



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating: 4.61

VET 2025; 10(3): 111-115

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www.veterinarypaper.com

Received: 24-01-2025

Accepted: 26-02-2025

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Mortality patterns in indigenous chickens of Kannur and Kozhikode Districts of Kerala

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DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i3b.2115>

Abstract

A survey study was conducted to document the pattern and causes of mortality in village chicken farming households of Kannur (N=21) and Kozhikode (N=43) districts of Kerala. In Kannur, mongoose (28.41%) and dogs (6.25%) were the primary predators, while in Kozhikode, mongoose (15.47%) wolves (10.43%) were common. Out of initial stock of 176 and 278-day-old chicks, predation accounted for 37.50 and 59.35% mortality in Kannur and Kozhikode districts respectively. Diseases accounted for 20.45 and 17.27% of mortality in the respective districts. Thus, the overall mortality of 57.95 and 76.62% out of was recorded in Kannur and Kozhikode districts, respectively leaving only 42.05% of the flock in Kannur and 23.37% in Kozhikode at 72 weeks of age. Ranikhet disease was identified as important disease by 33.33% farmers in Kannur, while 27.91% of the farmers in Kozhikode district cited respiratory diseases as major concern. A significant proportion of 42.86% in Kannur and 39.53% in Kozhikode opined disease incidences were higher in summer. Most farmers relied on allopathic and/or herbal medicines for treatment, with 57.14% in Kannur and 44.19% in Kozhikode districts practice own medication to treat the diseases.

Keywords: Diseases India, mortality, predation, village chicken

1. Introduction

Backyard chicken plays an important role in providing nutritious animal protein and supplementary income to the village farmers. Nearly 29% of layers are of indigenous type in India out of total layers in commercial farms and backyard put together (Churchil, 2022) ^[2]. Although low in production, the indigenous chickens are good mothers and suitable for smallholder scavenging family poultry (Kumar *et al.*, 2013a) ^[9]. The meat of indigenous chicken is considered as delicacy and fetches price of almost three times to that of commercial broiler meat (Kumar *et al.*, 2013b) ^[10]. The backyard poultry is reared in free-range system, wherein the birds find most of their feed by themselves through the scavengeable feed sources such as insects, seeds and kitchen wastes. Supplementary feed is given in the form of grains commonly available in the households (Nyandebo *et al.*, 2022) ^[12]. The bacterial, viral and parasitic diseases, accidents, poor nutrition, theft and climatic stress are the major causes of mortality or loss in these flocks. The severity of diseases/parasites was high in the plains, while predators were more of a problem in forested, farm-bush and grassland areas (Conteh and Gogra, 2020) ^[3].

The predators could be of areal or terrestrial. Major areal predators include crow, eagle and shikra (*Accipiter badius* and *A. virgatus*; local name: *Prappidiyan*), while terrestrial predators consist snake, cat, dog, mongoose and wolves. Aerial predators are the major threat to small chicks, especially when they begin scavenging and foraging independently (Kumar *et al.*, 2016) ^[8]. Simple fencing made around the grazing area using materials like bamboo splits could prevent the attacks of air-borne predators and mongoose. However, nocturnal predators like foxes, jackals and wild cats can invade by climbing over or digging under the fences (Biswas *et al.*, 2008) ^[1]. Another major cause for mortality is diseases. Respiratory tract infections, Newcastle disease, fowl pox and ectoparasites are causing major loss to the village farmers.

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Disease and predation together account for mortality of as high as more than two-third of the flock from day-old to 72 weeks of age in village chicken farming (Kumar *et al.*, 2016) [8]. Kumar *et al.* (2013c) [11] concluded from a study in Kannur and Kozhikode districts of Kerala, that proactive involvement of Government agencies is necessary for implementing disease and predation control measures in village chickens to augment output from this sector. A clear understanding of disease prevalence and predation in the hilly areas of Kerala is essential for efficiently implementing such measures therefore, this study was conducted.

2. Materials and Methods

A survey study was conducted to document the causes of mortality of the village chicken flocks, the common diseases prevalent and the control measures followed by the farmers in Kannur and Kozhikode districts of Kerala. Preliminary studies were conducted in these districts to identify the panchayats, which has significant activity of backyard chicken farming involving pure native chicken. Based on the preliminary studies, Thrippangottur Panchayat in Kannur district and Chekkiad Panchayat in Kozhikode district were found suitable for the study. Structured questionnaires were used to interview the member of the each family who was directly responsible for the care of chickens. Focussed group discussions with the family members were arranged to analyse the pros and cons of village chicken farming, disease prevalence, problem of predation and adequacy of veterinary facility in village chicken farming.

