

A case-control study to identify risk factors for the occurrence of highly pathogenic avian influenza H5N1 in Nigeria



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Background and study objectives

Since its first introduction in 2006, Nigeria has officially reported 300 cases of highly pathogenic avian influenza (HPAI) H5N1 as at the end of August 2008 (Federal Department of Livestock and Pest Control Services, PACE/NADIS, Epidemiology Unit, Abuja, Nigeria). Almost all cases were outbreaks in domestic poultry reported at a farm, village or market level. Few cases were reported for wild birds. In general, the most affected farms were backyard commercial farms, mainly raising layer hens, and household free-range farms. In both 2006 and 2007, waves of outbreaks occurred between January and April. In 2008, Nigeria reported one outbreak in January and then only 2 other cases in July, in Kano and Katsina States. The spatial pattern showed mainly three clusters of outbreaks in the high populated areas of Lagos, Kano and Jos. Information regarding risk factors associated with outbreaks of HPAI H5N1 in Africa is scarce.

Government control measures in Nigeria have so far focused on stamping out, enhanced communication and advocacy, surveillance, capacity building and improved biosecurity in live-bird markets. This study aims at identifying risk factors for HPAI H5N1 occurrence at the farm-level with a view to informing control measures that could be applied to farms on a routine basis. In addition, this study aims to develop risk maps for the study areas that will allow surveillance efforts to be focused in those regions with a predicted high risk of disease.

