers' demographic characteristics, perception, and attitude towards vaccination, mortality rate, knowledge on ND, challenges in local chicken production and free-range chicken vaccination were captured by the questionnaire.

Data analysis

Data collected were screened thoroughly for consistency to be in-line with the set study objectives. The data were analyzed using the latest version of the Statistical tool (SPSS) to present findings using tables and charts. Data from different sources (related fields) such as the internet (journal articles, publications) including field observation and side comments were further used as additional information sources

Result and Discussion

Table 1: Farmers socio-economic characteristics

Parameter	Frequency	Percentage		Parameter	Frequency	Percentage
Gender				**Age (years)**		
Male	11	4.7		≤ 20	19	9.9
Female	221	95.3		21-40	144	62.1
Education				41 plus	66	28.4
Primary	49	21.1		**Marital status**		
Secondary	19	8.2		Single	29	12.5
College/university	7	3.0		Married	142	61.2
Illiterate	160	69.0		Divorce/widow	61	26.3
Uses of chickens to farmers				**Livestock rear**		
Religious/traditional purpose	179	77.2		Chicken	232	100.0
Education	155	66.8		Goat	156	67.2
Food	134	57.8		Sheep	88	37.9
Buy food and household items	107	46.1		Duck	30	12.9
Income	72	31.0		Pig	11	4.7

This work presents information on ND vaccination, the attitude, and perception of farmers and the challenges encountered by both the farmers and the vaccinators during the exercise. Out of the 162 visited farmers, 95.3% were female while 4.7% were male. 62.1% fall within the working-age bracket (21-40) while 9.9% and 28.4% were below 21 and above 40 years old respectively. More than two-thirds of the respondents were married, 26.3% divorced/widow and 12.5% bachelor. Therefore, chicken production cut across all categories of individuals regardless of age and status (children, youth, old, marry, landless, rich or poor). The majority of the respondents (69.0%) were illiterate, 21.1% and 8.2% have primary and secondary education while 3.0% have tertiary education. All farmers visited reared either one or more types of breeds (ICs), because of their desirable natural characteristics (tolerance to some common diseases, adaptable to hostile environment, high fertility, perform better under little or no feeding condition, short generation interval); and easy access, less environmental impact, inter-neighbor conflict, easy to manage, and its diverse functions. Traditional/religious purposes were reported as the main reason for keeping the indigenous chickens (77.2%). Sixty-six-point-eight percent (66.8%), 57.8%, 46.1% and 31.0% of the farmers rear chickens for educational purposes, source of proteins, healthcare services, provision of food and household items, and income for other pressing needs respectively. These findings support Alders et al. (2018), Muchadeyi et al. (2004) and Eiki, (2016) studies where local poultry farmers used income earned from the sales of

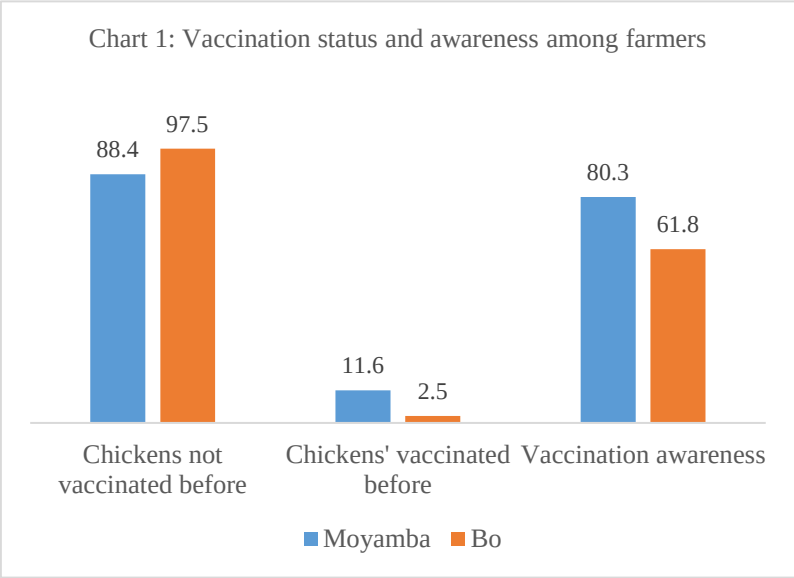
chickens to pay school fees and buy school materials, medical bills, household materials, contribute to funeral and religious activities and pay local tax.

