

# Epidemiology of Village Chicken Diseases and Associated Risk Factors in Mizoram, India

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## Abstract

*The study was conducted in three districts of Mizoram (India) to investigate the diseases of village chicken and associated risk factors. Constraints of village chicken production were studied in 126 randomly selected households and incidence of diseases was studied on 60 purposively selected farmers having large chicken flock. The diseases and predation were perceived as the major causes of village chicken loss. The seasonal occurrence of diseases was high with heavy mortality in chicks during monsoon and summer which hindered the consistent rearing of large sized chicken flock. Highest mortality was due to New Castle disease followed by other infectious diseases. Ethno veterinary medicine was commonly practiced and the farmers used local herbs namely capsicum/ chilli (hmarcha), turmeric (tengtere), amla (sunhlu) and lemon juice (hatkora) during the disease outbreak and as prophylaxis. Appropriate management along with programmed vaccination against common viral diseases should be practiced to control the loss of village chicken.*



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**Keywords:** Epidemiological Factors, Mizoram, Morbidity, Mortality, Village Chicken

## Introduction

In recent years, there has been marked increase in commercial poultry production in India due to high consumption of poultry and poultry products because of its high nutritive value, free from social taboo and price competitive nature (Mishra *et al.*, 2015). Livestock and poultry rearing play pivotal socioeconomic role in hilly north eastern states of India. Mizoram is a bordering and hilly state of North East India which shares international borders with Bangladesh and Myanmar. The poultry production sector in Mizoram is still dominated by village poultry production and remains to be a low productivity subsector like in other parts of country (Mehta *et al.*, 2003). However, the backyard poultry production has been showing increased growth from 217.49 million in 2012 to 317.07 million in 2019 with 45.78 per cent growth rate in India. India is the third largest egg-producer in the world with 180 million eggs being produced and the world's fifth largest producer of poultry meat holding 3.10% of total poultry in the world. The total poultry population in Mizoram is 20, 31, 406 and back yard poultry contributes to 20, 18, 495 (20<sup>th</sup> Livestock census). Back yard poultry production uses family labour and birds are partly confined within a fenced yard or merely within an overnight shelter (Uro, 2019). The village poultry or back yard poultry provides valuable protein through low input system, now representing 30 percent or more of all protein consumed country wide. However, birds are thought to be subject of high range of morbidity and mortality due to mismanagement, lack of potable water and feed, diseases, accidents and predation resulting in economic losses (Kityali, 1999).

Only little research and development work have been undertaken on village chicken, despite the fact that they are more numerous than commercial chicken in most developing counties. Therefore, identifying the major constraints of village chicken production is a prerequisite to design and implement chicken-based development programmes that benefit the rural and tribal people of the state. However, in Mizoram, there is no systemic study so far on the pattern and causes of village chicken morbidity and mortality. The present paper aimed to conduct a survey on constraints of village poultry production, causes of morbidity, mortality and disease associated epidemiological factors in village chicken.

## Materials and Methods

### Study Area for Base Line Survey

The base line study was under taken in three districts (four villages from each district) of Mizoram, namely Aizawl, Kolasib and Mamit. The annual rainfall was estimated to be 208 cm and temperature ranged from 11 - 29<sup>o</sup>C. A total of 12 villages from Aizawl, Kolasib and Mamit districts (4 villages from each district) were selected based on chicken production potential and communication ease. An exhaustive list of poultry owners was collected from the local veterinarians of the State Animal Husbandry and Veterinary Department and SMS of KVKs working in the study area. A multi stage sampling procedure (random and purposive) was applied for the study.

### Sampling and Data Collection

A prospective study was carried out from May, 2011 to April, 2012 on village chicken in the study area with an aim of determining the incidence of diseases, morbidity and mortality pattern and associated epidemiological factors. A multistage sampling technique was used for the study. A total of 126 village chicken farmers were selected by random sampling technique and were interviewed by using pre-structured questionnaire to identify the major constraints in village chicken production. The incidence of diseases, morbidity and mortality pattern and associated epidemiological factors were studied on 60 numbers of purposively selected farmers having large flock size (12<), co-operative nature and communicative skills. Twenty farmers were selected from each district (5 farmers from 4 villages) which made a total of 60 households. A total of 1387 chickens from these 60 households were included in the study. The sample population was unvaccinated and apparently healthy at the beginning of the study.

