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Factors influencing adoption of New Castle Disease Vaccine in Kakamega County in Kenya

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Abstract

Kenya has approximately 28 million poultry of which 22 million (76%) are indigenous chicken kept on free-range system by small-scale farmers in rural and peri-urban areas. Poultry production requires low initial capital and maintenance costs; however, predation and disease hinders this potential from full exploitation by 50-74% and 36-50% respectively. New castle disease (NCD) is the major cause of mortality in indigenous chicken flock. In Western Kenya, vaccination using heat labile live vaccines has been in use for its control. Due to high costs incurred in handling the vaccines, only large-scale commercial farms have the capacity to meet the demand. This leaves out the small-scale indigenous chicken farmers who produce over 70% of meat and 50% of eggs consumed in Kenya. This study was undertaken in January 2011 with the main objective being to determine mortality due to NCD and the factors influencing the adoption of its vaccine. Descriptive survey using questionnaire was used and forty respondents were involved the study. Only 35% of the respondent in the study area had adopted the vaccination and out of all the chicks hutched, only 45% survived to maturity. The loss due to predation and diseases were 45% and 55% respectively. The factors that influenced adoption were effectiveness, ease of availability, lack of any other option and affordability of vaccine at 34.6%, 26.9%, 23.1% and 15.4% respectively.

Keywords: New castle disease , Poultry, Vaccine

1. introduction

Poultry are domestic birds reared for their economic and social benefits; this is mainly because of low iron content due to minimum hemoglobin and myoglobin. Consumers' preference for chicken meat is because of its leanness, flavor and presumed organic. In addition, poultry's white meat is a good and safe source of essential amino acids. The cheapest way of feeding the population with white meat is through poultry enterprise [4]. This is because poultry are efficient producers, adapt to most agro ecological zones, have high economic value, have rapid generation time and have high rate of productivity. Kenya has an estimated poultry population of 28.5 million, of these 22million (76%) are free-range indigenous chicken [7]. Despite chicken's low productivity in Kenya, it contributes towards the nutritional status of many household. It is also a source of income despite its regard as a woman's affair in most of the Kenyan communities.

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All the same, it serves, as an important incentive by engaging rural womenfolk in income generation through their sale [4,1]. Indigenous chicken is a resource that is readily available in rural areas and its exploitation can enhance sustainable agricultural development [10].

In Western Kenya, chicken play an important role in traditional ceremonies, as a family household food and financial reserve for rural families. Chicken are sold when need arises and are slaughtered and served to special visitors. Although a low input enterprise, low marginal economic benefits accrue from it due to diseases, particularly NCD, lack of feed and predators [9]. Studies show that experience with NCD control results from campaigns conducted by various projects in the region from 1996 to 2002. The studies shows that by controlling NCD through vaccination, one would raise flock tremendously [11,12]. Such an increase affected positively on nutrition and the economy of the houses as indicated by [9]. He inferred that the major factors affecting chicken production are lack of supplementation, predation and diseases. Losses due to predation accounted for 50-74% losses while 36-50% was due to diseases. Diseases such as NCD, fowl pox, Mereks and Fowl typhoid are the leading killer among the poultry diseases, especially in developing countries and in the Tropics [11]. NCD is an endemic viral disease in many countries of the world. It is highly contagious, infectious and spreads between birds. NCD is associated with 100% morbidity and mortality rate of up to 100% in young birds and cessation of egg production in adults. This is a great threat to increased productivity and the coupled expected income.

