Spatial and Temporal Magnitude of Highly Pathogenic Avian Influenza Outbreaks, Bangladesh, 2007-2008

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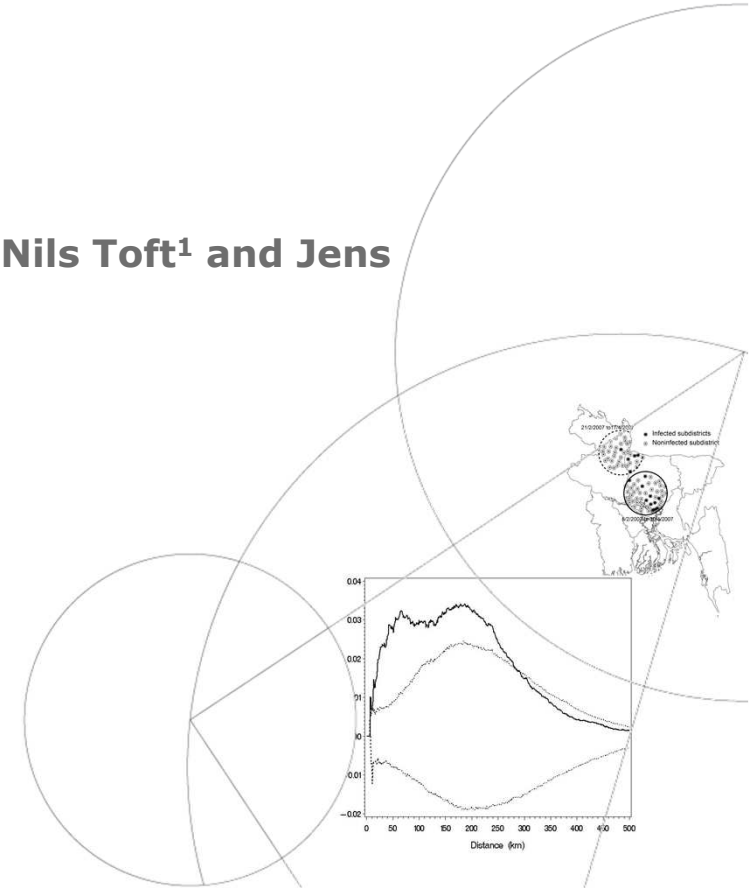
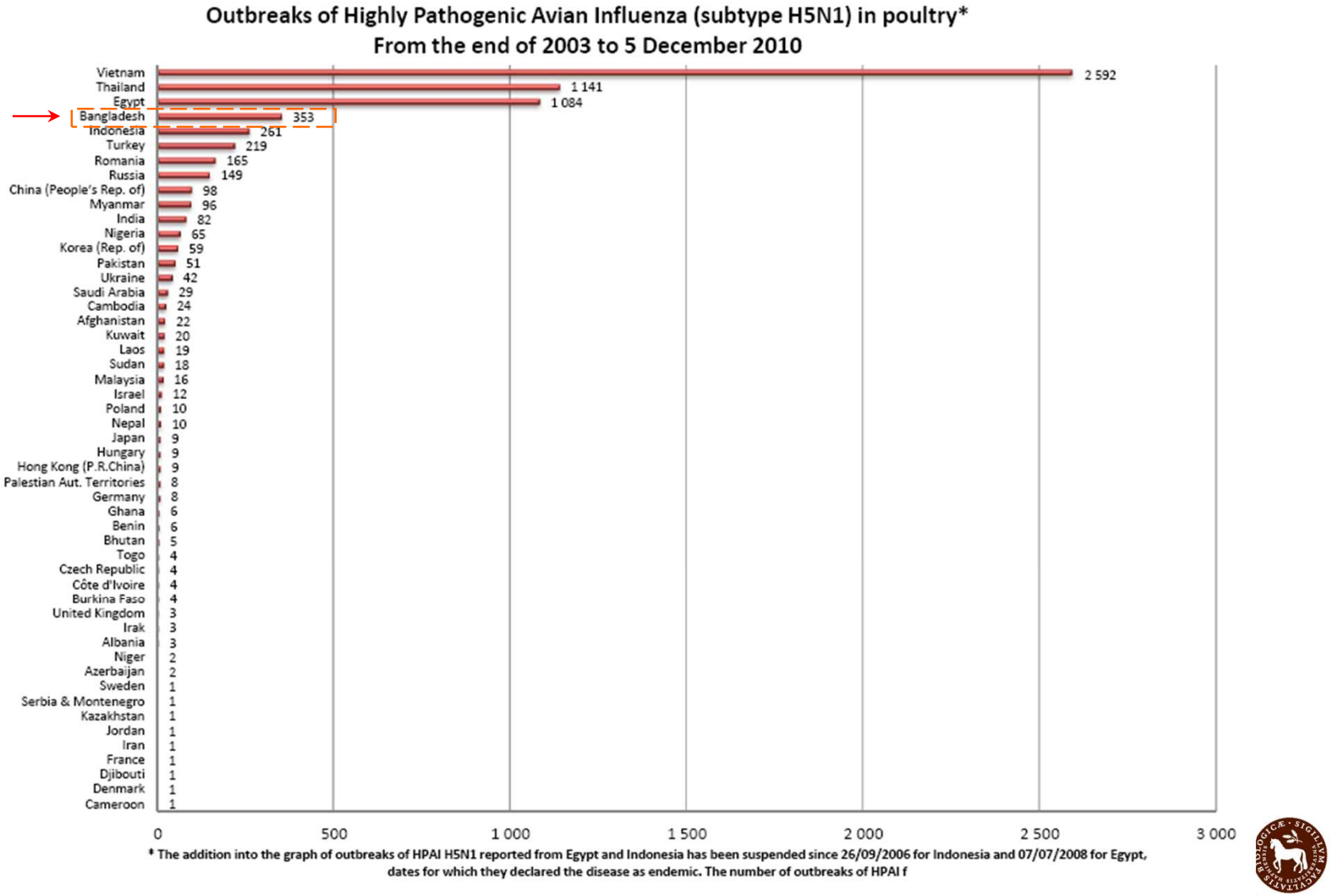