The influence of epidemiological factors like season, age, breed etc. on incidence of diseases, morbidity and mortality were considered. Different age groups were classified as chick (0-3 and 4-8 weeks), grower (9-16 weeks) and adult (16weeks<). The year under study was divided in to four seasons viz. summer (March-May), monsoon (June-September), retreating monsoon (October-November) and winter (December-February). Different breeds were classified as pure breed (Aseel), cross breed and indigenous ecotype. The disease conditions were observed and diagnosed on the basis of farmer's perception, history, clinical signs, post mortem findings and suitable

laboratory techniques using standard methodologies as required. The samples for bacteriological study were collected by using sterile cotton swab from liver, heart, infected ova, peritoneal fluid, intestine, respiratory tract and heart blood from moribund/dead birds suspected for colibacillosis and salmonellosis at necropsy and was kept in test tube containing nutrient broth. The test tubes with samples were incubated overnight at 37°C. For primary cultures, the broth samples were separately inoculated in nutrient agar plate and incubated over night at 37°C. The colonies picked from the primary culture were repeatedly sub cultured on different selective media namely MacConkey agar, Eosine methylene blue agar and Brilliant green agar and organisms were identified as described by Quin *et al* (1990). The isolated colonies were stained with Gram's stain to study the morphological and staining characteristics of bacteria. Discrete colonies on the agar surface were observed for their shape, size, consistency and colour. Organisms were further confirmed by biochemical reactions using IMViC and Triple sugar iron tests. For Newcastle disease and infectious bursal disease, haemagglutination inhibition test and agar gel precipitation test were performed, respectively. The parasitic ova and protozoal oocysts were microscopically identified by routine ova and parasitic (O & P) examination (Gracia, 2004). The diseases with respiratory tract involvement were studied based on clinical signs and post mortem findings irrespective of cause.

## Data Analysis

The data sets obtained from base line survey on constraints of village chicken production system and incidence of diseases, morbidity and mortality pattern and their association with epidemiological factors were analyzed by using standard statistical techniques like percentile, proportion, mean etc. for logical interpretation (Snedecor and Cochran, 1994).

## Results and Discussion

### Constraints of Village Chicken Production

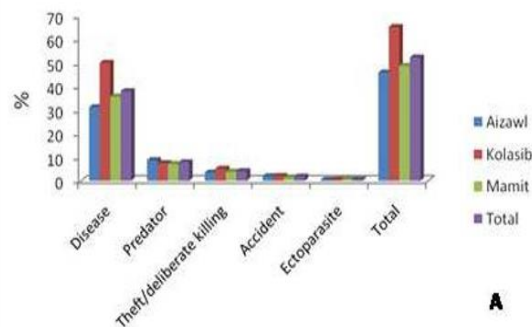
The baseline survey on 126 farmers revealed that high incidence of diseases was the top ranked (100%) and economically most important constraint in village chicken production in the study area followed by attack of predators (75.40%), lack of improved variety (55.56%), lack of veterinary and financial support (43.65%), lack of knowledge (33.33%), shortage of place (26.19%) and poor hygiene (11.11%). In the cross sectional study on 1387 chicken from 60 selected households, the overall mortality of village chicken was recorded as 52.42 per cent contributing to disease as the predominant cause of mortality (38.14%) followed by predators (7.86%), deliberate killing/ theft (4.11%), accident (1.80%) and ectoparasites (0.50%) (Table 1; Fig. 2A). The mortality due to diseases was markedly higher in Kolasib district (50.13%) than Aizawl (31.31%) and Mamit (35.79%) districts. High chick mortality (below 8 weeks) due to overload of diseases and predators hindered the consistent rearing of large sized flock.

**Table 1:** Causes of mortality in village chicken (n=1387) in selected households (N=60)

Causes of Mortality	District						Total (1387)	
	Aizawl (511)		Kolasib (387)		Mamit (489)			
	Death	%	Death	%	Death	%	Death	%
Disease	160	31.31	194	50.13	175	35.79	529	38.14
Predator	45	8.81	29	7.49	35	7.16	109	7.86
Theft/deliberate killing	18	3.52	20	5.17	19	3.89	57	4.11
Accident	10	1.96	8	2.07	7	1.43	25	1.8
Ectoparasite	2	0.39	2	0.52	3	0.61	7	0.5
Total	235	45.99	253	65.37	239	48.88	727	52.42

Some published reports on the constraints to backyard chicken production in Ethiopia indicated that high mortality in village chicken was caused by predators, infectious diseases, poor management and nutrition (Nega, 2012; Selam and Kelay, 2013). Predation and diseases were found to be the most common causes of village chicken mortality from Tanzania (Alfred *et al*, 2012). This difference could be due to protected shelter provided that reduced exposure of chicken to predation. Diarrhoea (kawthalo), dysentery (santen), coughing, sneezing and respiratory distress

(khuh), lesions in head (ar hmai huh), ectoparasites (saphihrik) and avitaminosis were the most common affections observed by the farmers with varying course from sudden death to a protracting course. Alfred *et al.* (2012) also noted diarrhoea, head nodules, bloody faeces, nasal discharge, swelling and closure of eye lid as major clinical signs in morbid birds. Biswas *et al.* (2005) reported that 58.44% deaths in village chicken had single or mixed type of infections.