The small-scale farmers in Likuyani district experience great losses annually although the disease is preventable through vaccination. The available vaccine strains and packages are as follows; La sota and hitchner BI, packaged in 200, 500 and 1000 doses, the local formerly KEVAVIPI strain “F” is available in 100, 200 and 1000 doses. The heat stable South African strain (Nobilis ND inkukhu) vaccines are usually sold at Ksh. 200 per 100 doses for KEVEVAPI vaccine, Ksh. 350 for 1000 doses of La sota or Hitchner B1 and Ksh100 for 100 doses of Nobilis inkukhu. Most residents of Likuyani constituency are peasant farmers with an average of 0.6ha of land per household. They keep an average of sixteen indigenous chickens per household on a free-range system [2]. Likuyani district has an average of 371,100 indigenous chickens and 13,000 exotic chickens. Vaccines issued in August and September were 4100 vaccine doses and 9200 doses, leaving about 99% of chicken exposed to the disease [3]. The purpose of this study was to determine the factors influencing the adoption of NCD vaccination determine the mortalities due to NCD and investigate the factors influencing adoption of its vaccination

It is estimated that NCD causes of most poultry mortalities than any other poultry disease in tropics [12]. During an outbreak, there is always observed 100% morbidity, 100% mortality is observed in young birds with 80% mortality in adults. No proper treatment is available but early vaccination is a remedy. The outbreak of the disease is seasonal and patterned. Although the disease has a vaccine, which is effective when the birds are vaccinated twice a year, high mortality rates still occur in Tropics. Studies in Western Kenya revealed that vaccination against NCD could reduce mortality by 45.5% and improved management alone could increase flock sizes by 12.5% [10].

New castle disease is caused by group v ((-)ssrna) virus of the following classification; Order Mononegaviraie, Family Paramyxoviridae, Genus Avulavirus ,Species New Castle Disease virus [11]. The virus has three strains; mesogenic, velogenic and lentogenic. The severity of the disease varies depending on the strain of the virus. The Velogenic strain is highly virulent and produces severe nervous and respiratory signs, spreads rapidly and causes up to 90% mortality. The monogenic strain has intermediate virulence and is associated with coughing, affects eggs quality production and results in up to 10% mortality.

Generally the signs and symptoms includes difficulty in breathing, discharge through the beak, paralysis, distended crop, drooping head, drowsiness, coma, dropping productivity especially eggs. Sometimes death can

be sudden without the symptoms. Chicken that reach the tertiary stage showing nervous symptoms may survive but will always show lack of nervous co-ordination [6].

2. Materials and Methodology

2.1 Location of the Study

The study was carried out in Nzoia Location of Likuyani in Kakamega County. This county has an estimated population of 1.5 million people. The major economic activity in this area is agriculture and livestock production. The agricultural activities in this area are maize and millet farming. The livestock production activities include small-scale dairy farming, poultry production and mixed farming.

2.2. Research Design

Descriptive survey was used in the study and collected information from respondents on levels of mortality due to NCD. A purposive survey was conducted was also conducted. Questionnaires were used to obtain primary data. Secondary data was obtained from the District Veterinary Office and KARI reports.

2.3 Sample Selection

The study area was stratified into four strata based on the administrative units. Using a purposive sampling, forty farmers were interviewed in the study. Two villages were chosen from each of the four sublocations selected. Five homes distant from each other were chosen randomly per village. This sampling frame covered forty households in the entire study area. This method of sampling was appropriate for this survey because it aimed at the small-scale farmers who keep indigenous chicken. The sample size was determined by the formula.

2.4 Research Instrument and data collection Techniques

A funnel-structured questionnaire was used to collect data. The questionnaires collected general information to specific information of the respondents. A structured questionnaire was preferred to collect precise data.

2.5 Data Analysis

Data was organized, coded, and entered into Ms Excel spreadsheet. Analysis was done using Statistical Package for Social Sciences version 16.0. Chi-square test was used to test the hypothesis..

3. Results and Discussion

In 2010, only 49857 (12.98%) vaccine doses were issued against 384,100 chickens (5).The number of NCD vaccine doses issued in 2010 were progressively increasing from January to December as indicated in Figure (a).