The information on hatches of chicks produced in these households and the age and cause of mortality were collected from day-old to 72 weeks of age. This information was collected from multiple hatches in the surveyed households. Thus, the mortality details from 454 day-old chicks (176 in Kannur and 278 in Kozhikode) up to 72 weeks of age was assembled. If the mortality was due to predation, the type of predator involved, namely, shikra, crow, dog, wolf, eagle, mongoose, cat and snake was recorded. Further, the farming households in Kannur (N=21) and Kozhikode (N=43) were interviewed to identify the most important disease condition among Ranikhet disease, respiratory disease, fowl pox and ectoparasites. The farmers were also asked to specify the season of highest disease occurrence among summer, rainy and all seasons; the type of medicine for disease treatment

between herbal and antibiotic; the preferred system of medicine between allopathic and indigenous and the choice of veterinary service between government institution and own-medication.

The rate of occurrence was calculated as proportion and the significance of difference between the proportions between two districts was compared using z-statistics.

$$Z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1 - \hat{p}) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Where,

$\hat{p}_1$: The proportion of sample 1, with sample size n_1

$\hat{p}_2$: The proportion of sample 2, with sample size n_2

$\hat{p}$: The pooled proportion calculated as $(x_1 + x_2)/(n_1 + n_2)$

3. Results and Discussion

3.1 Losses due to predation

In Kannur district, out of 176 initial day-old chicks, the mortality caused by primary predators was mongoose (28.41%) followed by dogs (6.25%), wolves (1.70%) and cats (1.14%) up to 72 weeks of age Table 1). In Kozhikode district, out of 278 initial day-old chicks, the mortality caused by different predators was mongoose (15.47%), wolves (10.43%), shikra (9.35%), dogs (7.91%), cats (6.12%), eagles (4.68%), crows (4.32%) and snakes (1.08%) up to 72 weeks of age. In total, predation accounted for 37.50% of total mortality in Kannur and 59.35% of total mortality in Kozhikode district up to 72 weeks of age. According to Kumar *et al.* (2016) [8], mongoose caused 44.63% of total mortality of village chicken in this area followed by shikra (16.15%) during chick stage, wolves (24.29%) followed by mongoose (22.86%) during grower stage and dogs (18.26%) followed by mongoose (16.52%) during adult stage. A mortality rate of 21% was recorded in Baladi grower chicken of Saudi Arabia (Yousef and Al-Yousef, 2007) [18]. At this stage, it was found from this study that wolf attack was the most common one followed by the attack of mongoose, cat, shikra, eagle and dogs. Biswas *et al.* (2008) [1] reported that crows, eagles, and mongoose are the primary predators during the day, while foxes, jackals, and wild cats are the main nocturnal predators.

Table 1: Causes of mortality in indigenous chicken of Kerala

Cause of mortality	Type	Kannur (N=176)	Kozhikode (N=278)	Z-Statistics
a. Predation	Shikra	0.00 (0)	9.35 (26)	4.18**
	Crows	0.00 (0)	4.32 (12)	2.79**
	Dogs	6.25 (11)	7.91 (22)	0.67 ^{NS}
	Wolves	1.70 (3)	10.43 (29)	3.54**
	Eagle	0.00 (0)	4.68 (13)	2.91**
	Mongoose	28.41 (50)	15.47 (43)	3.33**
	Cat	1.14 (2)	6.12 (17)	2.58 ^{NS}
	Snakes	0.00 (0)	1.08 (3)	1.38 ^{NS}
	Total mortality	37.50 (66)	59.35 (165)	4.54**
b. Diseases	All diseases	20.45 (36)	17.27 (48)	0.85 ^{NS}
Total mortality		57.95 (102)	76.62 (213)	4.20**

** Significant ($p < 0.01$); ^{NS} Not significant ($p > 0.05$)

This study also revealed that the predators like mongoose, shikra, crows, dogs, eagle, cats and snakes are prevalent in this region, which is covered significantly by forests with thick vegetation. Kannur and Kozhikode districts have extensive forest cover of 55.86 and 61.28% of their total

geographical areas respectively. It is noteworthy that the zone's topography is marked by valleys, hills with moderate gradients, and distinctive egg-shaped humps on hilltops. Conteh and Gogra (2020) [3] identified hawks, red foxes, and eagles as the most serious predators in Sierra Leone, while

dogs, iguanas, cats (both pet and wild), snakes, and crows had a moderate impact. Rats and pigs were reported to have a minor effect. Shortage of feed, destruction of habitat, and unfavourable environmental conditions are the main reasons for the frequent predator attack on chickens (Conteh and Gogra, 2020) [3].