**Figure 2:** A) Causes of village chicken mortality

The incidence/ outbreak of diseases were found to begin with the late summer and onset of rainy season and continued to affect the flock throughout the season due to fluctuating temperature, high humidity and wind co stressed with improper nutrition. Rats, snakes and foxes were the most commonly identified predators and were more prominent during the rainy season when vegetation was increased around the homestead. Practice of vaccination against the viral diseases was negligible and the base line survey showed that only 5.56 per cent farmers practiced vaccination irregularly that reared cross breed and Aseel birds. Lack of awareness, non-availability of vaccines in required doses, lack of cold storage, lack of hygiene and mal nutrition were the major constraints in prevention of diseases. Traditional treatment (ethno veterinary) had been a common practice among the tribal farmers and 18.25 per cent farmers used local herbs namely capsicum/ chilli (hmarcha), turmeric (tengtere), amla (sunhlu) and lemon juice (hatkora) more particularly against New Castle diseases during outbreak and as prophylaxis.

### **Incidence of Diseases in Village Chicken and Associated Epidemiological Factors**

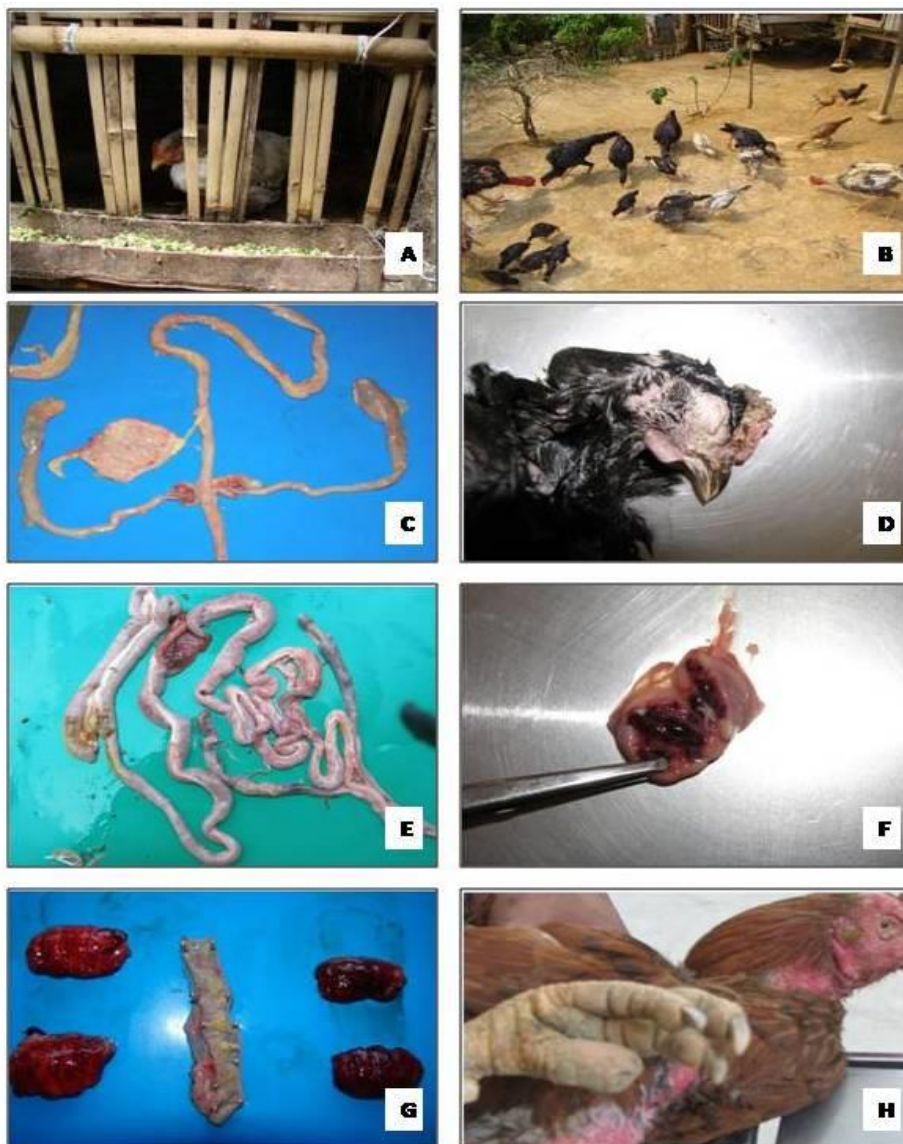
Ninety-two outbreaks of diseases were recorded affecting overall 52.92% birds with mortality rate of 38.14% (Table 2, Fig. 1A, B, C, D, E, F, G, H). The causes of diseases were similar in all the three districts with highest morbidity and mortality rates (50.13% and 64.86%) in Kolasib district followed by Mamit (53.37% and 35.79%) and Aizawl (43.44% and 31.31%) district. Viral diseases accounted for highest 44 outbreaks with 22 outbreaks of fowl pox, 16 outbreaks of New Castle disease and 6 outbreaks of infectious bursal disease. The morbidity and mortality values indicated the highest incidence of New Castle disease (23.14% and 18.60%) followed by fowl pox (7.93% and 4.33%), coccidiosis (6.71% and 5.05%), respiratory diseases (3.89% and 2.52%), colibacillosis (2.96% and 1.95%), infectious bursal disease (2.60% and 1.73%) and salmonellosis (1.51% and 1.08%) (Table 2). Although the occurrence of poisoning, *Ascaridia gali*, egg peritonitis, bumble foot and avitaminosis were recorded, the incidence rates were low. Dana *et al.* (2000) reported that the morbidity and mortality rates of birds due to Ranikhet disease were highest and is one of the main health constraints in rearing of desi chicken in tribal area of West Bengal, India. Marked depression, respiratory distress, greenish diarrhoea, head tremor and twisting and occasional paralysis were the major clinical signs observed in New Castle disease outbreaks. Shahid and Liaquat (2017) reported that NDV can infect both domestic and wild birds.