Most of the respondents were female (65%), most males either refused to answer the questions or delegated the responsibility unlike the situation in Uganda where 92.1% of the respondent were male [11].The findings indicate how important indigenous chicken are to female in the Likuyani. It was established that 51.90% of the respondent kept poultry and cattle, 20.04% kept cattle, 11.96% small ruminants, 10.10% poultry only and 6.00% other type of livestock. This implies that apart from cattle, indigenous poultry farming was an integral part of mixed farming in Likuyani District. The combined poultry and cattle rearing accounted for 61.2%, an indication that more than two thirds of the population was involved in mixed farming.

The respondent who kept chicken indicated that their flocks were indigenous. At the time of the study, most of them had a flock of 6-10 chicken while few had a flock of 11-15 chickens. This number did not include chicks hence the total number might be slightly higher than 15. A study done by Ondwasy [12] indicated a population of between 15 -25 under normal season. The respondent also indicated that the flock was small because of off takes during the festive months of December. Some also indicated they had made some sales in to avoid losses that occurs in January. January is generally a dry month, this result indicate a positive correlation between a dry weather and NCD. Most of the chicken were slaughtered, some offered as gifts while others sold for cash. There was no significant difference between the numbers of chicken kept by each household. The count of respondent on the number birds kept was as indicated in the Figure (c).

The productivity of the chicken was quite low. 52.2% of the respondents indicated that each of their chicken hatched between 6-10 chicks while only 35% indicated that their hens hatched above ten chicks (table 1). Indigenous chicken can lay a maximum of thirteen eggs before they become broody [12]. The low hatching may be attributed to poor handling of the eggs before incubation.

The survival rate of chick varied among the respondents. For those respondents who's chicken hatched 1-5 chicks, only 45% survived to maturity. In addition, those respondents whose chicken hatched 6-10 only 50% survived to maturity. This average survival to maturity indicates a loss 55% and 50% loss to the farmers' respectively. This is a great loss to any given farmer irrespective of the importance attached to the poultry. It is also clear that the source loss is known to the farmers hence need to put in mechanism to control. The study found out that 45% loss was due to predation while 55% loss was due to diseases. Hawks, wild cats, stray dogs, snakes, and kites are major predators.

