

SA'IDU et al.,: Retrospective study of Newcastle disease cases in Zaria, Nigeria

**RETROSPECTIVE STUDY OF NEWCASTLE DISEASE CASES IN ZARIA,
NIGERIA**

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SUMMARY

A ten year retrospective study (1990-1999) of the prevalence of Newcastle disease (ND) and other poultry diseases diagnosed at the Poultry Health Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria was conducted. A prevalence rate of 32.3% (812 cases) was recorded for ND out of 2513 cases of poultry diseases. The highest number of outbreaks of ND was recorded during the dry season (January - March). One hundred and ninety seven (24.3%) cases of ND were recorded in birds within 11-15 weeks age group. Fewer outbreaks of ND were recorded in broilers when compared to layers and local chickens. Only 1 case of ND was recorded in turkeys. Most of the outbreaks of ND (46.7%) were recorded in flocks with 1-80 birds and 23.4% of the outbreaks were recorded in flocks with 51-100 birds. Outbreak of ND was closely associated with age, type and specie of birds, vaccination status, flock size, source of birds and feed. ($P < 0.05$) This study observed that ND outbreak is 3.4 time more likely to occur in December than in November and January. The outbreaks of ND were also observed to be 27.47 time more likely to occur in bird of 11- 15 weeks (WK) of age than older age groups. It was concluded from the study that ND is more commonly reported in chickens than in other poultry species and farms with large flocks recorded less number of outbreaks of ND in their flocks.

INTRODUCTION

Newcastle Disease (ND) is an economically important viral disease of domestic and wild birds. Economic losses are due to high morbidity, mortality and drop in egg production (Philips, 1973; Alexander, 1990).

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The first documented confirmed outbreak of ND in Nigeria occurred between December 1952 and February 1953 in and around Ibadan (Hill *et al.*, 1953). Subsequently the disease appeared to be widespread in local and improved chickens (Fatumbi and Adene, 1979; Ezeokoli *et al.*, 1984; Gomwalk *et al.*, 1985; Sa'idu *et al.*, 1994). In Zaria, ND was reported to be the most prevalent disease of local and exotic birds (Abdu *et al.*, 1985; Sa'idu *et al.*, 1994; Halle *et al.*, 1999). The disease is reported to be the most important cause of death in chickens in Zaria (Abdu *et al.*, 1992).

Although there are various efforts such as extension and vaccination aimed at controlling ND in Nigeria, the disease continue to be of great economic importance in most poultry farms in Nigeria. This study was conducted to analyse the effects of season, age, type of bird, specie of bird, vaccination history, flock size, source of bird and source of feed on outbreaks of ND in Zaria.

MATERIALS AND METHODS

Study area

Zaria is located between latitude 11° 07'N and longitude 7° 44'E within the Sudan savanna zone. Grass is the dominant vegetation. The major trees in this vegetation are dumb palm, fan palms and shea butter. The average rainfall ranges from 1000 1250 mm and the average daily temperature ranges from 19°C - 33°C.

Data collection

Clinic records of the Poultry Health Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria were studied from

January 1990-December 1999 to determine the effects of season, age, type of bird specie, vaccination history, flock size, source of birds and source of feed on outbreaks of ND.

Information on ND was extracted from the clinic record and all non-ND cases were considered in a group as, "other poultry diseases." A case was defined as a farm that reported an outbreak of a disease and was diagnosed based on history, clinical signs, postmortem findings and laboratory results, in the Veterinary Teaching Hospital Ahmadu Bello University, Zaria, Nigeria.

The age groups of birds were categorized as follows: (i) 1-5 weeks old (ii) 6-10 weeks old (iii) 11-15 weeks old (iv) greater than 15 weeks old and (v) unknown age. The birds were categorized according to the purpose of keeping the birds. i.e. layers, broilers, cockerels, breeders and mixed (local chickens)

The flock sizes were arranged in ranges, The following ranges were adopted: (i) 1-50, (ii) 51-100, (iii) 101-200, (iv) 201-300, (v) greater than 300 and (vi) unknown flock size

A flock is considered as vaccinated, if there is a history of Newcastle disease vaccination irrespective of the type of ND vaccine used and the frequency of vaccination. The birds were divided into two groups, vaccinated and unvaccinated.