Although ICs perform vital functions to man and his social obligations for many centuries, ICP is faced with neglectable constraints in the study areas. Diseases, predators, lack of treatment services, poor awareness on disease management, thieving and inadequate market structure were identified as constraints encountered by farmers in rearing free-range chickens.

Table 2: Constraints faced by farmers in ICP in both districts

Variables	Frequency	Percentages
Disease	152	24.1
Lack of treatment	101	16.0
Predators	138	21.9
Theft	73	11.6
Lack of awareness of disease management	99	15.7
Poor market structure	67	10.6

Based on the assessment carried out on the awareness of ICFs on ND vaccination in the two districts, it was revealed that more farmers are aware of ND vaccination as control and preventive measure against ND. Eighty-point-three percent (80.3%) of the respondents in MD accepted that there is a vaccine for ND while 61.8% gave a similar response in BD (chart 1). Lack of direct link between livestock sector or veterinary professional, extension agents, and vaccination programs were reasons why some farmers do not know about ND vaccination which is similar to a study conducted by Gloria, (2016). In this study, the number of farmers who have vaccinated chickens before was less compared to those that have not vaccinated their chickens. In MD for instance, 88.4% of those who keep chickens have never vaccinated their chickens while 11.6% have vaccinated their chickens only once or twice. 97.5% of the ICFs in BD have also not vaccinated their chickens while 2.5% have agreed to have vaccinated their chickens before. These findings are similar to that reported by Barman et al, (2010) who reported a large number of chicken farmers who have not vaccinated their chicken against ND.



As poultry farmers, especially in rural settings, are hardly sensitized on disease management practices and methods coupled with the lack of vaccine; high illiteracy and poor animal healthcare delivery, vaccination is

wrongly perceived by some farmers and therefore, considered not a priority. Fisseha et al. (2010) and Ahmed, (2018) revealed a similar report where lack of vaccine awareness, experience, information, and weak extension services in local poultry rearing, caused most farmers not to vaccinate their chickens against ND. However, more respondents in MD were found to be aware of chicken vaccination with better vaccination records compared to those in BD. Findings based on the understanding of ND among the respondents revealed that ND is not a strange disease in the study areas. 70.3% of the respondents knew it is a viral infection while 29.7% considered it a disease without knowing its causative agent. 73.7% of the farmers reported that ND affects only chickens while 21.3% said it affects chicken and other avian species. 92.7% of the respondents described typical symptoms of ND (paralysis, nervous signs, coughing, gasping, sneezing, diarrhea, drooping wings, sudden death) while 7.3% of them were not familiar with the symptoms. Different modes of transmission were listed by the farmers among which direct contact between sick and healthy chickens was the most common. Sharing of water, feed troughs and shelter; free movement of birds; introduction of new birds; indirect contact (droppings from sick birds, improper carcass disposal) and trading of live chickens were other means of transmission identified which are in line with the findings of Conteh and Sesay, (2019). The seasonal pattern of the disease varies throughout the year as outbreaks were reported to have been occurred all year round.

Table 3: Farmer's knowledge on ND

Variable	Frequency	Percentage	Variable	Frequency	Percentage
ND			**Clinical signs**		
A viral disease of poultry	69	70.3	Yes	215	92.7
Disease	163	29.7	No	17	7.3
Species affected			**Seasonal pattern**		
Chicken	171	73.7	Dry season	46	19.8
Chicken and other avian	87	21.3	Rainy season	115	49.6
Mode of transmission			Both season	71	30.6
Direct contact	193	83.2	**Response to a suspected outbreak**		
Sharing water, feed, and shelter	152	65.5	Traditional means	177	76.3
Introduction of new chicken	54	23.3	Report to animal health	9	3.9
Uncontrolled movement of chicken	108	46.6	Report to a human health professional	5	2.2
Indirect contact	29	12.5	Sell/eat seemingly healthy ones	135	58.2
Trading	17	7.3	No reaction	21	9.1

The season with high ND prevalence was the rainy season, while 30.6% and 19.5% of the farmers reported experiencing outbreaks throughout the year and dry seasons respectively. This report is in-line with Nwanta et al. (2008), Miguel et al. 2012 and Musa et al. (2009) findings outside Sierra Leone where a high prevalence of ND was highly associated with the dry season. Also, ND was reported by Antipas et al. (2012) to have reached its peaks in December and April in Chad; it occurs throughout the year. Contrary to these findings, Moges, et al, (2010) reported high mortality and prevalence of ND in local chickens at the beginning of the main rainy season (April – June) in Ethiopia. Besides, farmers' attitudes towards the ND outbreak were further investigated and the outcome of this finding revealed that ND was traditionally managed followed by eating/selling of either seemingly healthy or sick chickens. Due to the lack of community animal healthcare and extension services, only 3.9% and 2.2% of the respondents attributed the outbreak to animal and human healthcare professionals respectively while 9.1% take no action. Therefore, farmers experience uncountable death of chicken whenever ND outbreak struck.