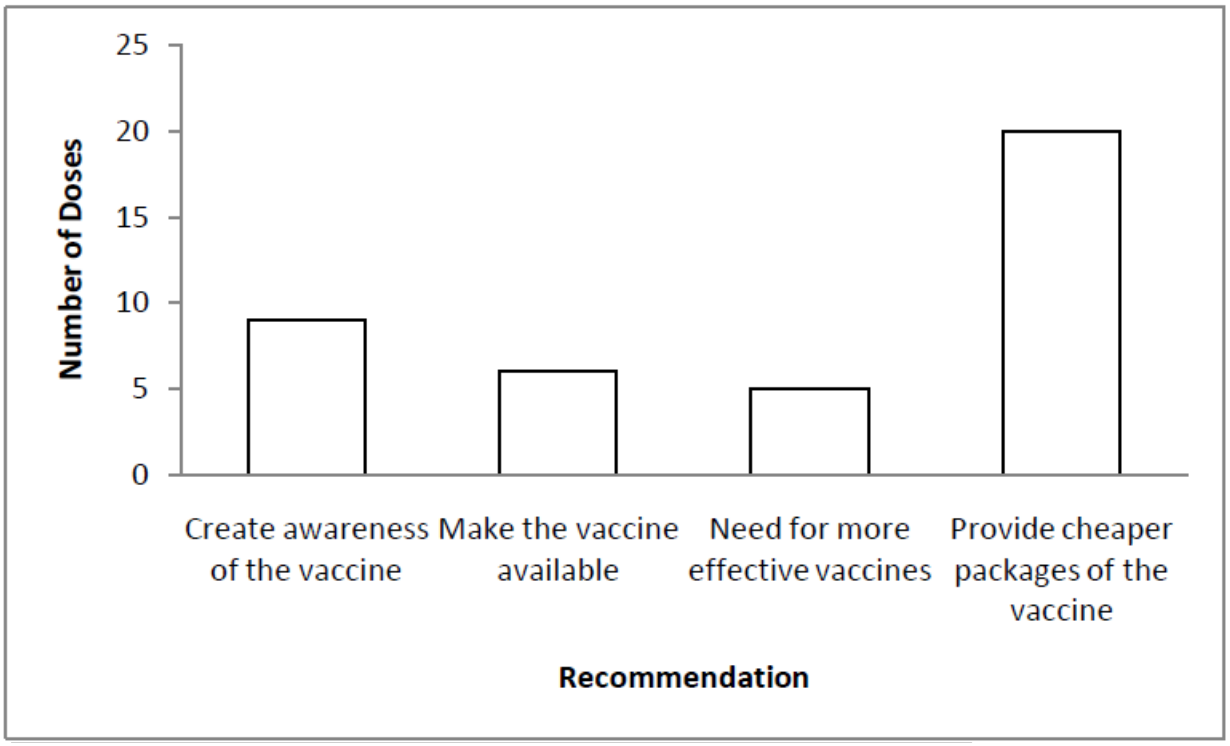

Fig a: Annual NCD vaccine doses issued in Likuyani District in the year 2010 (5)

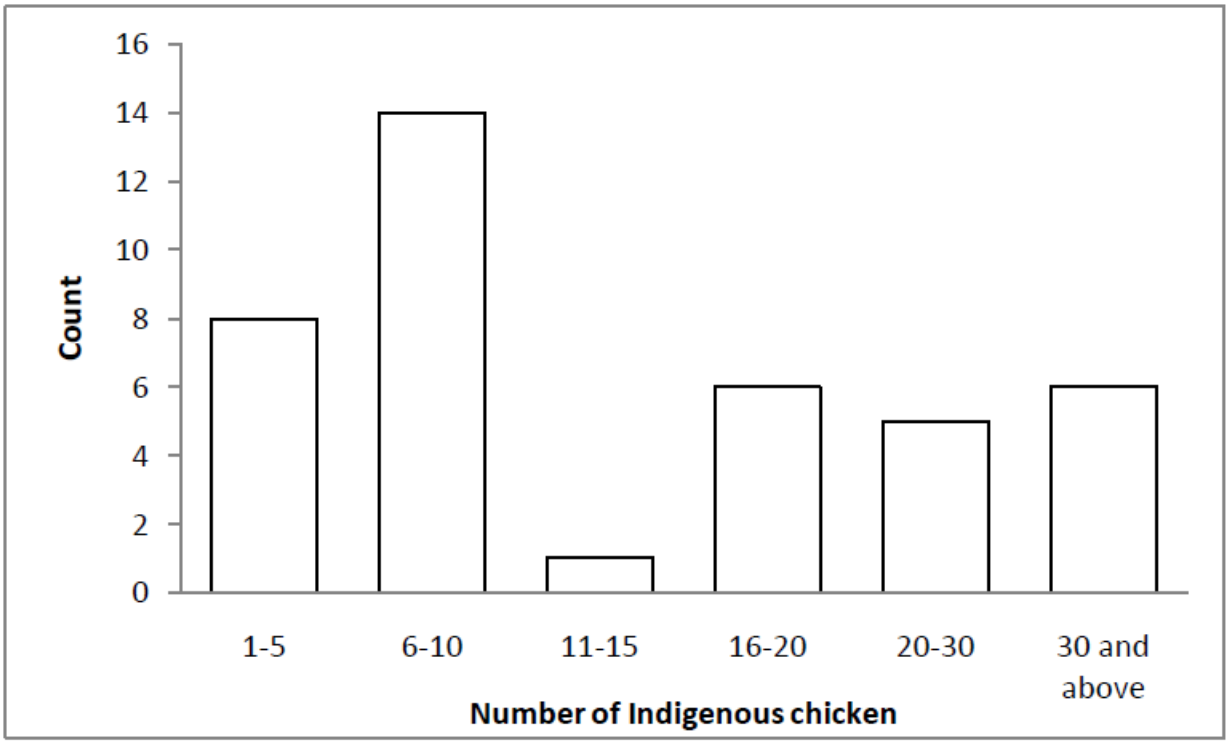

Figure b: The approximate number of indigenous chicken kept by each household in Likuyani District