Data analysis

The odds ratio (OR) for months, season, species, type of bird, age group and flock size were calculated to determine whether there is an association or not between the factor and ND. OR greater than unity denoted association and less than unity indicates that the factor may be protrusive (Harnett and Murphy, 1974; Klienbaun and Kupper, 1978, SAS, 1987).

The seasons in Zaria and environ were categorized as follows: (i) dry season (January - March). (ii) Pre-rainy season (April-June), (iii) rainy season (July-September) and pre-dry season (October- December). (Abdu *et al.*, 1992). The monthly variation in the distribution of ND was determined by reducing

the 10 year (1990 -1999) data to one year using the 12 monthly ratios to moving average method (Harnett and Murphy, 1974). The graph of the isolated monthly index (ISMI) was plotted.

RESULTS

A total of 2,153 cases of poultry diseases were recorded in the Poultry Health Clinic of Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria from January 1990 to December 1999. The prevalence of ND was 32.3% (812). One hundred and thirty nine (17.1%) outbreaks of ND were recorded in 1990. The lowest number of cases, 53 (6.5%) were recorded in 1993 (Table I).

One hundred and thirty two (16.3%) cases of ND were recorded in December; the lowest outbreaks of ND cases (4.1%) were recorded in August. The OR for December was 6.40 and 0.6 for September. The isolated monthly index (ISMI) showed that the disease has a peak in January, November and December. The highest peak was in December and the lowest peak was in August (Fig. 1). Three hundred and seventeen (39.0%) cases of ND were recorded in the pre-dry season and 110 (13.5%) cases were recorded in the rainy season. The OR for the pre dry season was 3.41 and 0.4 for rainy season (Table II).

One hundred and ninety seven (24.3%) outbreaks of ND were recorded in birds of 11-15 weeks (WK) age group, 108 (13.3%) in

birds of 1-5 WK age group and 388 (47.8%) outbreaks were recorded in flocks whose ages were not known. The OR for 1-5 WK age groups was 7.38 and 27.47 for 11-15 WK. age group. (Table III). Two hundred and ninety seven (36.6%) outbreaks of ND were each recorded in layers and 19.0 (2.3%) outbreaks were recorded in cockerels. The OR for cockerels was 2.86 and 0.0 for breeders. (Table IV)

Eight hundred and eleven (99.9%) outbreaks of ND were recorded in chickens and 1.0 (1%) was recorded in turkeys. Three hundred and twenty (39.4%) cases of ND were recorded in vaccinated flocks while 492 (60.6%) were recorded in unvaccinated flocks. The distribution of ND cases by flock size is shown in Table V. Birds from flock size 1-50 recorded 379 (46.7%) cases of ND and 13(1.6%) cases were recorded in flocks greater than 300. The OR for flocks with 1-50 bird was 29.0 and 3.02 for flock with more than 300 birds.

One hundred and eighty seven (23.0%), 21 (2.6%) and 16 (2.0%) outbreaks of ND were recorded in birds obtained from Aewa Farms, Niyya Farms and ASD respectively and 373 (45.9%) cases of ND were recorded in bird whose sources were not known. (Table VI). One hundred and eighty four (22.7%), 23 (2.8%), 22 (2.7%) and 1(1.0%) cases of ND were recorded in birds fed with Sanders, ECWA, Guinea and Edasel Feed respectively and 373 (46.0%) cases of ND were recorded in birds whose sources of feed were unknown. (Table VII).

TABLE I: Yearly distribution of Newcastle disease and other poultry diseases in Zaria Nigeria.

	Frequency of Newcastle disease	Frequency of other Poultry diseases	Total	Yearly specific rates %	OR	95% confidence interval
Year	Frequency (%)	Frequency (%)	Frequency (%)			
1990	139 (17.1)	225 (13.2)	364 (14.5)	38.2	1.28	0.93-1.89
1991	101 (12.4)	240 (14.1)	341 (13.6)	29.6	0.88	0.62-1.31
1992	76 (9.4)	179 (10.5)	255 (10.1)	29.8	0.89	0.69-1.67
1993	53 (6.5)	134 (8.0)	187 (7.4)	28.3	0.85	0.47-1.08
1994	102 (12.6)	184 (10.6)	286 (11.4)	35.7	1.19	0.78-1.63
1995	89 (11.0)	181 (10.6)	270 (10.7)	33.3	1.05	0.72-1.55
1996	78 (9.6)	167 (6.8)	245 (9.7)	31.8	1.00	
1997	57 (7.0)	125 (7.3)	182 (7.2)	3.8	8.34	0.05-0.30
1998	60 (7.4)	140 (8.2)	200 (8.0)	30.0	1.09	0.60-1.50
1999	57 (7.0)	126 (7.4)	183 (7.3)	31.1	1.03	0.49-1.08
Total	812 (32.3)	1,701(67.7)	2,513 (100.0)			

TABLE II: Seasonal distribution of Newcastle disease and other poultry diseases in Zaria, Nigeria.