The major routes of transmission and spread of infectious diseases from flock to flock were probably the contact between chicken during scavenging and exchange of chicken from a flock where the disease was incubating, during marketing and ceremony. The occurrence of diseases was higher in the flocks where they were kept in unclean, wet and overcrowded housing and 100 per cent mortality was observed due to New Castle disease in such an unvaccinated flock reared near pig sty in Sihphir village of Aizawl district. In unvaccinated chickens, the morbidity and mortality rates may reach up to 100 per cent each, depending upon the virulence of the NDV. Chuma *et al.* (2019) reported that the combination of vaccination and appropriate environmental hygiene and sanitation reduces the rate of infection and concentration of New Castle disease virus in the environment than any other combination of control strategies.

**Table 2:** Occurrence of diseases in village chicken (n=1387) in selected households (N=60)

Diseases	District									Total (1387)			Rank
	Aizawl (511)			Kolasib (387)			Mamit (489)			Outbreak	Morbidity	Mortality	
	Outbreak	Morbidity	Mortality	Outbreak	Morbidity	Mortality	Outbreak	Morbidity	Mortality				
New Castle disease	4	100 (19.57)	80 (15.66)	5	96 (24.81)	88 (22.74)	7	125 (25.56)	90 (18.4)	16	321 (23.14)	258 (18.6)	1
Fowl pox	7	35 (6.85)	20 (3.91)	7	48 (12.40)	29 (7.49)	8	27 (5.52)	11 (2.25)	22	110 (7.93)	60 (4.33)	2
Infectious Bursal disease	2	14 (2.74)	8 (1.57)	2	10 (2.58)	8 (2.07)	2	12(2.45)	8 (1.64)	6	36 (2.6)	24 (1.73)	6
Coccidiosis	3	25 (4.89)	20 (3.91)	4	38(9.82)	28 (7.24)	3	30 (6.13)	22 (4.5)	10	93 (6.71)	70 (5.05)	3
Respirator disease	2	14 (2.74)	9 (1.76)	3	20(5.17)	12 (3.11)	2	20 (4.09)	14 (2.86)	7	54 (3.89)	35(2.52)	4
Coli bacillosis	1	10 (1.96)	7 (1.37)	3	18 (4.65)	13 (3.36)	2	13 (2.66)	7 (1.43)	6	41 (2.96)	27 (1.95)	5
Salmonellosis	2	8 (1.57)	6 (1.17)	1	5 (1.29)	4 (1.03)	1	8(1.64)	5(1.02)	4	21 (1.51)	15 (1.08)	7
Poisoning	1	2 (0.39)	2 (0.39)	1	3 (0.78)	3 (0.78)	2	9 (1.84)	8 (1.64)	4	14 (1.01)	13 (0.94)	8
Parasitosis ( <i>A. gali</i> )	1	4 (0.78)	2 (0.39)	2	3 (0.78)	2 (0.52)	2	6 (1.23)	4 (0.8)	5	13 (0.94)	8 (0.58)	9
Egg peritonitis	1	3 (0.59)	2 (0.39)	2	5 (1.29)	3 (0.78)	1	4 (0.82)	2 (0.41)	4	12 (0.87)	7 (0.50)	10
Bumble foot	1	3 (0.59)	2 (0.39)	2	3 (0.78)	2 (0.52)	2	4 (0.82)	2(0.41)	5	10 (0.72)	6 (0.43)	11
Avitaminosis	1	4 (0.78)	2 (0.39)	1	2 (0.52)	2 (0.52)	1	3 (0.61)	2 (0.41)	3	9 (0.65)	6 (0.43)	12
All cases	26	222 (43.44)	160 (31.31)	33	251 (64.86)	194 (50.13)	33	261 (53.37)	175 (35.79)	92	734 (52.92)	529 (38.14)	13

