One health: epidemiology of antimicrobial resistance in children, food and livestock in a low-income setting

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Introduction

- Antimicrobial resistance (AMR) - 700,000 AMR-related deaths globally (children under 2 years in low-income settings mostly affected).
- Diarrhea - second leading cause of infant death.
- *E. coli* and non-typhoidal *Salmonella* (among 8 key pathogens for GLASS surveillance for AMR) mostly implicated in diarrhea-associated foodborne diseases.
- Require antibiotic treatment - driving AMR.
- To decipher the potential for transmission of AMR in food and livestock to under 2-year-old children in a low-income setting.

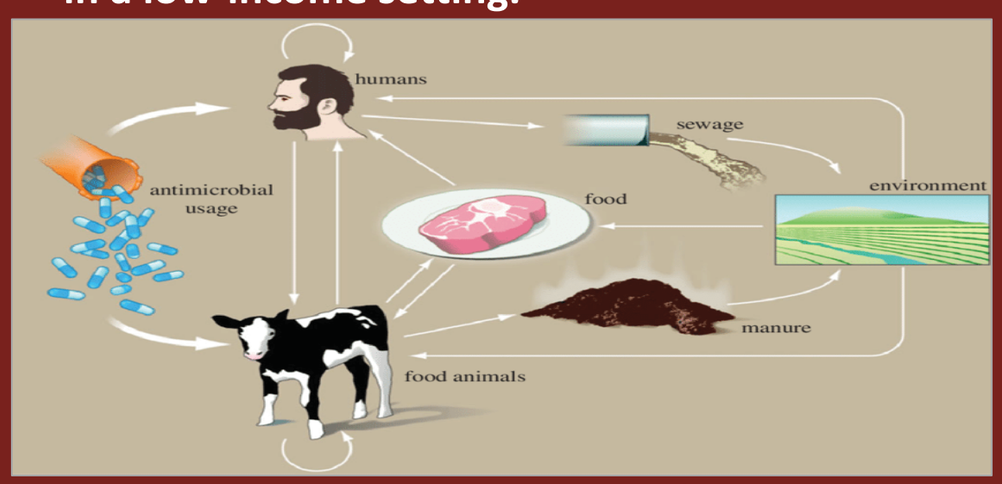


Fig. 1: AMR transmission pathways (Woolhouse *et al.*, 2015)

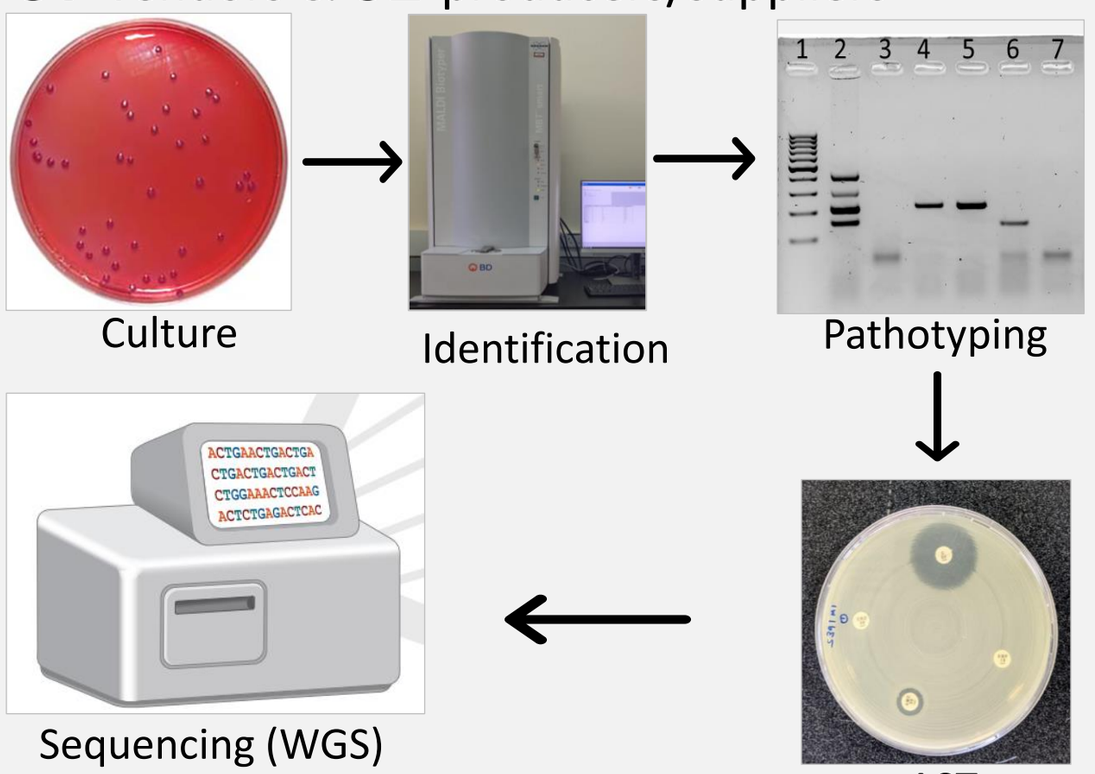
Methods

Phase 1: Household - stratified random sampling

- **590** households & **296** livestock sampled purposively (in peri-urban Dagoretti, Kenya)