In chart 2, the mortality recorded were categorized into those caused by ND and other diseases besides ND. Overall, 93.6% of the death was attributed to ND while 73.5% was caused by other diseases (see chart 2). 49.4% and 38.3% mortality caused by ND were reported in MD and BD while other diseases accounted for 27.8% and 35.7% death respectively (see chart 2).

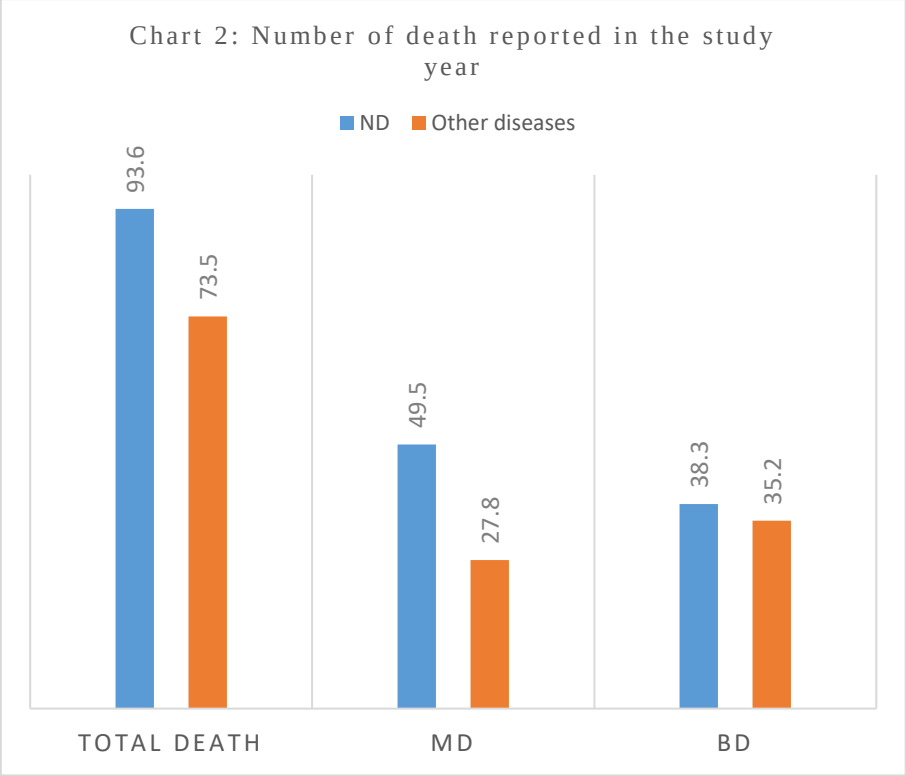


Table 4: Vaccination decision, disease category, mortality and cause				
	Moyamba District (No =116)		Bo District (No =116)	
Variables	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Decision to vaccinate				
Men	41	35.3	24	20.7
Women	11	9.5	9	7.8
Others	18	15.5	13	11.2
Willingness to vaccinate				
Yes	79	68.1	74	63.8
No	37	31.9	42	36.2
Vaccine accessibility				
Yes	116	100.0	116	100.0
No	0	0.0	0	0.0
Vaccination is the best option for ND				
Yes	85	73.3	98	84.5
No	31	26.7	18	15.5

Although
the death of chickens was reported all year round, it was more severe at the end of the dry, and start of the raining seasons due to change in climatic and environmental conditions that affect the health status of the chickens. Majority of the respondents confirmed that the decision to vaccinate and sometimes treat sick chickens is made by men although many reports have shown that women compare to men own and manage local chickens (Halima,