Introduction

Status of HPAI-H5N1 in Bangladesh



Source: http://www.oie.int/downld/AVIAN%20INFLUENZA/Graph%20HPAI/graphs%20HPAI%2005_12_2010.pdf

Introduction

Faced first outbreak of HPAI-H5N1 in February 2007

Ongoing outbreaks despite of range of control measures

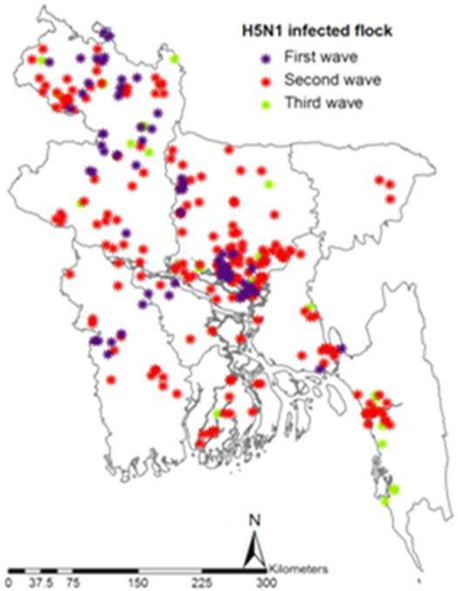
An estimated economic loss US$ 40 million for the year 2008 only (Alam J, et.al. 2009)