	Frequency of Newcastle disease	Frequency of other Poultry diseases	Total	Yearly specific rates %	OR	95% confidence interval
Year	Frequency (%)	Frequency(%)	Frequency(%)			
1990	139 (17.1)	225 (13.2)	364 (14.5)	38.2	1.28	0.93-1.89
1991	101 (12.4)	240 (14.1)	341 (13.6)	29.6	0.88	0.62-1.31
1992	76 (9.4)	179 (10.5)	255 (10.1)	29.8	0.89	0.69-1.67
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Total	812 (32.3)	1,701(67.7)	2,513 (100.0)			

TABLE III: Distribution of Newcastle disease and other poultry diseases by age group, in Zaria, Nigeria

Age group (weeks)	Frequency of Newcastle disease	Frequency of other poultry disease	Total	Age group specific rate	OR	95% confidence interval
	Frequency %	Frequency %	Frequency %			
1-5	108 (13.3)	213 (12.5)	321 (12.7)	33.6	9.94	0.21 - 0.34
6-10	15 (1.8)	294 (17.3)	309 (12.3)	5.1	1.00	
11-15	197 (24.3)	116 (6.8)	313 (12.5)	62.9	27.47	0.79 - 1.27
> 15	104 (12.8)	207 (12.2)	311 (12.4)	33.4	17.0	0.48-0.79
Unknown	388 (47.8)	871 (51.2)	1259 (51.1)	30.8	52.86	2.59 -3.79
Total	812 (32.3)	1701 (67.7)	2513 (100)			

TABLE IV: Distribution of Newcastle disease and other poultry diseases by type of bird in Zaria, Nigeria.

Type of bird	Frequency of Newcastle disease outbreak.	Frequency of other poultry disease outbreak.	Total	Type specific rate	OR	95 % confidence interval
	Frequency%	Frequency%	Frequency%			
Layers	297 (36.6)	395 (23.2)	692 (27.5)	42.9	1.9	0.45- 0.94
Broilers	199 (24.5)	490 (28.8)	689 (27.4)	28.9	1.00	
Breeders	0 (0.0)	0 (0.0)	0 (0.0)	0.00	0.00	0.00
Cockerels	19 (2.3)	25 (1.5)	44 (1.8)	43.2	2.86	0.61- 1.64
Local Chickens	29 (36.6)	791 (46.5)	1,088 (43.3)	2.7	1.26	1.51-3.25
Total	812 (100)	1701 (100)	2513 (100)			

TABLE V: Distribution of Newcastle disease and other poultry disease by flock size in Zaria, Nigeria.

Flock size (no. of birds)	Frequency of Newcastle disease outbreaks		Frequency of other disease outbreak		Total	Flock Size specific rate	OR	95% confidence interval
	Frequency of ND outbreaks %		Frequency of the poultry disease (%)		Total (%)			
1-50	379	(46.7)	86	(50.7)	1242 (49.4)	30.5	29.40	9.04-14.20
51-100	190	(23.4)	204	(120)	394 (15.7)	48.2	7.69	1.91-2.99
101-200	108	(13.3)	295	(17.3)	403 (16.0)	26.8	3.41	0.80-1.25
201-300	18	(2.2)	213	(12.5)	230 (9.2)	7.8	1.00	
> 300	13	(1.6)	19	(1.1)	32 (1.2)	40.6	3.02	0.26-0.84
Unknown	104	(12.8)	108	(6.3)	212 (84)	49.1	3.40	0.57-0.90
Total	812	(32.3)	1701	(67.7)	2513 (100)	P < 0.05		

TABLE VI: Distribution of Newcastle disease and other poultry diseases by source of birds in Zaria, Nigeria

