

# Sink Surveillance, an Innovative Approach to Identify HPAI and Other Emerging Zoonotic Pathogens in Live Bird Markets in Bangladesh



Muzaffar Osmani<sup>1</sup>, Holy Akwar<sup>2</sup>, Zakiul Hasan<sup>2</sup>, Shovon Chakma<sup>2</sup>, Md Mehedi Hossain<sup>1</sup>, \* Eric Brum<sup>2</sup>

<sup>1</sup>Department of Livestock Services, Ministry of Fisheries and Livestock, Dhaka, Bangladesh;

<sup>2</sup>Food and Agriculture Organization of the United Nations Emergency Centre for Transboundary Animal Diseases, Dhaka, Bangladesh



## Introduction

Bangladesh experienced approximately 550 outbreaks of highly pathogenic avian influenza (HPAI) from 2007 through 2012. From 2013 through 2015 no more outbreaks of HPAI were reported and the existing traditional surveillance system and institutional studies estimated the prevalence of HPAI at 2% or lower, contributing to a "false sense of security" regarding the disease. Sink surveillance was introduced in Bangladesh in 2016 as an innovative approach to detect avian influenza. It is the longitudinal collection, collation, analysis and interpretation of data from representative live bird markets (LBMs) in a specified area to detect avian influenza viruses through environmental sampling, establish a baseline and identify determinants of disease to inform policy and veterinary public health interventions. This approach utilizes a source-sink ecological model that predicts the accumulation of pathogens of interest from various sources to mega urban cities like Dhaka and describes the ecological dynamics along the poultry value chains. We describe here the preliminary findings of this initiative in Dhaka city.

## Objectives

- Assess the overall level of prevalence of HPAI viruses in LBMs
- Identify determinants of HPAI LBMs
- Characterize virus to inform vaccine production
- Assess the spill-over risk to humans attending these LBMs

## Methodology

A census of LBMs conducted in Dhaka City and 659 LBMs identified of which 106 with at least seven vendors were enrolled into sink surveillance programme. Sampling at the LBMs was stratified based on specific areas of the market (arrival, slaughter, and sales area) and government-based Market Environmental Surveillance Officers (MESOs) collected monthly environmental samples from these LBMs starting January 2016. All samples were testing using RT-PCR at the Bangladesh Influenza Reference Laboratory as per standard protocols (Fig. 1).

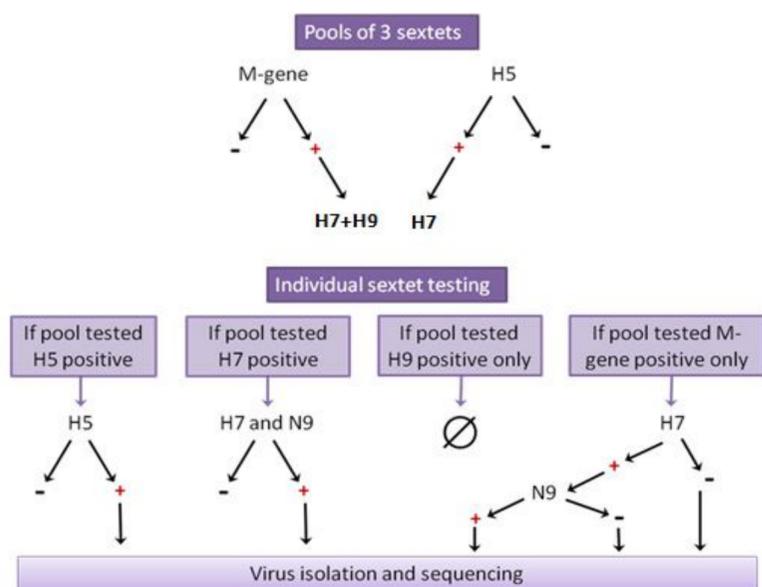


Figure 1: Protocols for testing HPAI in Bangladesh

## What is unique about Sink Surveillance?

- ❖ Accumulation of avian influenza from different farms (commercial and backyard) to a single location (LBM) via poultry trading
- ❖ Inexpensive and efficient method to identify avian influenza presence in the country, eliminating the need to visit individual farms
- ❖ Targets pooled environmental samples to maximize the probability of detecting influenza viruses if present at LBMs
- ❖ Enables monitoring and assessment overall impact of the disease control programme as well as of spill-over risk to humans



Figure 2: Government livestock officer collecting environmental sample at LBM

## Results

- ❖ Overall, the sink surveillance in Dhaka revealed a high prevalence and continuous presence of H5 subtype as well as other subtypes
- ❖ LBMs in Dhaka serve as a source of Influenza A viruses for potential spill-over to poultry consumers in Dhaka
- ❖ The pattern of H5 in these LBMs maintains the seasonal pattern well documented for influenza with off-flu season from May-October
- ❖ The high prevalence indicates that current control measures are not having sufficient impact