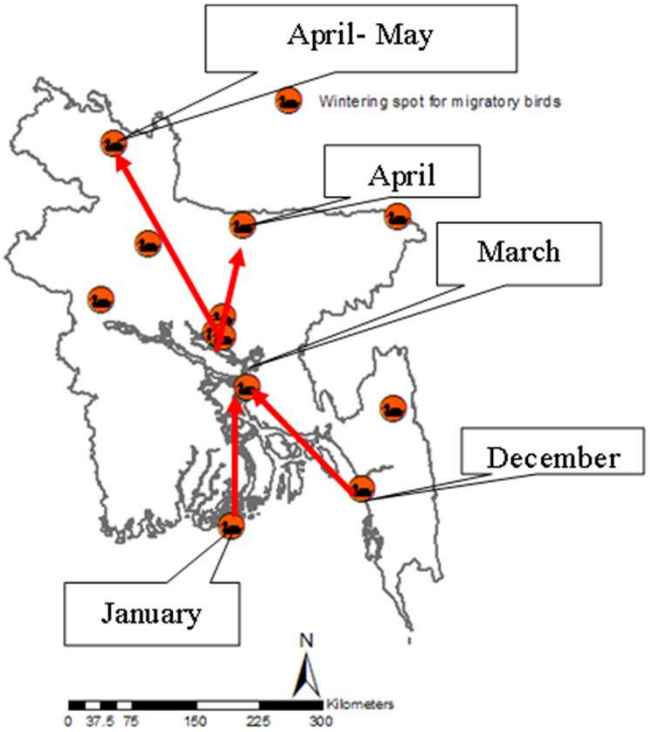
Understanding of introduction, epidemic progression, spread and persistance remains limited

Objectives

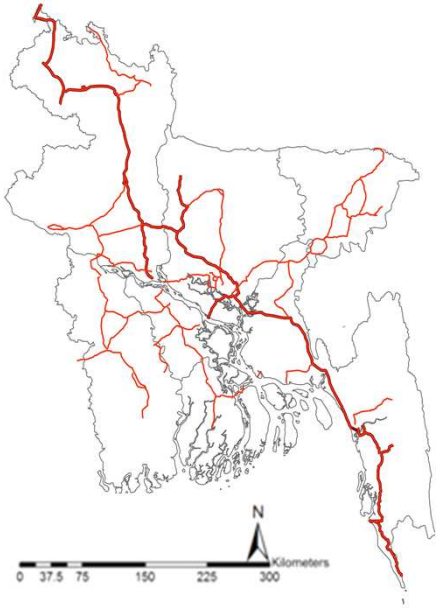
To gain in-depth understanding of introduction, progression and persistance

Hypothesis





Highway Network



Bin Muzzafar et. Al., 2008

& other literatures

Materials and Methods

Data:

Data for outbreak information were collected from the OIE website page (http://www.oie.int/downld/AVIAN%20INFLUENZA/A_AI-Asia.htm)

FAO Geonetwork (http://www.fao.org/geonetwork)

Bangladesh Bureau of Statistics (http://www.bbs.gov.bd)

Bird Life International (http://www.birdlife.org)

Materials and Methods

Epidemic curve

Magnitude:

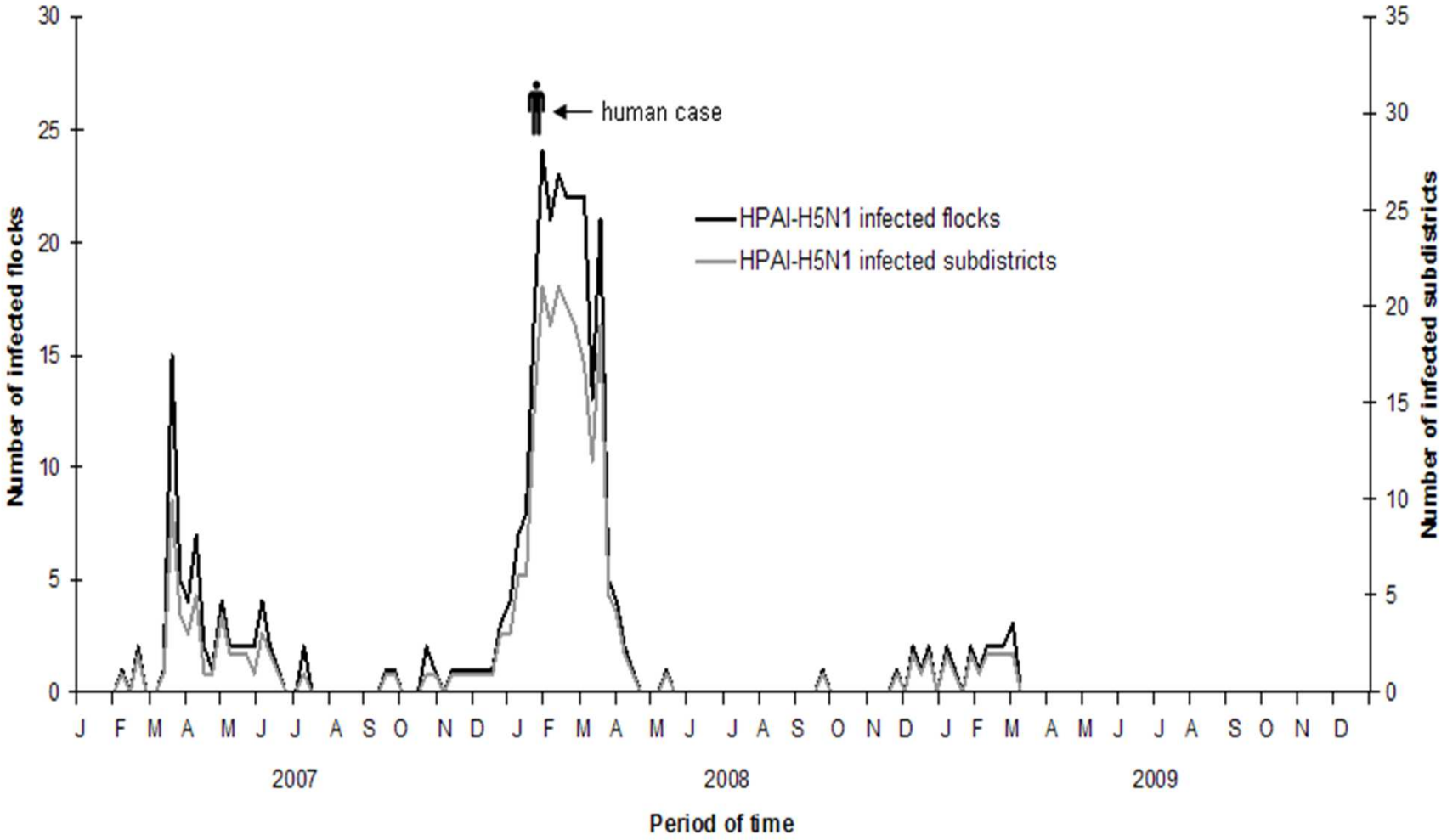
- Kernal smoothing (ArcView)
- Emperical Bayes Incidence (Geoda)