Source of bird	Frequency of Newcastle disease (%)	Frequency of other poultry diseases (%)	Total (%)	Source specific Rate
Kaduna Hatchery	0 (0.00)	9 (0.5)	9(0.4)	0.00
NAPRI	7 (0.9)	0 (0.00)	7(0.3)	100.0
Arewa	187 (23.0)	14 (0.8)	201(7.9)	93.0
Ibadan	0. (0.00)	8 (0.5)	8 (0.3)	0.0
Abeokuta	0 (0.00)	97 (5.7)	97 (3.9)	0.0
ECWA	13 (1.60)	106 (6.2)	119 (4.7)	10.9
Zartec	7 (0.9)	9 (0.5)	16 (0.6)	43.8
Niger First	8 (1.0)	8 (0.5)	16 (0.6)	50.0
S and D	0 (0.00)	8 (0.5)	8 (0.3)	0.0
ASD	16 (2.0)	18 (10.6)	34 (1.1)	47.1
Niyya	219 (2.6)	14 (0.8)	35 (1.4)	60.0
Is Agric	0(0.00)	7 (0.4)	7 (0.3)	0.0
Edasel	1809(22.2)	188(11.1)	368(14.)	48.9
Market	0 (0.00)	7 (0.4)	1581(69)	0.0
Unknown	3739(45.9)	1208(71.0)	2513(10)	23.6
Total	812 (100)	1701(100)		

TABLE VII: Distribution of Newcastle disease and other poultry diseases by source of Feeds in Zaria, Nigeria.

Source of feed	Frequency of Newcastle disease (%)	Frequency of other poultry diseases (%)	Total (%)	Source specific rate
Pfizer	113(13.9)	17(1.0)	130(5.2)	86.9
ECWA	23(2.8)	14(0.8)	37(1.5)	62.2
Guinea	22(2.7)	25(1.5)	47(1.9)	46.8
Sanders	184(22.7)	189(11.1)	373 (14.8)	49.3
Top	0 (0.0)	12(0.7)	12(0.5)	0.00
Feeds	0(0.0)	11(0.6)	11(0.4)	0.00
Noma	0(0.0)	13(0.80)	13(0.5)	0.00
Edasel	1(0.0)	106(6.2)	107(4.3)	0.9
Self	96(11.8)	101(6.0)	197(7.3)	48.7
Unknown	373(46.0)	1213(17.3)	1586(63.1)	30.8
Total	312(100)	1701(100)	2513(100)	

