Background
Bangladesh is a potential hotspot for the transmission of AMR from the outdoor environment to humans. High population densities, poor water and sanitation infrastructure, and the unregulated use of antibiotics among humans and animals increase the risk of the development and transmission of resistant bacteria. Multi-drug resistance has been reported in up to 36% of E. coli isolates from tap water samples in Dhaka, and NDM-1 resistant genes have been established in Bangladesh since 2010.2,3 We hypothesise that humans with high exposure to contaminated environments will have higher carriage rates of resistant forms of E. coli.

Objectives
- To quantify the number and concentration of antibiotic resistant bacteria (E. coli) and resistance genes (ESBL and carbapenemase) among humans, animals and the environment (water, soil and waste) in Bangladesh.
- To understand the selective drivers of antimicrobial resistance (AMR) in urban live poultry markets; commercial poultry farms, and rural villages.
- To assess anthropogenic influences on AMR in the natural environment though ethnographic research among poultry farmers, poultry sellers and village poultry owners.

Study design
Sample collection focussed on three exposure-relevant sites:
- live poultry markets
- commercial (non-industrial) poultry farms
- rural poultry owners
Samples were collected upstream, at source and downstream from contamination. Sample collection from the dry season has been completed (Feb-Mar 2017) and wet season samples will be collected (- Aug-Sept 2017). A total of 1420 samples from humans, animals and environmental compartments will be collected.

Laboratory methods
- E. coli is being studied as an indicator organism. Samples will be tested for concentrations of CTX-M and NDM genes by quantitative real time PCR and cultured for third generation cephalosporin and carbapenem resistant organisms.
- A minimum of one E. coli colony per sample will be tested for different ESBL producing and CARBase genes including CTX-M and NDM.
- Isolates from all environmental compartments will be tested for minimum inhibitory concentration of different classes of antibiotics and genetic fingerprinting using multi-locus sequence typing (MLST).

Preliminary results and discussion
- Carriage of ESBL resistant E. coli was high across all environmental compartments, with the highest prevalence (90%) in downstream (river) water and wastewater.
- Carbapenem resistant E. coli were found in up to 10% of wastewater and downstream samples respectively.
- ESBL resistant E. coli were observed in 62% and 50% of poultry farmers and markets sellers respectively.

This holistic approach to surveillance and monitoring of AMR in Bangladesh is a first step towards understanding the risk of AMR transmission from the outdoor environment to humans using a one health approach. The findings will be used to develop mitigating strategies to prevent the spread of AMR in resource-poor settings.