Materials and Methods

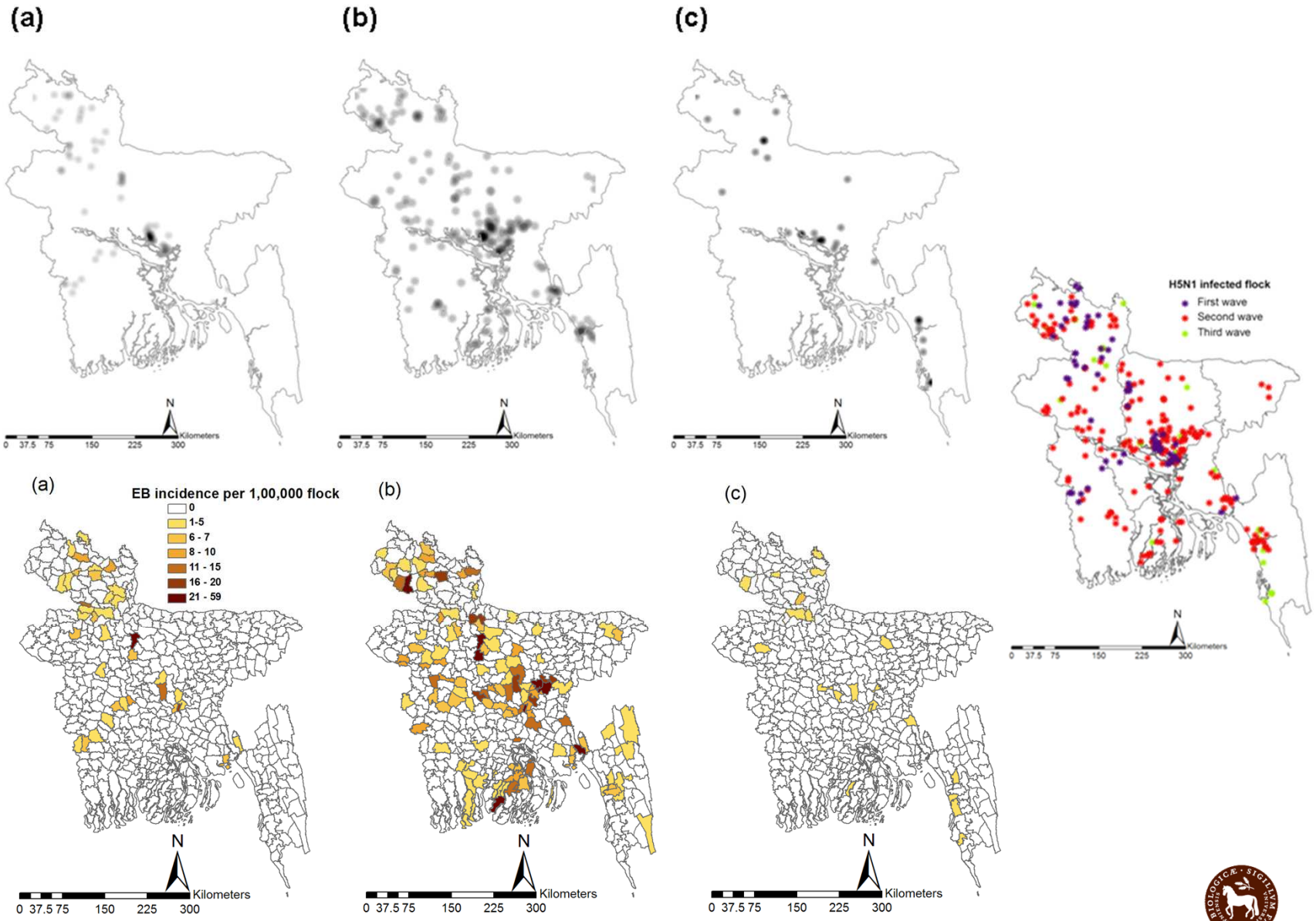
Directional statistics described by Jacqez GM (Clusterseer)

