

SPATIAL DISTRIBUTION OF PRIMARY OUTBREAKS OF HIGHLY PATHOGENIC AVIAN INFLUENZA IN NIGERIA

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ABSTRACT

The geographic coordinates of 116 out of 166 poultry farms (69.9%) with confirm Highly Pathogenic Avian Influenza (HPAI) virus by the National Veterinary Research Institute (NVRI) in Nigeria, out of 629 premises that were screened within 30 States and the Federal Capital Territory (FCT) were used to design a spatial model of the spread of the virus within Nigeria from January 1, 2006 to January 31, 2007. The results showed that 19 of 36 States (52%) of Nigeria were affected with the virus. Movement of personnel from one infected farm to an uninfected farm, transfer of infected birds and contaminated equipment were the main sources of spread of the virus. Thus, there is need to improve the animal health services in Nigeria to attain efficient control of HPAI.

INTRODUCTION

Highly pathogenic avian influenza is a devastating disease of poultry, associated with high death rates that disrupt poultry production and trade (6, 5). The first outbreak of the disease in Africa was reported in Nigeria in January 2006. The outbreak occurred among commercial poultry flock in Kaduna, Plateau and Kano States, all in northern Nigeria. The outbreak later spread to the southern part of the country affecting 13 States within a period of 7 weeks (3). Since then, seven other African countries, namely, Egypt, Niger, Cameroon, Burkina Faso, Sudan, Cote d'Ivoire and Djibouti have reported infection and disease outbreaks (1).

Nigeria's first Highly Pathogenic Avian influenza (HPAI) outbreak occurred on January 16, 2006 and was caused by the H5N1 strain of the virus. The confirmation was based on laboratory tests carried out at the National Veterinary Research Institute (NVRI) in Vom, Plateau State, Nigeria and validated by the OIE Reference Laboratory for HPAI in Padova, Italy. Following the subsequent spread of the disease across poultry flocks in northern and southern Nigeria, all samples from suspected cases requiring laboratory test were confirmed at the National Veterinary Research Institute (NVRI) in Vom, Plateau State, Nigeria. It has therefore become possible to provide consistent reports of the disease emerging trend across the country. More than 100 poultry farms have since been confirmed positive. The farms are located in different States of Nigeria.

The aim of this study was to describe the spatial distribution and risk of spread of HPAI among poultry in Nigeria based on laboratory-confirmed records at the NVRI between January 2006 and January 2007.

MATERIALS AND METHODS

This study covered the period from January 16, 2006 to January 31, 2007, which corresponds to the primary outbreak of HPAI in Nigeria. The data were pooled for the entire time series from the NVRI. The coordinates of farms affected were collected using Personal Digital Assistant (PDA) running Global Positioning System (GPS). Non-spatial data were collected through case reports that accompanied the specimens for diagnosis. Every non infected farm within 5km and 10km radii of an infected farm was inventoried for spatial analysis on risk of spread. Spatial and non-spatial data gathered were added to ESRI ArcGIS Desktop for mapping.

RESULTS

The NVRI laboratory received a total of 570 samples from poultry farms and local chicken communities in 29 states and the Federal Capital Territory (FCT), Abuja, between January and December 2006. 134 (23.5%) were confirmed positive for H5N1. The positive cases originated from 17 states and the FCT. In January 2007, 32 (54.2%) of the 59 samples tested were confirmed positive for H5N1 in poultry.