The 55% losses due to diseases was a component of 80% NCD, 10% Mareks and 10% fowl typhoid. A similar study in Uganda found that 70% of 73% causes of mortality in chicks was due to NCD [11]. From this result, it is clear that NCD is a real problem causing grave loss to farmers (accounting for 44% losses). Total control of NCD would lead to reduction in losses by at least 44%. The only way to control NCD is through vaccination, surprisingly only 35% of the respondents were found to use the vaccine, 65% were found to have never used the vaccine.

Table 1: Average number of chicks hatched per hen in Likuyani District during the study period

Range of chicks	Frequency of Respondents	Percent of respondents	Cumulative Percent
1-5	4	10.0	10.0
6-10	21	52.5	62.5 97.5
11-15	14	35.0	100.0
16-20	1	2.5	
Total	40	100.0	

Table 2: Number of chicks that survived in Likuyani District during the study period

	Range of chicks	Frequency of respondents	Percentage of Respondents	Cumulative Percent
	1-5	18	45.0	45.0
	6-10	20	50.0	95.0
	11-15	2	5.0	100.0
	Total	40	100.0	

Table 3: Common poultry diseases found in Likuyani District during the study period

Type of Diseases	Frequency of Respondent	Percentage of Respondent	Cumulative Percent
New castle disease	32	80.0	80.0
Mereks	4	10.0	90.0
Fowl typhoid	4	10.0	100.0
Total	40	100.0	

Farmers had varying reason for adopting or not adopting the vaccine. The study revealed that among the adopters 34.62% believed it was effective, 15.4% affordable, and 26.92% easily available while 23.08% had no option (figure d). The vaccine doses were only affordable to 15.38% and easily available to 26.92% an indication that the vaccine was costly and unavailable to more than three-quarters of the respondents.

Despite having adopters we have those who never vaccinated there poultry. According to the study, the reasons given for not adopting the vaccination was found to be unaffordable (52.63%), lack of awareness (31.58%), not available (10.53%) and for those who had no interest (5.26%) as indicated in Figure (e).

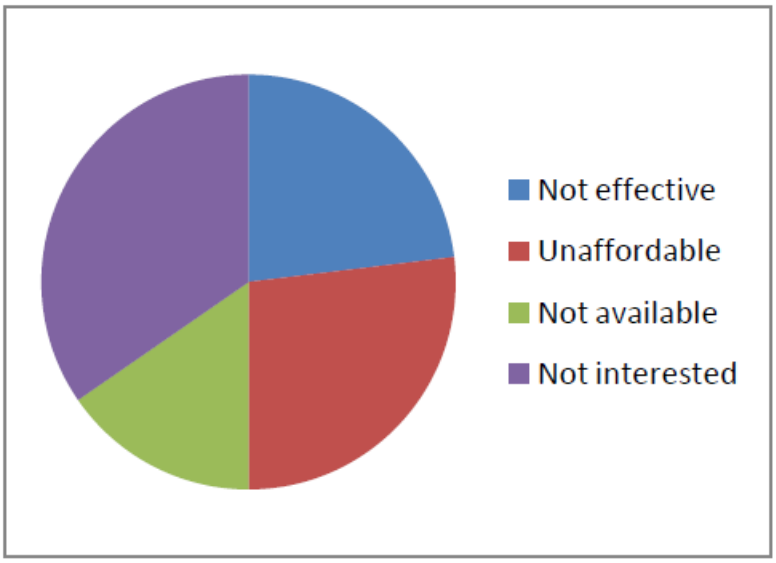

Figure c. Factors influencing adoption of vaccination for NCD in Likuyani District.