Instantaneous hazard anlysis (R)

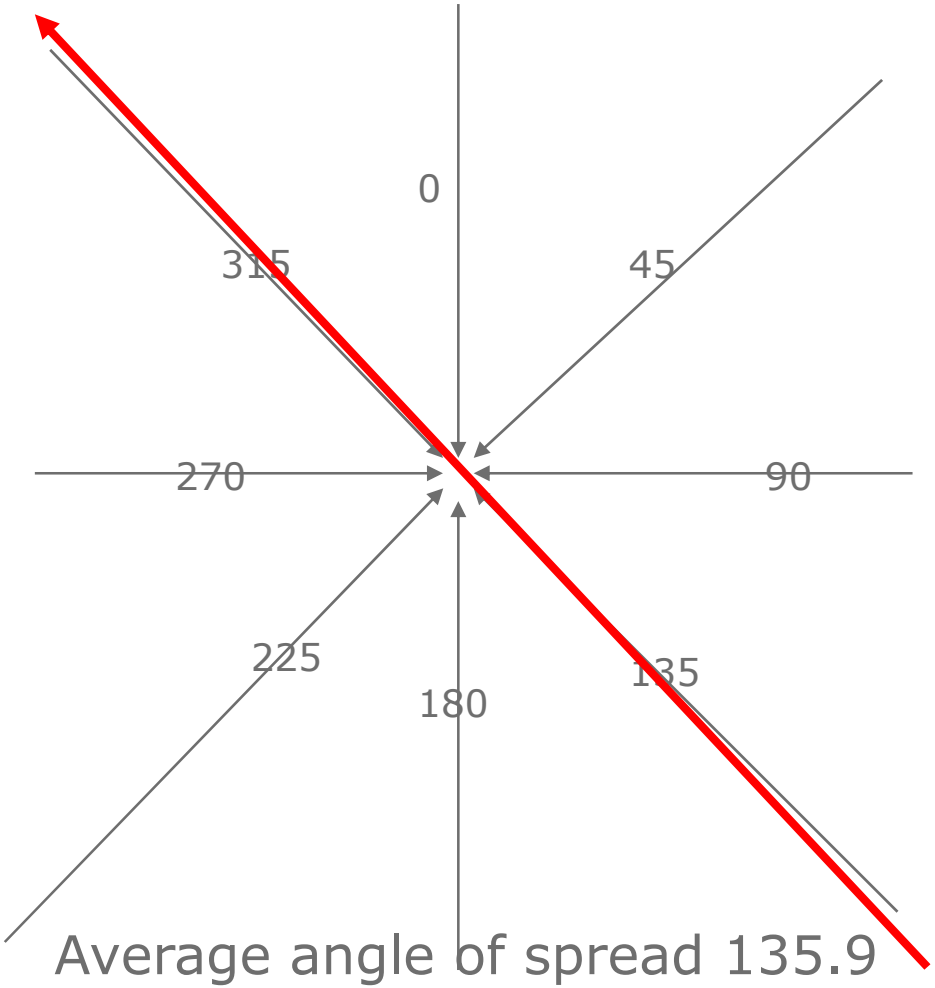
Results (Epidemic curve)