2007; Guèye, 2005). In this study, 35.3% and 20.7% of the respondents in MD and KD respectively approve vaccination or treatment of chickens although women and other family members may at times give the order. Most of the farmers interviewed were willing to vaccinate their chickens against ND. 68.1% and 63.8% of the farmers in Moyamba and Bo districts showed high interest in vaccinating chickens and other livestock (goat, sheep) although 31.9% and 36.2% of the farmers did not show any interest to vaccinate their chickens. Due to a lack of income to pay for vaccination services, some farmers gave live chickens as compensation for the service. The availability of ND vaccine in the rural community was lacking. It was perceived by some farmers that vaccination is not the best option although the majority (MD = 73.3%, BD = 84.5%) considered it as the most effective preventive measure (table 4). The main reasons mentioned include the type of management system practiced (traditional), the free introduction of chicken with unknown health status, the time/season of vaccination and the cost of vaccine recovery further reasons, since majority of the farmers are most times engaged in crop farming with low financial status. Therefore, vaccination should be scheduled at the time when farmers are less engaged with their farm activities and are easy to be reached which is in agreement with (Alders and Spradbrow, 2001) report.

In table 5, farmers' opinions were assessed to know why they refused to vaccinate their chickens. Some of these opinions were based on experience got from vaccination, dissemination of incorrect information and lack of knowledge among farmers about modern treatment. The key reason highlighted was that vaccinating chicken may lead to infection and possible death. 25.4% and 16.8% of the ICFs also perceived that vaccination may not only cause reinfection and death of chickens but it may further lead to infertility in chickens or human health issues.

Table 5: Reasons why farmers reject vaccination

Reason	Frequency	Percentage
Cause infection and death	84	36.2
Cause infertility	39	16.8
Affect human health	59	25.4
Reduces taste	26	11.2
Reduces flock size	22	9.5
No reason	15	6.5

Added to these were a reduction in flock size and palatability in chickens although 6.5% did not advance any reason for rejecting vaccination. Effective awareness followed by basic education on conventional disease management (vaccination) is the key to change the perception of the farmers.

Table 5 presents information on the challenges encountered in rural free-range chicken vaccination. Lack of education/awareness, agricultural/climatic calendar, and access to most farmers due to the bad road network and lack of mobility were the main challenges identified. Educating farmers by delivering effective communication messages particularly where farmers' have less or no formal education is key to vaccination success which is in agreement with Alders et al. (2007) findings. Depending on the agricultural activities per year, scheduling vaccination in

Table 6: Challenges faced in local chicken vaccination

Challenge	Frequency	Percentage
Education/awareness	199	85.8
Not receptive	81	34.9
Small flock size	76	32.8
Vaccine dosage and management	49	21.1
Farming activity	148	63.8
Willingness to pay	35	15.1
Proper confinement	19	8.2
Community vaccinator	5	2.2
Community accessibility	121	52.2

non-farming periods especially for the women and when there is no suspected outbreak in the community are important factors to consider for the successful vaccination program. Considering the endemic nature of ND in the study areas, ICFs are frustrated by the continuous loss of their chicken leading to a lack of attention in the local poultry industry which is related to Alders and Spradbrow, (2001). This condition has caused many farmers to abandon or not to invest in LCP. Other challenges reported were flock size, dosage per vial and management, willingness to pay for vaccine cost recovery, poor confinement of chickens for vaccination, and community vaccinators. As most commercial vaccines require a large number of chickens per vial with proper storage and good handling, they cannot fit well into the traditional system where chickens are reared on a small-scale with improper confinement.

Conclusion and Recommendation

Newcastle disease is the most important economic poultry disease causing serious economic and flock loss. ND is well understood but its control is almost impossible due to lack of: vaccination, good animal healthcare and husbandry practices, and trained and experienced animal healthcare professionals.

Majority of the farmers in the study areas know about the vaccine as a control and preventive measure against ND although it is not available. The attitudes and perceptions of farmers to vaccination were poor due to a lack of education and awareness. Some farmers considered vaccination as an ineffective strategy in controlling and preventing ND because of poor sensitization which caused them to reject vaccinating their chickens.

Different challenges associated with rural chicken vaccination were identified from which lack of education/awareness, farming activity and poor access to the community ranked top among others. To reduce the huge impact of ND in the study sites, effective disease management programs are of great concern to the farmers. These programs should gear towards improving veterinary services, biosecurity, and adequate management practices.

Livestock extension services in rural communities should be improved to ensure that farmers are well educated about modern interventions in controlling, and eliminating diseases. Government and non-governmental organizations at both national and international levels should incorporate annual vaccination into the livestock sector especially for village chickens whose contributions to livelihood, economic growth, and socio-cultural beliefs are significant to all Sierra Leoneans especially the poor.

Conflict of Interest

The authors declare no conflict of interest.

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