Evaluation of the surveillance system for Avian Influenza and Newcastle Disease Virus in Ghana

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Summary

This project evaluated the surveillance system for Avian Influenza (AI) and Newcastle Disease virus (ND) in poultry in Ghana. APHA staff collected data from surveillance stakeholders at all levels of the surveillance system. At the lower-levels of the system this included poultry workers (farmers, market sellers, transporters and slaughter facility workers), district veterinary officers (DVOs) and animal health professionals (AHPs). Local contractors visited 24 selected districts to meet participants and carry out questionnaires. The data was analysed and used to inform conclusions and recommendations for surveillance system improvements. This paper focuses on disease reporting and response behaviour by these groups. The recommendations included: providing more education to poultry workers on the clinical signs of AI and ND and the risk of disease transmission; prioritising access to means of transport and equipment for veterinary professionals; considering widening the remit of compensation paid following outbreaks of AI; ensuring that poultry workers know how to contact a veterinary professional when none are present in the village; and clarifying the routes of reporting for transporters.

Introduction

The most effective and sustainable way to protect against biothreats from natural, deliberate or accidental origin include strengthening existing systems for surveillance, early on-farm detection and rapid response, and good biosafety and biosecurity practices[1]. This project focused on the evaluation of the surveillance system for AI and ND in poultry in Ghana. AI and ND are endemic in Ghana. Both diseases can lead to high mortality in poultry and can have significant economic consequences for farmers and others who work with poultry. Both AI[2]and ND[3] can be transmitted from wild birds to poultry via direct contact, faeces, and contaminated feed, water and equipment. ND is an important differential diagnostic for AI, as the two diseases have very similar clinical signs. The aim of the project was to identify and analyse surveillance processes related to these pathogens to highlight areas for improvement. This paper focuses on disease reporting and response behaviours by poultry workers, AHPs and DVOs.

Materials and methods

SERVAL framework

The surveillance system was evaluated using the SERVAL framework[4], a standardised framework to characterise a surveillance system and highlight its strengths and weaknesses. Using the framework guidance, 12 surveillance system attributes were selected for assessment, based on the objectives of the surveillance system (early detection, case finding of infected animals, and identification of changes in the population at risk). The results presented here correspond to the attributes of Sensitivity, Impact and Representativeness. The techniques that would be used to assess each attribute were determined, as well as the data and information required to carry out the assessment.

Field data collection

The APHA team worked with a sub-contractor based in Ghana, The Ghana Poultry Network (GAPNET), who carried out field-based data collection from individuals working directly within the poultry industry (farmers, market sellers, transporters and slaughter facility workers), AHPs who work directly with animals at the village level, and DVOs who are responsible for overseeing the AHPs and veterinary activities undertaken in their district.

The APHA team prepared seven questionnaires, each tailored to a stakeholder group. The questionnaires were prepared in Qualtrics online, an online platform for surveys. Paper questionnaires were also produced for use where internet connection was not available.

The GAPNET team travelled to 24 selected districts to meet participants and carry out the questionnaires in person. The 24 selected districts consisted of eight randomly selected districts in each of the three epidemiological zones in the country (the Northern, Middle and Southern zones). Within each selected district, two villages were visited (48 villages in total).

Planned participant numbers were determined based on the available time and resources to complete the field work, with a focus on collecting data from farmers and AHPs. Four farmers were to be interviewed in each village (192 in total). One market seller and one slaughter facility worker were to be interviewed per district (24 of each in total), and three transporters were to be interviewed per epi zone (nine in total). Seven AHPs were to be interviewed per district (168 in total) in addition to the DVO (24 in total).

The APHA team visited Accra in July 2024 to train the GAPNET team and pilot the questionnaires. The main field data collection took place during July and August 2024.