Results (Magnitude)



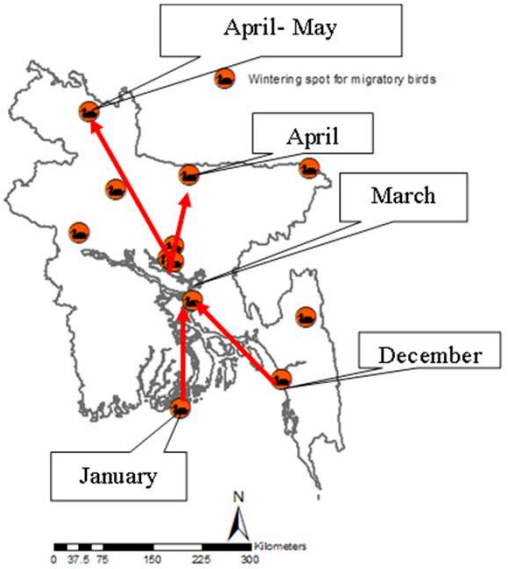
Results (Direction)

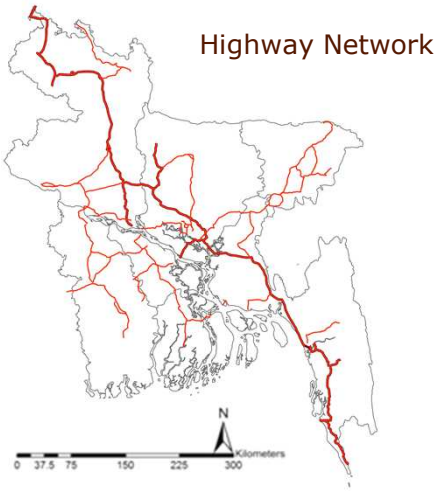


Average angle of spread 135.9

Angular variance 0.028

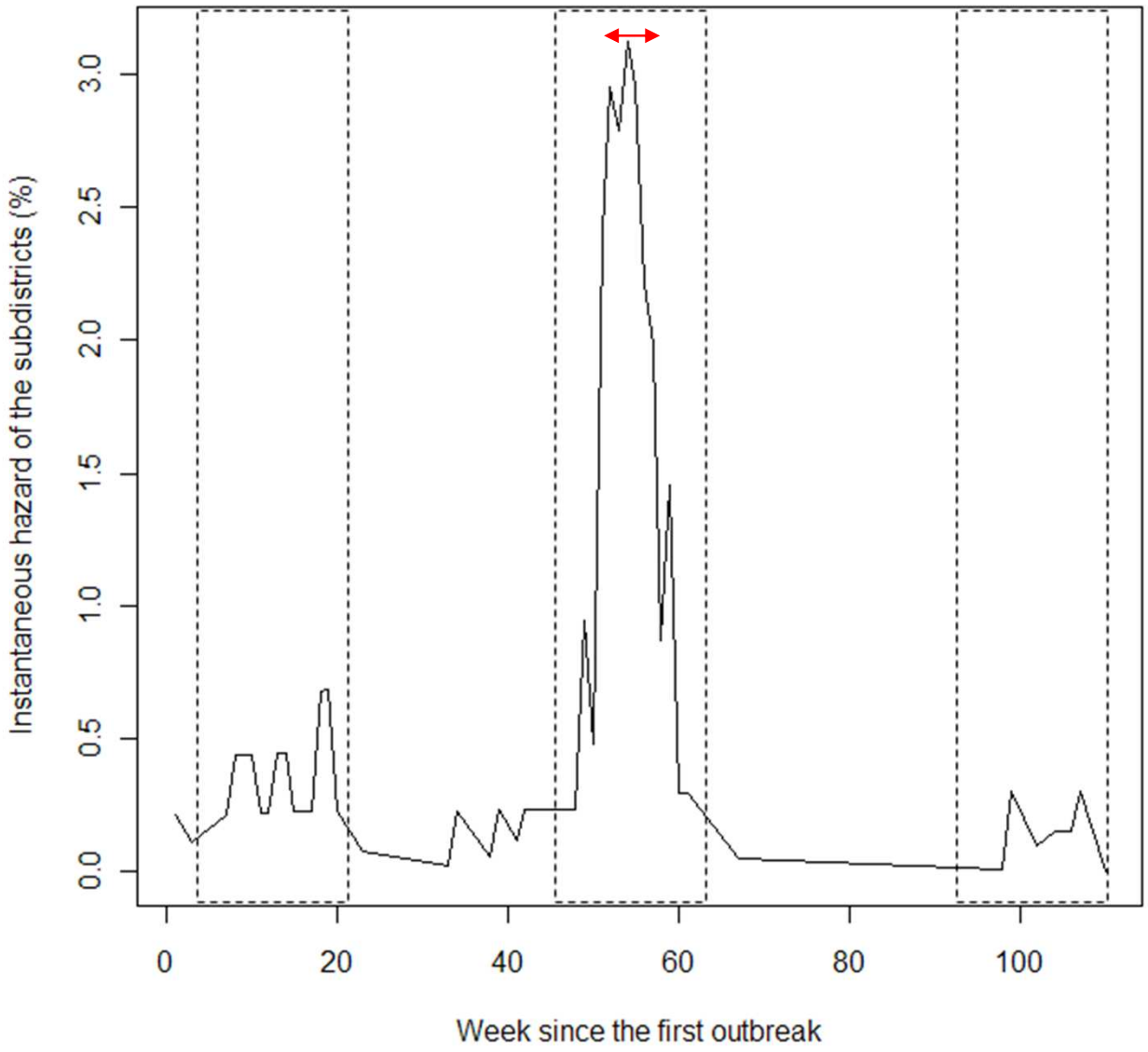
p<0.001





Results

Eastimated weekly hazards of H5N1-HPAI infection for the subdistricts of Bangladesh



Discussion

The descriptive analyses revealed that the intensity and magnitude of the second wave was the highest

The highest intensity and magnitude of the outbreaks was systematic persistent direction of epidemic progression in an oblique line that connects south-east to north-west through the central part of the country

Geostatistical analysis revealed a significant south-east to north-west direction

The line follows the major poultry trading route in Bangladesh. Moreover, several migratory bird stopovers were identified along the line

Discussion

Survival analysis of time to the first outbreak describes the temporal evolution of the epidemic

We estimated that the highest number of the subdistricts to be infected at a given week was 15

This information is of practical value and could be useful to assess possible infectiousness at spatial scale and to estimate the resources required to address an outbreak with certain magnitude at a given point in time

Conclusion

The line of magnitude and direction indicate the necessity of mobilizing maximum resources not at random, but on this line to strengthen the existing surveillance

Thanks