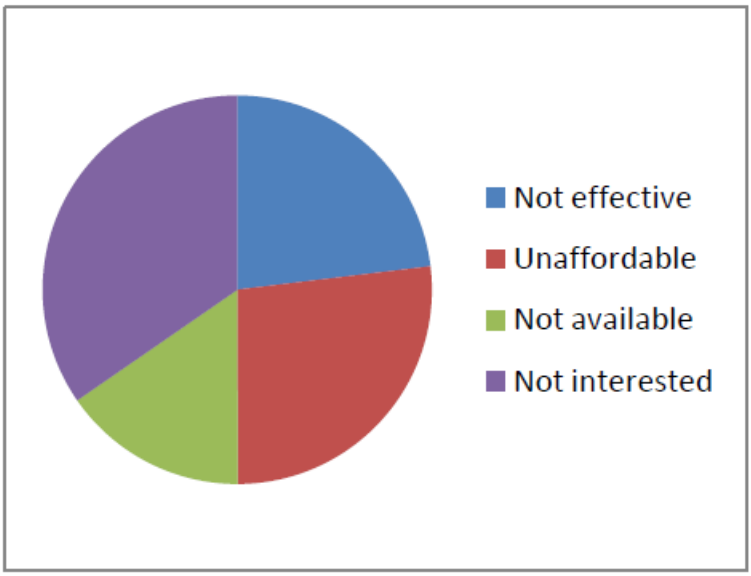

Figure (d): Factors hindering the adoption of NCD vaccine in Likuyani District.

Table 6: Vaccine adoption and usage in Likuyani District

	Frequency of Respondents	Valid Percent	Cumulative Percent
NO	26	65.0	65.0
YES	14	35.0	100.0
Total	40	100.0	

Table 7: Comparison between the management system and adoption of NCD vaccine in Likuyani District

		Type of management system			
		Intensive	Semi-Intensive	Extensive (Free Range)	Total
Is there any vaccination in place?	Yes	0	3	11	14
	No	1	6	19	26
Total		1	9	30	40

Table 8:Chi-Square Tests

	Value	do	Sump. Sig. (2-sided)
Pearson Chi-Square	.586[a]	2	.746
Likelihood Ratio	.909	2	.635
Linear-by-Linear Association	.310	1	.577
N of Valid Cases	40		

From Chi-Square Tests Table 8 that the p-value=0.746, this shows that p-value is insignificant and conclude that there is relationship between management system and adoption of vaccine. In order to deliver the vaccines to the farmers, various approaches have been used including extension agents visiting homes to carry out vaccination and birds being brought to a central place for vaccination. However, birds being brought together for vaccination have been ranked the very poor .Various initiatives projects have been in place to foster adoption of the vaccination skills. In a project organized by KARI, 80% of the farmers who attended were women while 20 % were men. It was the responsibility of the Ministry of Livestock to ensure that livestock health is maintained, but the situation has changed. Nowadays it is the responsibility of the farmers to ensure proper livestock healthy management is done by instilling preventive measures such as vaccination. This has brought about challenges that require change in new technology acquisition and delivery. The government of Kenya through KARI has packaged a NCD vaccination and delivery systems under which the farmer are supposed to be empowered to acquire, correctly handle and administer vaccine (13), The respondents recommended some measures that could be put in place to enhance vaccination adoption especially among the small-scale indigenous farmers. A 50% of the respondents recommended for the provision of cheaper packages of the vaccine, 25.5% proposed the creation of awareness the farmers while 15% wanted the vaccine to be made available. Only 12.5% of the respondents claimed the inefficiency in the vaccine hence needed a more effective vaccine. This is clearly represented in Figure (e).