3.2 Losses due to diseases

In addition to predation, diseases accounted for 20.45 and 17.27% of total mortality in the present study in Kannur and Kozhikode districts, respectively. In the same locality, Kumar *et al.* (2016) [8] noted that diseases accounted for 7.69, 20.00 and 52.18% of total mortality during chick, grower and adult stages, respectively. Conteh and Gogra (2020) [3] reported an annual mortality rate of 24.9% among native chickens in rural areas of Sierra Leone, located on the African continent.

Among the surveyed households, 38, 10% in Kannur and 27.91% in Kozhikode district opined that diseases in native chicken were not an important problem (Table 2). The present results conform the findings of Kumar *et al.* (2016) [8], who also reported that 26.67% of the farmers in this locality considered diseases as the major threat. Among other respondents in Kannur district, most of them (33.33%) considered Ranikhet disease as an important disease followed by respiratory disease (19.05%). In Kozhikode district, most of them identified respiratory disease (27.91%) as the most important one followed by Ranikhet disease (20.93%). Fowl

pox was deemed the next significant disease in both Kannur (9.52%) and Kozhikode (13.95%) districts, while 9.30% of households in Kozhikode also identified ectoparasites as next concern. Statistical analysis using the z-test revealed no significant difference in the perceived importance of disease conditions between the two districts. The combined data from respondents of Kannur and Kozhikode revealed that Ranikhet and respiratory disease were the top most important diseases followed by fowl pox and ectoparasites. The incidence of Ranikhet disease and/or fowl pox in native chicken populations has been reported in India and other countries by many earlier workers (Gupta *et al.*, 2006 [4]; Tania *et al.*, 2006 [14]; Vij *et al.*, 2006 [15]; Biswas *et al.*, 2008 [1]; Iqbal and Pampori, 2008 [6]), However, other diseases like Marek's Disease (Gupta *et al.*, 2006 [4]), chronic respiratory disease (Gupta *et al.*, 2006 [4]) and coccidiosis (Vij *et al.*, 2006) [15] have also been reported as important ones in different native chicken populations. The scavenging chicken farmers in central Uganda ranked the major infectious causes of mortality slightly differently from the present study, with Salmonellosis (37%), Newcastle Disease (ND) (28%), mixed infections (16%), and Coccidiosis (14%) being the most prevalent and significant (Semakula *et al.*, 2015) [13]. The respiratory syndrome reported by the farmers might be due to the combined infection of organisms like *E. coli*, *Mycoplasma sp.*, *Pasteurella sp.* etc.

Table 2: Common diseases of indigenous chicken and their control measures

SL. No	Cause of mortality	Rate of occurrence Percent (No)			Overall
		Kannur	Kozhikode	Z-Statistics	
1	Diseases				
	No disease	38.10 (8)	27.91 (12)	0.83 ^{NS}	31.25 (20)
	Ranikhet disease	33.33 (7)	20.93 (9)	1.21 ^{NS}	25.00 (16)
	Respiratory diseases	19.05 (4)	27.91 (12)	0.77 ^{NS}	25.00 (16)
	Fowl pox	9.52 (2)	13.95 (6)	0.50 ^{NS}	12.50 (8)
	Ectoparasites	0.00 (0)	9.30 (4)	1.44 ^{NS}	6.25 (4)
	Total	100.00 (21)	100.00 (43)		100.00 (64)
2	Season				
	No disease	38.10 (8)	27.91 (12)	0.83 ^{NS}	31.25 (20)
	Summer season	42.86 (9)	39.53 (17)	0.25 ^{NS}	40.63 (26)
	Rainy season	14.29 (3)	11.63 (5)	0.30 ^{NS}	12.50 (8)
	Any season	4.76 (1)	20.93 (9)	1.67 ^{NS}	15.63 (10)
	Total	100.00 (21)	100.00 (43)		100.00
3	Disease control measure				
	No measures taken	90.48 (19)	90.70 (39)	0.03 ^{NS}	90.63 (58)
	Biosecurity	0.00 (0)	2.33 (1)	0.70 ^{NS}	1.56 (1)
	Herbal	4.76 (1)	6.98 (3)	0.34 ^{NS}	6.25 (4)
	Antibiotics	4.76 (1)	0.00 (0)	1.44 ^{NS}	1.56 (1)
	Total	100.00 (21)	100.00 (43)		100.00 (64)
4	System of medicine				
	No treatment	23.81 (5)	37.21 (16)	1.07 ^{NS}	32.81 (21)
	Allopathic	28.57 (6)	16.28 (7)	1.15 ^{NS}	20.31 (13)
	Indigenous	28.57 (6)	32.56 (14)	0.32 ^{NS}	31.25 (20)
	Combination	19.05 (4)	13.95 (6)	0.53 ^{NS}	15.63 (10)
	Total	100.00 (21)	100.00 (43)		100.00
5	Veterinary services				
	No services	19.05 (4)	30.23 (13)	0.95 ^{NS}	26.56 (17)
	Govt. institution	23.81 (5)	25.58 (11)	0.15 ^{NS}	25.00 (16)
	Own-treatment	57.14 (12)	44.19 (19)	0.97 ^{NS}	48.44 (31)
	Total	100.00 (21)	100.00 (43)		100.00