*Figures in the parentheses indicate morbidity and mortality rates*



**Figure 1:** A) Conventional chicken rearing; B) A village chicken flock; C) New Castle disease lesions; D) Fowl pox lesions; E) Coccidiosis lesions; F) Infectious bursal disease lesions; G) Respiratory tract disease lesions; H) Bumble foot lesions

The distribution of improved breed of chickens from infected poultry breeding and multiplication centre might also disseminate the diseases to village chicken. Although number of outbreaks of fowl pox was more, the morbidity and mortality rates were higher in New Castle disease. Colibacillosis was the most common bacterial infection followed by salmonellosis. Similar to the present finding, Biswas *et al.* (2007) also reported that New Castle disease had the highest proportional mortality rate (15.81%) followed by fowl pox, infectious bursal disease, salmonellosis and colibacillosis of 8.96, 2.04, 7.09 and 6.93 per cent, respectively in Bangladesh. In Ethiopia the most devastating diseases of village chicken were New Castle disease and infectious bursal disease (Shiferaw *et al.*, 2012; Chaka *et al.*, 2013). An overall 32.70 and 50 per cent mortality rates caused by New Castle disease and infectious bursal disease, respectively were reported by Mohamed *et al.* (2014). Infectious bursal disease was found as the second most important diseases of village chickens in Ethiopia and continuous presence of New Castle disease and infectious bursal disease in village poultry populations has been reported (Mazengia *et al.*, 2009; Hailu *et al.*, 2010; Kassaa and Molla, 2012; Shiferaw *et al.*, 2012). Coccidiosis was the major parasitic disease and had been found to be consequence of infectious bursal disease in two outbreaks. Earlier studies also indicated that coccidiosis impacted different chicken production systems (Getachew *et al.*, 2008; Luu *et al.*, 2013; Jallailudeen *et al.*, 2016). Hunduma *et al.* (2010) recorded high flock mortality due to New Castle disease (57.30%), fowl pox (31.60%) and coccidiosis (9.40%) in Ethiopia. Kumar *et al.* (2018) also reported colibacillosis and coccidiosis as major causes of mortality in Ranchi (India). The occurrence of poisoning, *Ascaridia gali*, egg peritonitis and avitaminosis B were low (Table 2). Bumble foot predominantly affected the Aseel breed with secondary bacterial infection of

*Staphylococcus aureus.*

Maximum morbidity and mortality due to diseases were seen among the birds kept in dark, congested, wet and dirty houses at night. However, the occurrence of disease in indigenous chicken from 4 flocks roosting on tree for night shelter did not show any mortality depicting the sturdy nature of indigenous ecotypes. The winter stress with the sudden change in weather at the beginning of summer lowered the immunity of birds surviving in improper management condition with inadequate feed and hence made the birds susceptible to various infections. (Khan et al., 2011).