Material & Methods

Study areas

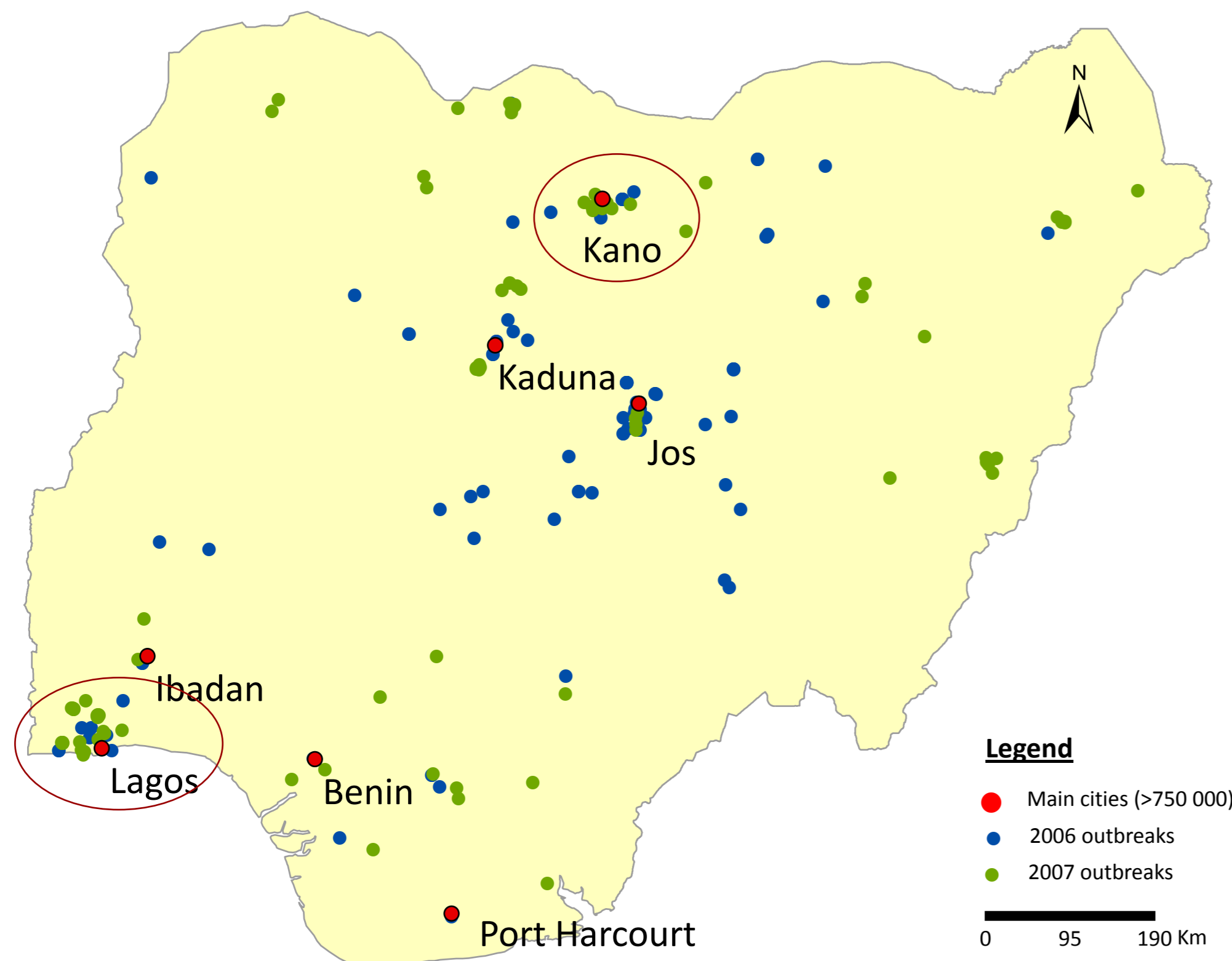


Figure 1: Location of reported cases of HPAI H5N1 in Nigeria in 2006 and 2007. The study areas Lagos and Kano are circled in red.

Design & Case definition

- **Study design:** case-control study
- **Epidemiological unit:** Backyard commercial farm and household free range farm.
- **Cases:** backyard commercial farm or household free range farm having experienced an outbreak in 2006 or 2007, confirmed by the laboratory.
- **Controls:** backyard commercial farm or household free range farm not having experienced an outbreak in 2006 or 2007.

Sample selection & size

- **Cases:** Randomly selected from the list of farms that reported confirmed outbreaks.
- **Controls:** Randomly selected from register of poultry farms. Controls that had an outbreak but did not report will be excluded.
- **Assumptions for sample size calculation (expert estimates):**
 - Exposure : farm being visited more than 7 times per week by a trader.
 - Proportion of cases exposed : 70%.
 - Proportion of controls exposed :40%.
 - Power 90% & significance level 5%
 - **Total sample size: 50 cases and 50 controls** to be divided between the two study areas proportional to the number of cases in each.



Data collection

- **Data to be collected:** History of disease on the farm, farm management, farm biosecurity, movement of staff and visitors, farm gate trade practices, market practices.
- **One interviewer** per study area will visit each farm and administer the questionnaire to the farmer.



Biases & measurement error

- **Random misclassification :** Some selected control farms might have experienced HPAI outbreaks but did not report. These farms will be excluded from the study.
- **Observer and recall biases:** Both farmer and interviewer are aware of the farm's status. Outbreaks happened 2 – 3 years ago.
- **Repeatability** will be ensured by the 2 interviewers being trained by the same person.
- **Validity:** the study was prepared in conjunction with epidemiologists experienced in HPAI H5N1 in a Nigerian context .

Expected outputs

- A detailed description of case and controls farm with respect to farm management practices, farm biosecurity, farm gate trade practices, market practices and movement of staff and visitors.
- Identification of farm-level risk factors associated with an HPAI H5N1 outbreak on backyard commercial and household free range farms.
- Risk maps of the two study regions (Lagos and Kano) indicating areas with a higher risk of experiencing an outbreak of HPAI H5N1 based on the significant risk factors identified in (b).

Outlook & Discussion



Epidemiological studies investigating risk factors for the occurrence of HPAI H5N1 in domestic poultry have, for the most part, been limited to South-East Asia and little information is currently available regarding the introduction and spread of the disease in Africa.

A parallel objective of the USAID-funded project was to produce risk maps for the introduction and spread of HPAI H5N1 in Africa using a knowledge-driven approach to risk mapping (multicriteria decision modeling (MCDM)). The results of this case-control study will be used to validate the choice of risk factors included in that model, and the weights assigned to each.

Acknowledgments: This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of RVC and ILRI and do not necessarily reflect the views of USAID or the United States Government.
 The authors thank Avian Influenza Control Project-Animal Health Component, Federal Department of Livestock, Abuja, Nigeria for providing outbreak data and for assisting in the implementation of the field work.

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