^{NS} Not significant ($p > 0.05$)

Most of the respondents in Kannur (42.86%) and Kozhikode (39.53%) with an overall 40.63% respondents opined that diseases are prevalent in summer compared to rainy season. Kugonza *et al.* (2008) [7] reported a similar observation in

native chicken of Kumi district in eastern Uganda with 62% mortality occurring in dry season. In sharp contrast, Yousef and Al Yousef (2007) [18] found lower mortality in summer in Baladi chicken of Saudi Arabia.

The farmers were not impressed upon vaccination when explained; but felt predation is the grave problem causing more mortality compared to diseases. Similar observation of no vaccination against any of the diseases on the same population of Tellichery chicken has been reported by Vij *et al.* (2007) ^[16]. However, in case of other indigenous chicken populations like Kashmir Favorolla, Ghagus, Kalasthi, Ankleshwar and Daothigir, birds are being vaccinated against one or more diseases such as Ranikhet, fowl pox and fowl cholera (Vijh *et al.*, 2005 ^[17]; Tantia *et al.*, 2006 ^[14]; Vij *et al.*, 2006 ^[15]; Haunshi and Rajkumar, 2020 ^[5]). However, the practice of deworming either using allopathic medicines or indigenous substances has been reportedly followed in this area

Survey on disease control measures adopted revealed that 90.63% overall households (90.48% in Kannur and 90.70% in Kozhikode) did not practice any preventive control measures. Only a few farmers used herbs, antibiotics, or daily coop disinfection when they anticipated an outbreak or noticed disease conditions in nearby households. Even after an outbreak, nearly one-third of the farmers, (23.81% in Kannur and 37.21% in Kozhikode district) did not treat their birds, while others used herbal and/or allopathic medicines.

Regarding the services adopted for treatment, 57.14% households in Kannur and 44.19% in Kozhikode district (overall 48.44%) practiced own treatment, while 23.81% in Kannur and 25.58% in Kozhikode district (overall 25%) sought treatment from government institutions. Farmers cited the distance and inaccessibility of government veterinary dispensaries as the main reasons for not utilizing these facilities. Conteh and Gogra (2020) ^[3] reported that 38.2% of the respondents treated sick birds by themselves, 25.3% opted to eat or sell them, 4.5% sought assistance from veterinarians or Community Animal Health Worker (CAHW), while 32.0% offered no solution in rural areas of Sierra Leone, Africa.

3.3 Overall mortality

Altogether, there was a total mortality of 57.95 and 76.62% in Kannur and Kozhikode districts leaving only 42.05 and 23.37% of the flock respectively surviving up to 72 weeks of age. This result was in contrary with the report of Vij *et al.* (2007) ^[16], who stated that the mortality in the same population of Tellichery chicken was very low and almost nil. However, in Danki birds, Vijh *et al.* (2005) ^[17] documented a mortality rate of around 20 to 30 per cent during first two month of age, similar to the result of present study. Conteh and Gogra (2020) ^[3] reported predator (45.5%), diseases (27.1%), theft (8.7%), feed/ water shortage (5.3%), bad weather (5.1%), accident (4.6%) and other miscellaneous factors (3.7%) are the major causes of mortality in village chickens of rural areas of Sierra Leone, Africa.

4. Conclusion

It can be concluded that predation is a serious concern contributing to the mortality to the village chickens in the Kannur and Kozhikode districts of Kerala. Ranikhet and respiratory diseases are the major diseases causing mortality. Predation and diseases together result in substantial depletion in village chicken flocks, with only about half of the hatched chicks in Kannur and nearly one-third in Kozhikode reach 72 weeks of age. This situation highlights the need for active involvement of government in providing secure night shelter and strengthening veterinary services, especially in hilly regions of the Kerala.

Conflict of Interest

Not available

Financial Support

Not available

5. Reference

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How to Cite This Article

Kumar PG, Churchill RR. Mortality patterns in indigenous chickens of Kannur and Kozhikode Districts of Kerala. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(3):111-115.

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