Letter to the editors

Geographical information system a panacea to livestock diseases investigation in Nigeria

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To the editors of the Pan African Medical Journal

A geographic information system (GIS) is an automated system for the input, storage, analysis, and output of spatial information related to positions on the Earth´s surface [1,2]. Epidemiologists and public health professionals have adopted the use of GIS technology to investigate diseases. The earliest evidence of this involved the use of maps to describe the global disease burden by Finke in 1792 [3] and an outbreak of yellow fever at the New York Harbour in 1798 [4]. The most famous application of GIS mapping in interventional epidemiology was in 1854 by John Snow. He described the outbreak of

the Cholera epidemic in the Soho District of England and established an epidemiological link between Cholera cases in individuals who drank water from contaminated water pumps [5]. Similarly, GIS has been used in agriculture and the assessment of natural disasters.

In 1964 the Canadian Geographical Information System was deployed to assess the productivity of farmland and describe earthquakes, forest fires, and flooding [6]. In Africa, GIS has been employed in livestock disease investigation since 1987 by the International Livestock Research Institute (ILRI) in Nairobi, Kenya [7]. In Nigeria, the emergence of highly pathogenic avian influenza (HPAI) H5N1 in 2006, led to the development and subsequent deployment of the National Animal Disease Information System (NADIS) a web-based, and mobile-enabled application that allows real-time disease reporting, surveillance analysis, and geo-referencing of disease outbreaks. Furthermore, the emergence of pathogens and pandemic threats worldwide has brought to the fore the need to develop a model to better investigate, analyze disease outbreaks and provide information on which public health policies are to be based [8].

The GIS technology is not a substitute for traditional descriptive epidemiology, and microbiological investigation but a value addition to the toolbox of public health professionals [9]. Consequently, this study identifies and recommends spot maps and hotspot analysis as tools that may be used by the veterinary epidemiologist to evaluate and analyze livestock disease outbreaks. To achieve these aims analysts will require geo-referenced epidemiological data displayed on a spreadsheet and knowledgeable in the use of Quantum Geographical Information System (QGIS), ArcGIS or any other spatial analysis software. The purpose of this study was to demonstrate the use of a hotspot plugin tool of the QGIS to analyze retrospective epidemiological data for the outbreaks of avian influenza in Nigeria in 2015 and describe disease distribution, clusters, and hotspots of avian influenza [10].

Conclusion

Public health professionals are adopting the use of geographical information systems to investigate animal and zoonotic diseases. The ability to synthesize satellite-derived environmental data such as vegetation cover, temperature, humidity; vector density makes disease modelling possible using GIS technology. In 2015, the resurgence of highly pathogenic avian influenza (HPAI) was reported in 21 states. The disease distribution pattern was eccentric and clustered across four states, Kano, Plateau, Lagos, and Rivers State. The eccentric pattern may be suggestive of a propagative epidemic. The hotspots of HPAI in 2015 were Kano, Plateau, Lagos, and Rivers States (Figure 1). These states were the main distribution hub for poultry and poultry products within their respective region of Nigeria. Consequently, the spread of the virus to contiguous states.

Competing interests

The author declares no competing interests.

Authors' contributions

Okoli Solomon Chieloka wrote this manuscript. The author read and approved the final version of this manuscript.
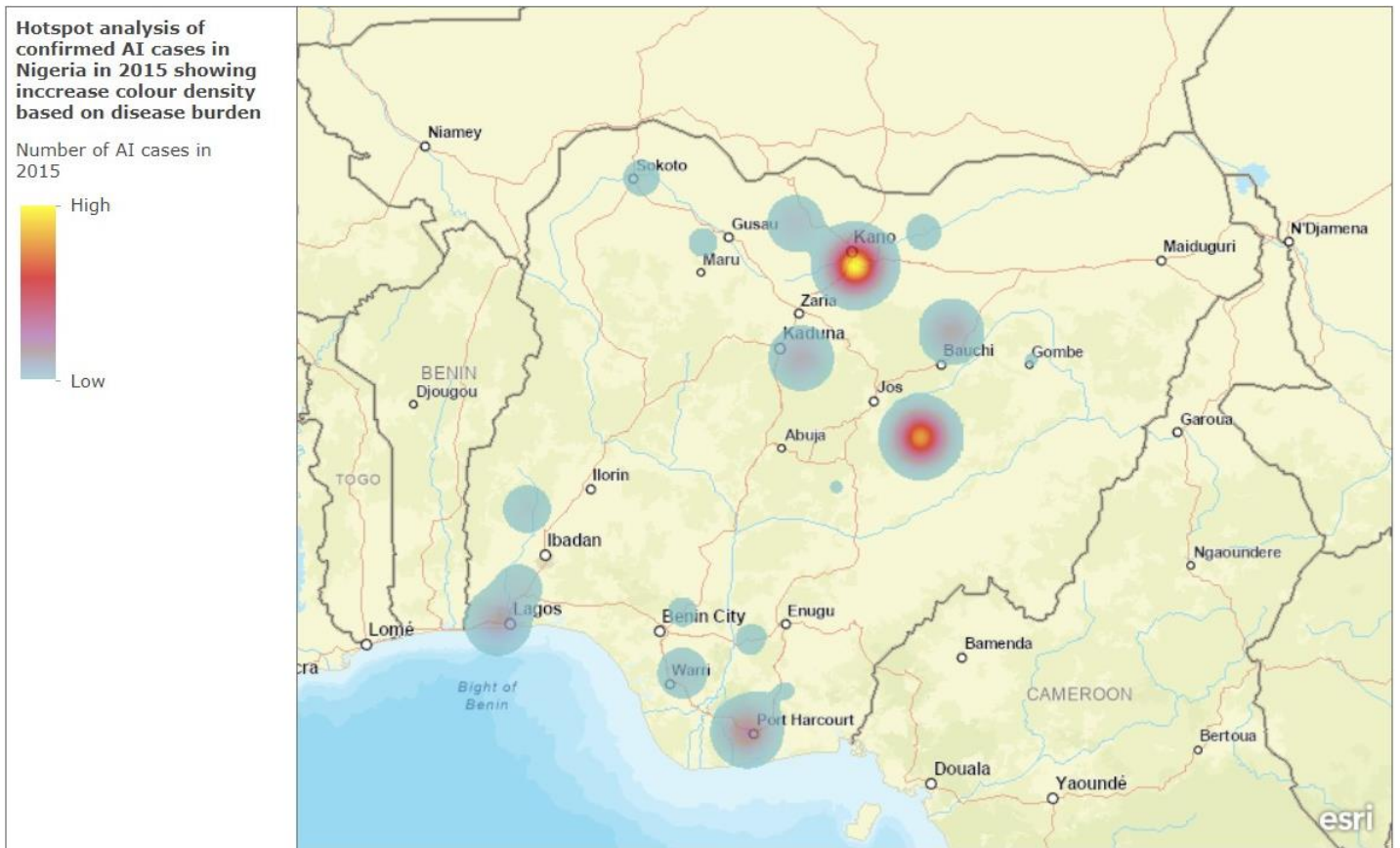
Acknowledgments

The author acknowledges the Nigerian field epidemiology and laboratory training program.

Figure

Figure 1: map of Nigeria showing hotspot of avian influenza in 2015

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