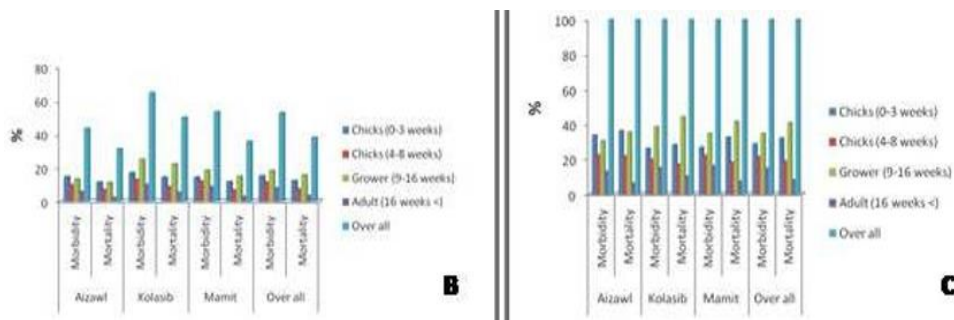
**Age Wise Incidence of Diseases**

Chicks were found to be maximum affected with diseases (38.43%) contributed by 15. 21 per cent in 0-3 weeks and 11. 39 per cent in 4-8 weeks followed by growers (18.46%) and adults (7.86%). The overall mortality rates in different age groups due to diseases were recorded as 19.47, 15.57 and 3.10 per cent in chicks (12.26% in 0-3 weeks and 7.21% in 4-8 weeks), growers and adults, respectively. The proportional morbidity and mortality rates also varied in similar pattern. (Table 3; Fig. 2B, 2C). Mekkonen (2007) reported that highest mortality occurred in chicks below 2 months of age followed by growers and adults.

**Table 3:** Age wise morbidity and mortality due to diseases in village chicken (n=1387) in selected households (N=60)

Age	District									Total (1387)		
	Aizawl (511)			Kolasib (387)			Mamit (489)					
	Total	Cases (222)	Mortality (160)	Total	Cases (251)	Mortality (194)	Total	Cases (261)	Mortality (175)	Total (1387)	Cases (734)	Mortality (529)
<b>Chicks (0-3 weeks)</b>	106	75 (14.68) *(33.78) **(70.75)	58 (11.35) *(36.25) **(54.72)	80	66 (17.05) *(26.29) **(82.50)	55 (14.21) *(28.35) **(68.75)	100	70 (14.31) *(26.82) **(70.00)	57 (11.66) *(32.57) **(57.00)	286	211 (15.21) *(28.75) **(73.78)	170 (12.26) *(32.14) **(59.44)
<b>Chicks (4-8 weeks)</b>	90	50 (9.78) *(22.52) **(55.56)	35 (6.85) *(21.88) **(38.89)	72	50 (12.92) *(19.92) **(59.44)	33 (8.53) *(17.01) **(45.83)	85	58 (11.86) *(22.22) **(68.24)	32 (6.54) *(18.29) **(37.65)	274	158 (11.39) *(21.53) **(63.97)	100 (7.21) *(18.90) **(40.49)
<b>Grower (9-16 weeks)</b>	161	68 (13.31) *(30.63) **(42.24)	57 (11.15) *(35.63) **(35.40)	125	97 (25.06) *(38.65) **(77.60)	86 (22.22) *(44.33) **(68.80)	136	91 (18.61) *(34.87) **(66.91)	73 (14.93) *(41.71) **(53.68)	422	256 (18.46) *(34.88) **(60.66)	216 (15.57) *(40.83) **(51.18)
<b>Adult (16 weeks &lt;)</b>	154	29 (5.68) *(13.06) **(18.83)	10 (1.96) *(6.25) **(6.49)	110	38 (9.82) *(15.14) **(34.54)	20 (5.17) *(10.31) **(18.18)	168	42 (8.59) *(16.09) **(25.00)	13 (2.66) *(7.43) **(7.74)	432	109 (7.86) *(14.85) **(25.23)	43 (3.10) *(8.13) **(9.95)
<b>Overall</b>	511	222 (43.44) *(100)	160 (31.31) *(100)	387	251 (64.86) *(100)	194 (50.13) *(100)	489	261 (53.37) *(100)	175 (35.79) *(100)	1387	734 (52.92) *(100)	529 (38.14) *(100)

(--) indicates overall morbidity and mortality rate; \*(--) indicates proportional morbidity and mortality rate \*\* (--) indicates age specific morbidity and mortality rate