Phase 2: Food value chain - trace back

- **97** vendors & **62** producers/suppliers



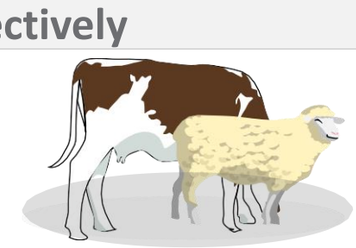
Culture → Identification → Pathotyping → AST → Sequencing (WGS)

Fig.2: Sample processing workflow

Results highlights

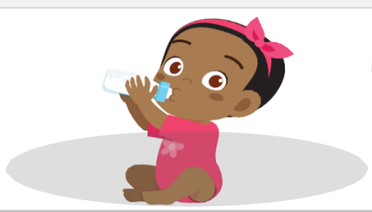
Livestock

- **122** isolates: pathogenic *E. coli*
- **18/122** multidrug resistant (MDR) >=3 antibiotic classes
- **100%** susceptibility: CRO and CN
- **21/122**, **39/122** and **50/122** resistance to AMP, SXT and TE respectively



Children

- **134** isolates: pathogenic *E. coli*
- **76/134** multidrug resistant
- **101/134, 94/134** resistance to SXT and AMP respectively
- **1** isolate resistant to **8/9** antibiotics, same ID also in food



Food

- **25** isolates: pathogenic *E. coli*
- **6/25** multidrug resistant

***Salmonella* spp.**

- Children - **9** isolates
- Food - **3** isolates
- Livestock - **2** isolates

Results

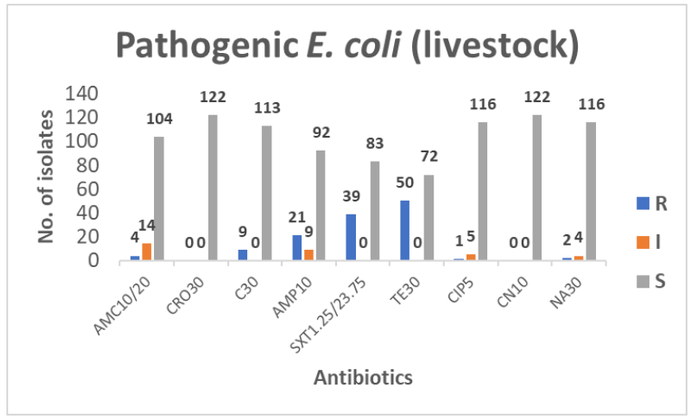


Fig.3: Antibiogram of *E. coli* from livestock

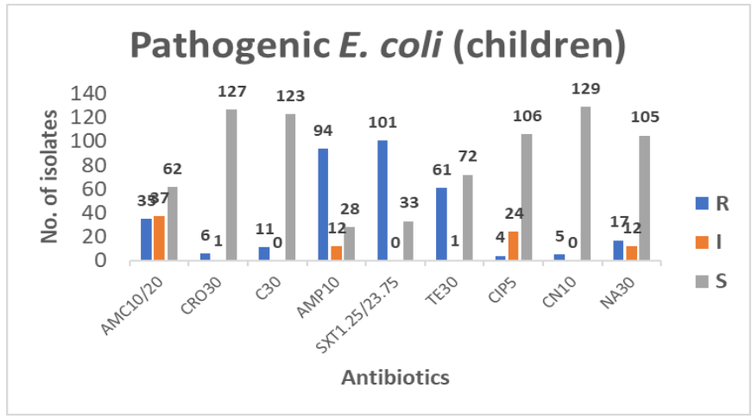


Fig.4: Antibiogram of *E. coli* from children

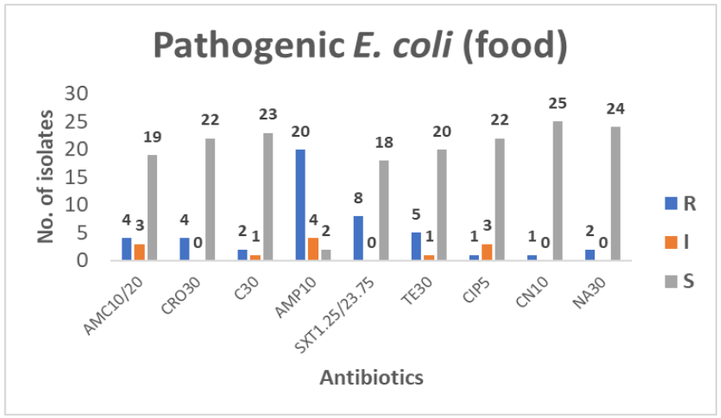


Fig.5: Antibiogram of *E. coli* from food

Conclusion

- High resistance to SXT and TE is of epidemiological relevance
- Resistance to AMP, AMC and CRO is of clinical relevance
- Phenotypic AMR used in selection for WGS to demonstrate source attribution
- Inform public health action on AMR-associated foodborne disease in children

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