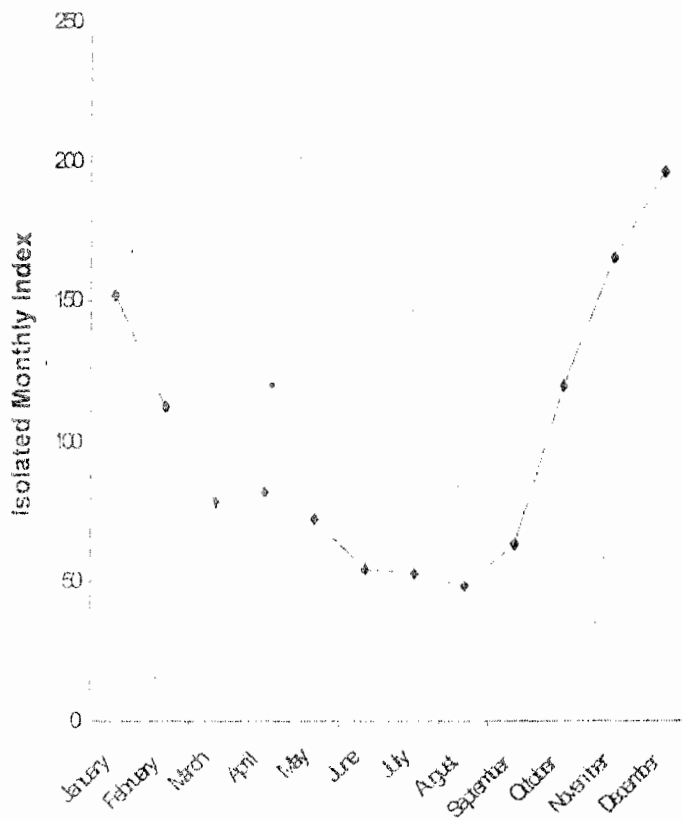


FIGURE 1: Monthly distribution of New castle disease in Zaria Nigeria

DISCUSSION

The prevalence of ND in this study was 32.3% which was higher than the 31.2% reported in Zaria by Halle *et al.* (1999). This may be due to increase in the number of backyard poultry farmers in Zaria in the period under study. Although ND was observed to occur throughout the year its occurrence was more likely to be in the dry season months than in the rainy season. This observation lends support to the works of Abdu *et al.* (1992) who reported that the harsh harmattan wind and the cold weather makes birds more susceptible to ND. The isolated monthly index (ISMI) showed that the disease has two peaks, one in January and a continuous peak from October to December. This is similar to what was reported and explained by Sa'idu *et al.*, (1994). Halle *et al.* (1999) also observed that ND is more likely to occur in December, November and January. It is important to note that these months fall within the dry harmattan period which is characterized by dry wind and cold (Abdu *et al.*, 1992). The cold harmattan wind is reported to increase the aero stability of NDV (Nawathe, 1985). The slight increase in ND prevalence in April may be due to high environmental temperature usually recorded in this month (Abdu *et al.*, 1992). High temperature causes heat stress that depresses the immunity of birds thereby making them more susceptible to ND and other poultry diseases (Seigel, 1985; Abdu *et al.*, 1992).

In this study most ND outbreaks were recorded in bird of unknown age, this may be as a result of the fact that most flocks in Zaria are small backyard holdings and owners of these flocks are not diligent in keeping records. Also, some of them purchase older chicks from hawkers at local markets in Zaria and its environs. It is also important to note that most owners of local chickens do not record the age of their birds and the flocks are usually made up of birds of different ages. Local chickens are known to suffer from annual epidemic of ND with high mortalities (Alders and Spradbrow, 2001).

The most susceptible age group to ND viral infection in this study was 11-15 WK. This may be attributed to inadequate ND antibody titre capable of protecting the bird from field ND virus

infection. The present ND vaccination programme in Zaria (i.e. NDVi/o at day old, ND vaccine La Sota at three WK and ND vaccine Komarov at six and sixteen WK (Halle *et al.*, 1999) may also explain why the birds in the 11-15 WK age group were at high risk of suffering from ND. Layers and cockerels were at highest risk of ND outbreak than other type of bird, this may be due to the fact that most backyard and commercial farmers in Zaria raise layers and the stress of egg production depresses their ability to resist infection, and in addition, some farmers do not administer booster doses of ND vaccine to layers. The cockerels are at high risk because most backyard poultry farmers that keep this type of bird for meat do not regularly vaccinate them against ND. In most cases the cockerels are not adequately fed, and some are even raised extensively.

In this study 99.9% of all the ND outbreaks were recorded in chickens and only an outbreak was reported in turkeys. This may be due to absence of organized turkey farms in Zaria. In this study 60.6% of ND outbreaks were recorded in unvaccinated birds. This means that vaccinated bird must have develop enough protective immunity against the disease (Halle *et al.*, 1999). Considering the distribution of ND by flock size, it was observed that as the flock size increased the number of outbreak reduces. This observation may not be readily explained but, it could be that backyard poultry farmers with small sized flocks do not follow ND vaccination schedules strictly.

Most of the ND outbreaks were recorded in birds whose sources were not known. This may indicate that most backyard poultry farmers obtained their day old chicks from middle men or hawkers with inadequate records and not directly from known hatcheries. It may also indicate the poor disease reporting habit of some poultry farmers which affect the quality of information they give when reporting sickness or mortality to the clinic (Abdu and Sa'idu, 2000). The second and third highest outbreaks of ND were recorded in birds obtained from

Arewa and Edasel respectively. This may be that more birds were obtained from these sources during the period of this study.

The sources of feed were not known by the majority of the farmers because of their poor attitude to record keeping. The self compounded feed in some instances may be of poor quality and not balanced leading to lowered resistance to diseases. It is also a common practice among farmers in Zaria to mix the commercial feed with corn bran in order to reduce the cost of feeding the birds which may make the feed unbalanced thereby leading to lowered disease resistance.

CONCLUSION

It was concluded that ND was more common in local chickens and the disease was a disease of dry season months, therefore both local and commercial birds should be properly housed in order to be protected from the harsh weather during harmattan period. The Backyard poultry farmers should be encouraged to adhere to ND vaccination schedule.

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