Questionnaire data cleaning and analysis
Data cleaning and analysis were carried out using Excel, Stata and R software. Frequency tables were produced and summary statistics were generated. The results of the data analysis were used to evaluate each of the selected SERVAL attributes and inform our overall conclusions and recommendations for surveillance improvement.

Results

Participant numbers
Of 441 planned questionnaires, 328 were carried out in total. The vast majority of the shortfall was within the AHP category, due to lower numbers of these professionals being employed in the selected districts than anticipated. Questionnaires were completed by 178 farmers, 22 market sellers, 17 slaughter facility workers, 19 transporters, 70 AHPs and 22 DVOs.

Disease reporting and response behaviour
Over 30% of farmers, who had previously noticed signs of disease consistent with AI or ND in their birds, said they did not report the issue to a veterinary professional the last time it occurred (Table 1A). Higher percentages of market sellers, transporters and slaughter facility workers said the same, though sample sizes for these groups were low.

AHPs reported that they do not always visit the premises to investigate after being notified of a suspected case of disease. AHPs also indicated that they are unlikely to take samples for laboratory testing when they do suspect AI or ND during a visit, with the median response indicating they would do this 1-10% of the time for suspected cases on farms, though they were more likely to take samples for suspected cases at markets and larger abattoirs or slaughterhouses (Table 1B).

When asked about suspected cases of disease in wild birds, of 43 farmers who said they had previously noticed signs of disease in wild birds, only 12 (27.9%) said they reported the issue to a veterinary professional. In addition, only 55.4% of farmers (98/177) said they believe that diseases in wild birds can affect the health of their poultry birds, with even lower percentages seen for the other poultry worker groups.

Key issues impacting reporting, identified by poultry workers, included concerns regarding financial losses that could result from control measures being put in place in the event of confirmed disease and a lack of compensation. In addition, a lack of visible/accessible AHPs in the area was identified as an issue by all poultry worker groups, but was a particular issue for transporters. Veterinary staff also identified concerns around financial losses and a lack of compensation as factors limiting reporting by poultry workers, as well as a lack of awareness of the risk of disease transmission.

AHPs identified factors limiting their ability to respond to notifications of suspected disease as staffing shortages, a lack of available transportation, and a lack of basic equipment including sample collection kits and rapid testing kits.

Farmers were asked what actions they took the last time they experienced disease consistent with AI/ND in their flock. Over 60% of farmers said they separated the sick birds from the healthy-looking birds and over 80% tried to treat the sick birds. In addition, over 80% of participants said they disposed of the dead birds by burying them, while a small number (3.8%) disposed of them by burning them, both considered appropriate methods of disposal. Some participants reported actions that could increase the risk of disease transmission. For dead birds,

these included disposing of them by throwing them away (10.8%), consuming them at home (4.4%), feeding them to other animals (1.3%) or selling the carcasses as meat (1.3%). For sick birds, these included killing them and consuming them at home (10.1%), feeding them to other animals (0.6%) or selling the carcasses as meat (1.9%), selling the live sick birds (2.5%), and not doing anything with them (5.1%). For healthy-looking birds, nearly a quarter of participants said they did not do anything with them (24.1%), while some said they sold them (15.8%), slaughtered them and sold them as meat (3.2%), or slaughtered them for home consumption (10.1%). Only around a third of participants reported putting movement restrictions in place or carrying out enhanced cleaning and disinfection, and only around 5% implemented restrictions on sales, all of which are key biosecurity measures recommended to prevent the spread of disease.

Discussion

Some clear recurring themes were seen across stakeholder groups, helping to identify the key areas that should be prioritised for improvement.

Financial concerns
Poultry workers cited financial concerns as one of the main factors limiting reporting. Currently, in the event of a confirmed case of AI, compensation is paid to the farmer if the disease is confirmed to be highly pathogenic AI (HPAI), with the amount based on a percentage of the slaughter value of the birds. Expanding the remit of compensation so that it is paid for all cases of AI, compensating the full value of the birds, and compensating other financial losses arising from the outbreak, may improve the willingness of farmers to report. For confirmed cases of ND, where the policy is for the affected flock to be vaccinated, subsidising these vaccinations may help. However, if this is not possible due to financial constraints, then targeting areas where financial support would have the greatest impact should be identified and prioritised for any funding that is available.