**Figure 2:** B) Age wise morbidity and mortality rates; C) Age wise proportional morbidity and mortality rates

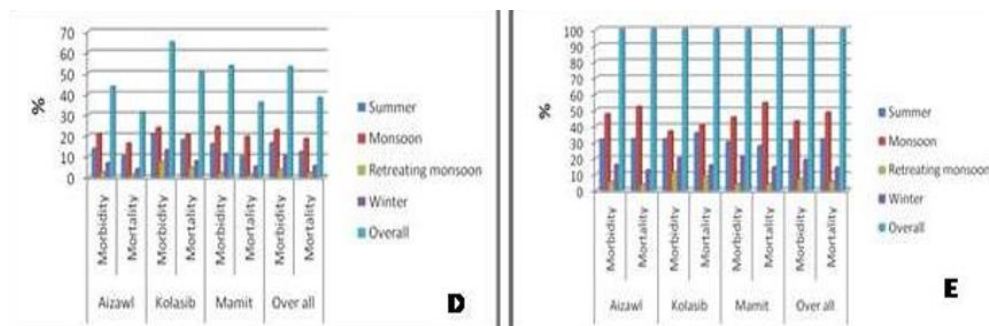
### Seasonal Incidence of Diseases

The seasonal variation of overall morbidity and mortality rates due to diseases (Table 4) showed highest occurrence in monsoon (22.71% and 18.46%) followed by summer (16.44% and 12.11%), winter (10.09% and 5.41%) and retreating monsoon (3.68% and 2.16%), respectively with similar pattern in all the three districts. (Table 4; Figure 2D).

**Table 4:** Seasonal morbidity and mortality in village chicken (n=1387) in selected households (n=60)

Season	District									Total (1387)		
	Aizawl (511)			Kolasib (387)			Mamit (489)			Out break	Cases	Mortality
	Out break	Cases	Mortality	Out break	Cases	Mortality	Out break	Cases	Mortality			
Summer	7	70 (13.70) *(31.53)	51 (9.98) *(31.88)	10	80 (20.67) *(31.87)	69 (17.83) *(35.57)	9	78 (15.95) *(29.89)	48 (9.82) *(27.43)	26	228 (16.44) *(31.06)	168 (12.11) *(31.76)
Monsoon	12	105 (20.55) *(47.30)	83 (16.24) *(51.88)	15	92 (23.77) *(36.55)	78 (20.16) *(40.21)	17	118 (24.13) *(45.21)	95 (19.43) *(54.29)	44	315 (22.71) *(42.92)	256 (18.46) *(48.39)
Retreating monsoon	2	12 (2.35) *(5.41)	6 (1.17) *(3.75)	4	29 (7.49) *(11.55)	17 (4.39) *(8.76)	2	10 (2.04) *(3.83)	7 (1.43) *(4.00)	8	51 (3.68) *(6.95)	30 (2.16) *(5.67)
Winter	5	35 (6.85) *(15.77)	20 (3.91) *(12.50)	4	50 (12.92) *(19.92)	30 (7.75) *(15.46)	5	55 (11.25) *(21.07)	25 (5.11) *(14.29)	14	140 (10.09) *(19.07)	75 (5.41) *(14.18)
Overall	26	222 (43.44)	160 (31.31)	33	251 (64.86)	194 (50.13)	33	261 (53.37)	175 (35.79)	92	734 (52.92)	529 (38.14)

(--) indicates overall morbidity and mortality rate, \*(--) indicates proportional morbidity and mortality rate



**Figure 2:** D) Season wise morbidity and mortality rates; E) Season wise Proportional morbidity and mortality rates

The season wise proportional morbidity and mortality rates due to diseases also showed similar pattern in all the three districts (Fig. 2E). Although the morbidity and mortality due to New Castle disease, fowl pox and coccidiosis were higher in late summer and monsoon months (May-August), sporadic incidences were recorded in other seasons indicating persistence nature of the diseases in the study area. During the dry months of retreating monsoon and winter, the diseases were maintained in specific foci with only few cases. However, the diseases spread in outbreak form during wet months of late summer and monsoon. This result agrees with the findings of Moges *et al.* (2010), Badhaso (2012) and Selam and Kelay (2013) who indicated that disease occurrence was higher at rainy season. The survival rate of chicken in the rainy season was lower because of high humidity, strong wind, risk of predation due to increased vegetation and fluctuating temperature. The adverse environmental conditions during rainy season made birds more susceptible to infectious diseases more particularly the respiratory tract infection including New Castle disease. On the other hand, Chaka *et al.* (2013) identified human activity and increase in the chicken market turnover during dry season could lead to outbreaks of chicken diseases which have been attributed to high prevalence during dry season.

