

One health, One crisis: Tackling India's alarming burden of food-borne pathogens and antimicrobial resistance at the human-animal interface

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Background : In India, rising demand for livestock, driven by population growth and changing dietary habits, has led to the adoption of intensive farming practices. Antimicrobial use in animal husbandry is rampant and poorly regulated. Due to absence of an integrated surveillance system, the true burden of foodborne diseases and antimicrobial resistance from key pathogens in India remains unknown.

Methods: We present data from the WHO-AGISAR India study involving concurrent human and animal sampling across North India, with participation from 14 laboratories. A total of 1,968 community-acquired diarrhoea cases (severity assessed by Vesikari score) across all ages were included. Cross-sectional sampling included 487 animal stools and 419 meat samples. Pathogens were identified and tested for antimicrobial susceptibility. Whole-genome sequencing was performed on 117 non-typhoidal *Salmonella* (NTS) and 122 Enterotoxigenic *E. coli* isolates from both humans and animals.

Results: Over 80% of diarrhoeal samples were from moderate to severe cases, showing EAEC (5%), ETEC (4.84%), EPEC (4.32%), *Campylobacter* (2%), and NTS (1.2%). Food animals showed high carriage of EPEC (32.11%), *Campylobacter* (24.72%), and NTS (10.15%), and mostly atypical EPEC (84.52%). Multi drug resistance (MDR) was high, ranging from 28% in NTS to 59.8% in ETEC. Human strains were more resistant to β -lactams and co-trimoxazole and animal strains had higher resistance to ciprofloxacin, aminoglycosides, and tetracycline. A high diversity of serovars, with considerable overlap in serovar and sequence types was found between human and animal isolates. A diverse range of *Salmonella* serovars infecting humans was identified, with most linked to animal reservoirs - pigs notably being a key source of human infections. Poultry was confirmed as a reservoir for *S. typhimurium* ST19 carrying the IncFIB (S).1__FN432031 plasmid variant.

Conclusions: This extensive Indian surveillance study, following the WHO-AGISAR protocol, reveals a high burden of multidrug-resistant (MDR) and extended-spectrum beta-lactamase (ESBL)-producing foodborne pathogens in livestock, poultry, and retail meat. The detection of enterotoxigenic *E. coli* (EAEC) strains in animals highlights their zoonotic potential and the need for integrated surveillance and control strategies. The multidrug-resistant ST131 strain, linked to various human diseases, was found in both acute diarrhoea cases in humans and animals, reinforcing its clinical importance. Overall, the study highlights critical gaps in our understanding of foodborne pathogens and antimicrobial resistance, advocating for sustained One Health surveillance to combat these public health threats.

Keywords: One Health, India, Foodborne pathogens, AMR, WGS, MDR

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