Education
Veterinary professionals said that they think a lack of awareness of the risk of disease transmission limits reporting by poultry workers. This was reflected by reports of actions that could increase the risk of disease transmission being taken by farmers the last time they experienced disease in their flock consistent with AI/ND, and a lack of awareness that disease in wild birds presents a risk to their birds. A key recommendation is to provide education to poultry workers on the risks of disease transmission, as well as ensuring they are aware of the clinical signs of AI and ND.

Veterinary staffing shortages
Veterinary professionals noted that staffing shortages impact their ability to respond to notifications of disease. This was also reflected in the responses from poultry workers, with many noting a lack of visible or accessible veterinary staff in their area. If it is not possible to increase staffing levels, then it is important to ensure that all poultry workers are aware of who they should contact to report an issue, and how to contact them. Transporters in particular noted difficulties accessing veterinary professionals and several suggested that a phone app to report issues would help. Clarifying the routes of reporting for transporters may help to improve levels of reporting from this group.

Lack of transportation for veterinary staff
Responses from veterinary professionals indicated that a lack of means of transport is a significant issue impacting their ability to carry out their roles. Improving access to transportation should be considered a key area to prioritise for funding. Options for improving the situation include providing vehicles, providing vehicle/fuel allowances, and providing funds for hiring drivers or use of other public transport.

Lack of diagnostic equipment
An area to prioritise for funding is the provision of diagnostic equipment including sample collection kits and rapid testing kits. Veterinary professionals noted that there is a shortage of these items, limiting their ability to accurately diagnose cases of disease. This is of particular importance due to the need for differential diagnosis between AI and ND through testing, given that the two diseases have similar clinical signs.

Conclusion

This project helped to identify a number of areas that should be prioritised for improvement to enhance the sensitivity and overall effectiveness of the AI and ND surveillance system in Ghana. Improvements could lead to better control and monitoring of disease risks within the country, and a reduction in the risk of disease transmission. Strengthening surveillance of AI and ND in Ghana could also provide regional and global benefits to biosecurity, by reducing the risk and consequences of disease transmission whether natural, accidental or

deliberate to other countries, including the UK with which Ghana has strong ties for trade, people movement and bird migration.

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Table 1: Responses from poultry workers and AHPs to questions on disease reporting and response behaviour

A) Questions asked to poultry workers					
	Farmers	Market sellers	Transporters	Slaughter facility workers	
No. who had ever noticed signs of disease in their birds consistent with AI or ND	158/175 (90.3%)	20/22 (90.9%)	4/19 (21.1%)	2/17 (11.8%)	
No. who reported the issue to a veterinary professional the last time it occurred	107/158 (67.7%)	7/20 (35.0%)	2/4 (50.0%)	0/2 (0.0%)	
No. who said a veterinary professional visited to investigate	91/107 (85.0%)	7/7 (100.0%)	2/2 (100.0%)	-	
B) Questions asked to AHPs					
	Farms	Markets	Transporters	Abattoirs or slaughterhouses	Other slaughter facilities
How often do you visit the premises after being notified of a suspected case of disease? (Median probability[a])	61-70% of the time	51-60% of the time	41-50% of the time	61-70% of the time	51-60% of the time
If you suspect AI or ND during the visit, how often do you take samples for laboratory testing? (Median probability[a])	1-10% of the time	31-40% of the time	1-10% of the time	51-60% of the time	0% of the time

[a]For both questions, participants were asked to select a category (0-10% of the time, 11-20% of the time, etc).

Keywords: Avian Influenza, Newcastle Disease, Surveillance system evaluation, Ghana.

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