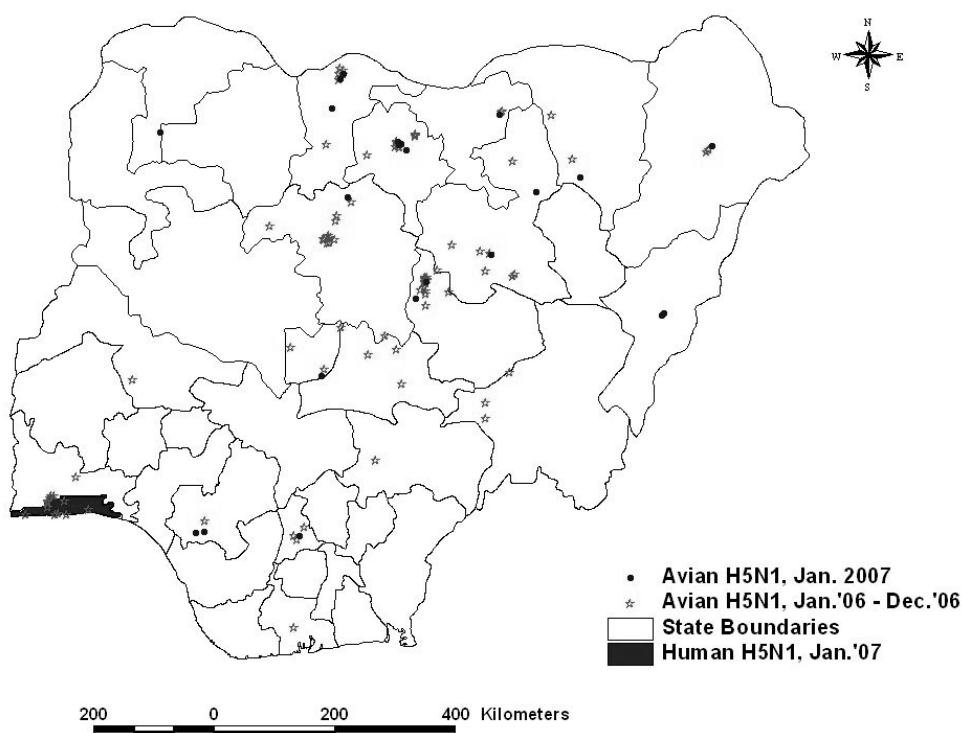


Figure1. Spatial distribution of HPAI outbreaks in poultry in Nigeria from January 2006 to January 2007 and location of the single human case in south-western Nigeria

In all, H5N1 outbreak was confirmed in 166 (26.4%) premises from 629 submitted from 19 states and the FCT from January 1, 2006 to January 31, 2007. The farms were distributed in various Nigerian states as shown in the Figure 1 above. There are 36 States in Nigeria and one Federal Capital Territory.

Figure 2 shows the epidemic curve of HPAI in Nigeria from January 2006 to January 2007, as well as a curve of the total number of states infected. The latter curve gives an indication of the spatial extent of the disease in the country, while the former indicates the magnitude of the outbreak.

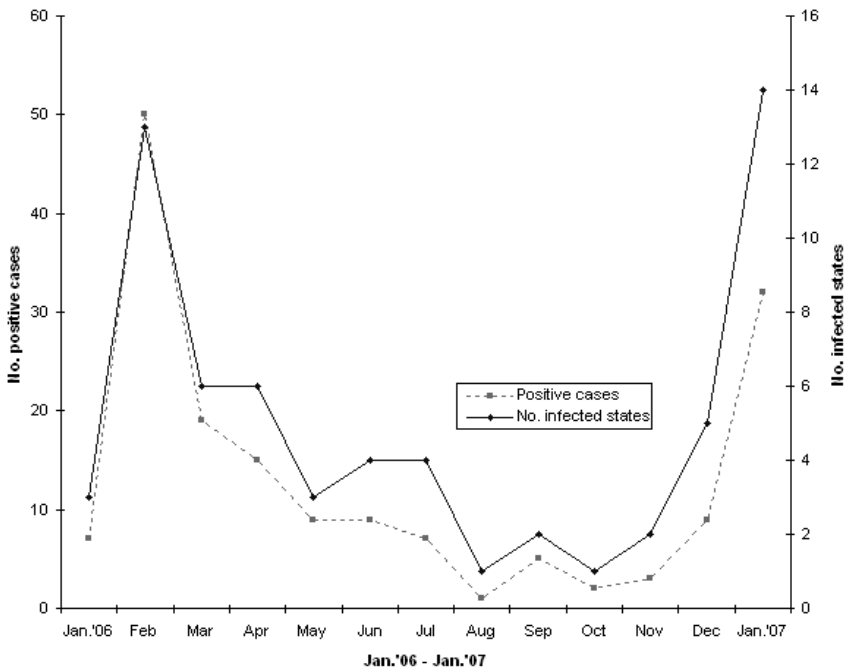


Figure2. Number of HPAI Positive cases in Nigeria (January 2006 – January 2007)

The dramatic decrease in incidence of HPAI in March through August is related to the restrictions imposed on movement of live poultry, pre-emptive slaughter of infected birds within and around infected farms and heightened public sensitization on the need for strict bio-security measures on farms (2). The number of cases and infected states were at the lowest in August. The number of cases and infected states gradually increased from November, 2006 with the number of infected States increased well above the initial peak in February 2006.

DISCUSSION

Between January 2006 and January 2007, some 166 poultry outbreaks of HPAI were confirmed and well over 828,000 poultry including commercial layers, breeder stocks of chicken, turkeys, ostriches, broilers, ducks, geese, local chicken and guinea fowls, had died of the disease or were culled in 19 States and the FCT, Abuja. Thus, as the virus persists in the poultry population in Nigeria, what started in 3 States has been reported in 49 Local Government Areas originating from 19 States and FCT. The H5N1 subtype which is known to be occasionally pathogenic to human was identified in each of the outbreaks. The first and yet only human H5N1 case was however confirmed in January 2007 in Lagos State, south-western Nigeria (4), 12 months after the first outbreak of the virus in the poultry population in the country. This situation further raises public health concern about the disease and its presence in Nigeria. The efforts of the animal health services thus needs more support from within and outside the country to effectively and efficiently control and stamp out the disease in Nigeria.

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