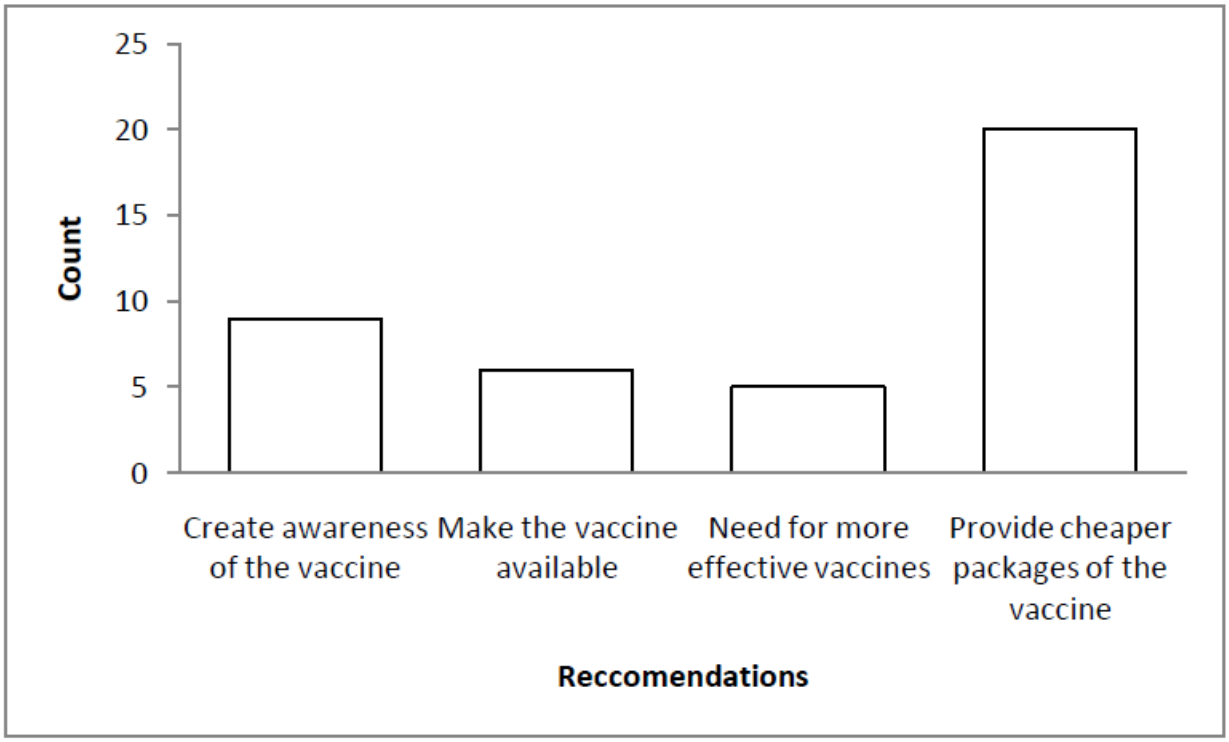

Figure (e): Recommendations by the respondents on vaccination for NCD

4. Conclusion

The indigenous chickens are highly valued among the small scale farmers in Likuyani district of Kakamega County. More than half of the population in the area practices some backyard poultry farming on extensive system with supplementation from grains and leftovers. More than 65% of the respondents were women

signifying its importance to them. The farmers incurs loses due to predation and diseases. New castle disease is a leader kill accounting for about 80% of all cases of mortality. The farmers lack knowledge on the availability of the vaccine and its use. Moreover, some farmers allege the high cost of vaccines, lack of awareness and unavailability of vaccines as the factors hindering the adoption of the vaccine.

5. Recommendation

There is need to provide cheaper packages of vaccine for the farmers. The current minimum of 100 doses each does selling at KSh.2.00 is unaffordable to small scale indigenous chicken farmers. Farmers need to adopt intensive management system to mitigate NCD and enhance the vaccine adoption. Through extension services,

farmers need to be educated and informed of the vaccination programmes. To enhance effectiveness of the vaccines, there is to train the farmers on precautions during the handling of the vaccine especially the cold storage chain. To make the vaccine available, the government and private sector need to partner to create more outlets for dispensing the vaccines such as agro-vet.

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