### Breed Wise Incidence of Diseases

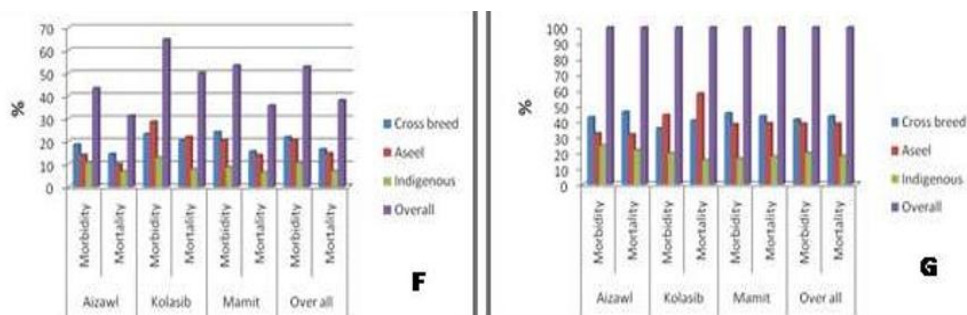
The overall morbidity and mortality rates due to diseases were 21.85 and 16.51 per cent in cross breed, 20.40 and 14.71 per cent in Aseel breed and 10.67 and 6.92 per cent in indigenous ecotypes, respectively. Similar pattern of

proportional morbidity and mortality rates were observed among different breeds of birds. (Table 5; Fig. 2F, 2G). The lack of vaccination and improper housing and management practice might attribute to higher mortality in Aseel and cross breed birds. However, the indigenous ecotypes might be sturdier and more resistant to diseases. Some breed-based studies conducted on New Castle disease indicated higher prevalence of the disease in cross breed than local breed (Belayheh *et al.*, 2014; Desalegn, 2015).

**Table 5:** Breed wise morbidity and mortality due to disease in village chicken (n=1387) in selected households (N=60)

Breed	District									Total (1387)		
	Aizawl (511)			Kolasib (387)			Mamit (489)			Total	Cases	Mortality
	Total	Cases	Mortality	Total	Cases	Mortality	Total	Cases	Mortality			
<b>Cross breed</b>	240 *(46.97)	95 (18.59) *(42.79) **(39.58)	74 (14.48) *(46.25) **(30.83)	130 *(33.59)	90 (23.26) *(35.86) **(69.23)	79 (20.41) *(40.72) **(60.77)	199 *(40.70)	118 (24.13) *(45.21) **(59.30)	76 (15.54) *(43.43) **(38.19)	569 *(41.02)	303 (21.85) *(41.28) **(53.25)	229 (16.51) *(43.29) **(40.25)
<b>Aseel</b>	145 *(28.38)	72 (14.09) *(32.43) **(49.66)	51 (9.98) *(31.88) **(35.17)	147 *(37.98)	111 (28.68) *(44.22) **(75.51)	85 (21.96) *(43.81) **(57.82)	165 *(33.74)	100 (20.45) *(38.31) **(60.61)	68 (13.91) *(38.86) **(41.22)	457 *(32.95)	283 (20.40) *(38.56) **(61.93)	204 (14.71) *(38.56) **(44.64)
<b>Indigenous</b>	126 *(24.66)	55 (10.76) *(24.77) **(43.65)	35 (6.85) *(21.88) **(27.78)	110 *(28.42)	50 (12.92) *(19.92) **(45.45)	30 (7.75) *(15.46) **(27.27)	125 *(25.56)	43 (8.79) *(16.48) **(34.40)	31 (6.34) *(17.71) **(24.80)	361 *(26.03)	148 (10.67) *(20.16) **(41.00)	96 (6.92) *(18.15) **(26.59)
<b>Overall</b>	511 *(100)	222 (43.44) *(100)	160 (31.31) *(100)	387 *(100)	251 (64.86) *(100)	194 (50.13) *(100)	489 *(100)	261 (53.37) *(100)	175 (35.79) *(100)	1387 *(100)	734 (52.92) *(100)	529 (38.14) *(100)

(--) indicates overall morbidity and mortality rate; \*(--) indicates proportional morbidity and mortality rate \*\*(--)) indicates breed specific morbidity and mortality rate



**Figure 2:** F) Breed wise morbidity and mortality rates; G) Breed wise proportional morbidity and mortality rates

## Conclusion

Incidence of diseases with high morbidity and mortality from New Castle disease and other infectious diseases was found to be the main constraint affecting the village chicken. Improper housing lead to both stresses predisposing to diseases and predation. Self-medication by the farmers bears considerable public health importance. The traditional medicaments included different medicinal plant species. Farmers were concerned regarding the nearest sources of improved variety of birds, low cost feed, availability of vaccines and effective veterinary services. Programmed vaccination at the household level could be considered to reduce the seasonal incidence and mortality from viral diseases. Further study is necessary to understand the interactions of these infectious poultry diseases and to estimate their impact on the backyard poultry production in the study area.

## Conflict of Interests

There is no conflict of interest.

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