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Farm Biosecurity at backyard poultry of Bangladesh and its role in spread of HPAI

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Objective

We have conducted this study to characterise the movement and contact patterns of poultry in Bangladesh that could be associated with transmission of newly-introduced subtypes of avian influenza virus in two districts of Bangladesh as well as to summarise the patterns arising from the network analysis in a way that can inform the parameterisation of spatially explicit stochastic models of transmission of newly-introduced subtypes of avian influenza virus in the two types of areas.

Introduction

Bangladesh is a South Asian country with large human and poultry populations which is highly affected with frequent outbreaks of both high and low pathogenic avian influenza since 2007. Very few studies have been carried out to reveal the farm biosecurity at backyard poultry that might have contributed to the spread of avian influenza in Bangladesh, specially rural areas. Therefore, we aimed to characterize biosecurity practices of poultry farm including the movement of live birds which is a well-known risk factor for the geographic dissemination of the virus among poultry flocks and personnel hygiene of poultry workers for rapid detection and effective risk management of incursion of HPAI and LPAI viruses.

Methods

This cross sectional survey was carried out using a pretested questionnaire in backyard Poultry holdings of Kalkini Upazila of Madaripur district in Dhaka division which has a relatively low proportion of commercial poultry farms and high proportion of backyard poultry holdings. 1-mode and 2-mode social network analysis was also carried out to show the farm to farm movements. From each primarily selected farm, details of the last 2 movements of live poultry along with source/destination details was collected with pre-tested questionnaire. Later, data was stored in Epi-Info, analysed with STATA 14 and UCINET. 315 backyard HH from 2 villages of Kalkini Upazila, Madaripur District were randomly selected.

Results

The study revealed that majority backyard farm owners do not maintain the standard biosecurity measures whereas a significant amount of the study included farms rear multiple poultry species. No poultry workers were found to use any personal protective equipment (PPEs) while cleaning the litter/mats (Figure 2). The farms with multiple poultry species feed them in same container and keep them in same shed which is a major risk factor for disease transmission. Movement patterns differed in a number of aspects (Table 1) and this information is useful for the establishment of the movement parameter settings in a simulation model of avian influenza incursion.

Conclusions

The findings on farm biosecurity practices and movement pattern from this study will support to develop risk-based surveillance and contingency policies as well as to minimize the spread between poultry units and also from poultry to people for novel AI viruses in Bangladesh.

Farm to Farm Movement of Live Birds (1-Mode Network Analysis)

Network metrics	Madaripur
A. Network size	
Number of nodes (farms)	291
Number of directed links	181
Total number of shipments	229
Network size (all possible pair-wise links)	84390
B. Node level centrality measures - values reported are Median (Minimum & Maximum)	
Out-degree (using binary network)	1 (0 – 2)
In-degree	1 (0 – 3)
Betweenness score	0 (0 – 8)
Density	0.002
Fragmentation	0.997

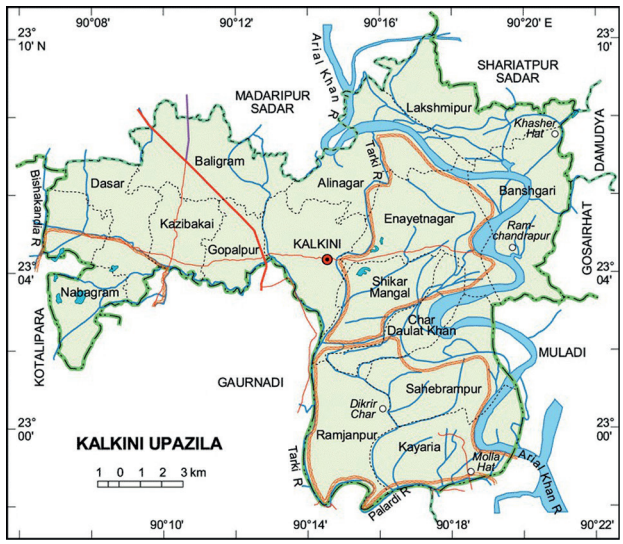

Figure 1. Study Area

Farm characteristics	Categories	Madaripur (n= 315)	
		Freq	%
Keep ducks in the same night shelter with the poultry	Yes	25	7.94
	No	290	92.06
Bring back unsold poultry	Yes	0	0.00
	No	190	60.32
	Do not sell any poultry	125	39.68
keep of bring back poultry upon unsold at market	Isolated from the flock	0	0.00
	Mix with the flock	0	0.00
	Do not bring back unsold poultry	190	60.32
	Do not sell any poultry	125	39.68
Place of poultry slaughter	Outside the home yard	136	43.17
	Inside the yard but separate from the house	176	55.87
	Place attached to the house	3	0.95
	Inside the house	0	0.00
Disposal of offal's	Bury	16	5.08
	Through	139	44.13
	Fish	87	27.62
	All above	1	0.32
	Bury and Through in open place	2	0.63
	Bury and Feed to fish/ animals	0	0.00
	Through and Feed	70	22.22
Allow birds to roam inside house	Yes	301	95.56
	No	14	4.44
Separate sick birds from the healthy bird	Yes	78	24.76
	No	237	75.24
Keep the sick birds	In the living room where household member sleep at night	58	18.41
	Inside poultry shed where healthy birds are kept at night	219	69.52
	Outside of the poultry shed but attached	38	12.06
	Other	0	0.00

Figure 2. Biosecurity Practices in Backyard Farms of Madaripur District

Keywords

Farm Biosecurity; HPAI; Backyard Poultry

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