DISTRIBUTION & VOLUME OF POULTRY IN LIVE BIRD MARKET OF DHAKA CITY CORPORATION 2016

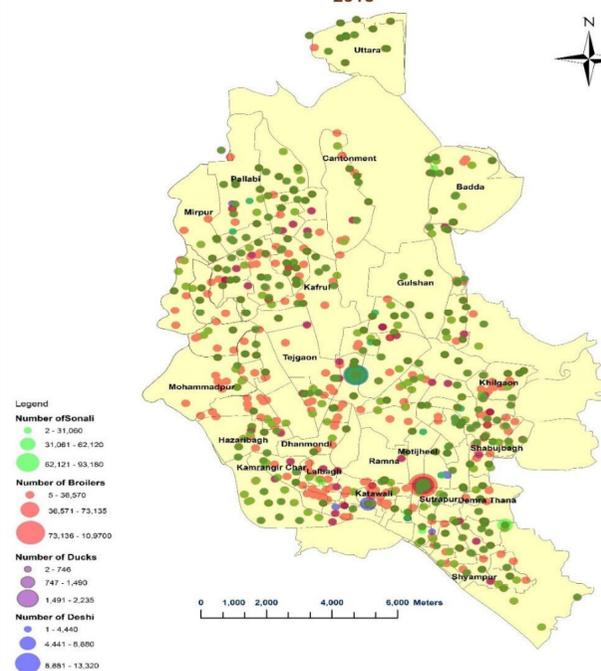


Figure 3: Distribution and volume of LBMs in Dhaka city (2016)

- ❖ As a result of sink surveillance findings, the Department of Livestock Services (DLS) has initiated series of intervention measures to improve control of avian influenza in poultry including the Upazila to Community (U2C) initiative; sequencing of the virus to inform vaccine production; and review/modification of existing and approved vaccines used in poultry

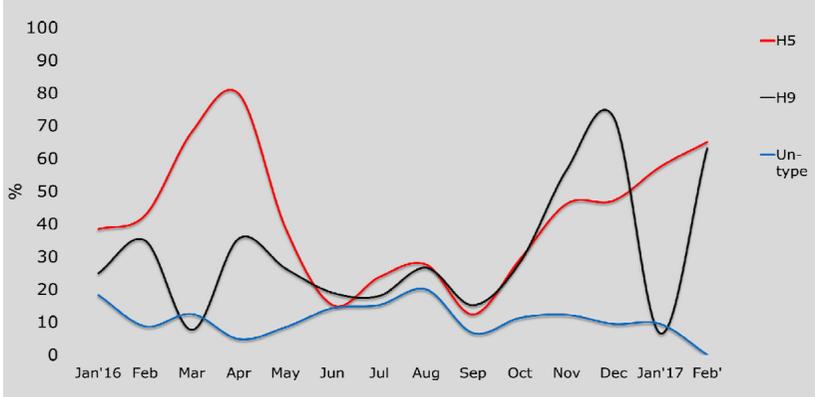


Figure 4: Monthly Prevalence of Influenza A Subtypes in LBMs in Dhaka

- ❖ Influenza A/H5 has been the predominant strain circulating in LBMs in Dhaka compared to other subtypes (Fig. 4)
- ❖ Although H9 is low pathogenic in poultry and does not affect humans, the prevalence picked up towards the end of 2016 entering 2017 and is reported to be of significant economic burden to poultry farmers
- ❖ 36 H5-subtype viruses have been isolated from this sink surveillance initiative for sequencing thus far

## Conclusions

- Sink-surveillance is a cost-effective and highly efficient approach to finding avian influenza viruses and monitoring the overall prevalence in LBMs
- H5 is the predominant sub-type in the poultry market chain feeding Dhaka city
- DLS has initiated series of disease control measures following these preliminary results (farmer outreach and community disease control via U2C, poultry vaccination)
- Laboratory testing is underway to fully characterize H5 subtype and clades
- These results sets a baseline for future comparisons and trend analysis for avian influenza control in Bangladesh
- The traditional outbreak-based surveillance system continues to only rarely report HPAI, indicating the limitations of using farm-level outbreak-based surveillance for monitoring progress of control of HPAI

\*Corresponding Author contact: eric.brum@fao.org  
FAO ECTAD Bangladesh; Fax: +880-29126328

This poster was supported by the United States Agency for International Development (USAID) with technical cooperation of the Government of Bangladesh and the Food and Agriculture Organization of the United Nations (FAO), Emergency Centre for Transboundary Animal Diseases (ECTAD)