



# Background

## ABR: Global threat to public health

- 4.2 million deaths in Africa annually
- 300 million deaths annually-worldwide by 2050
- Global GDP will decrease by 2-3.5% by 2050
- (lose of 60-100 million USD) if AMR is unmanaged

## E. coli-infections;

- Humans: UTI, neonatal meningitis, diarrhea
- Chickens: Avian colibacillosis
- E. coli- commensal in humans and chickens  
Carries & spreads ARGs (levy *et al.*, 2020)

Rodents carry & transmit zoonotic pathogens to Chickens (Rao *et al.*, 2015) and humans (Gwenzi *et al.*, 2021)



# Background

## Interaction

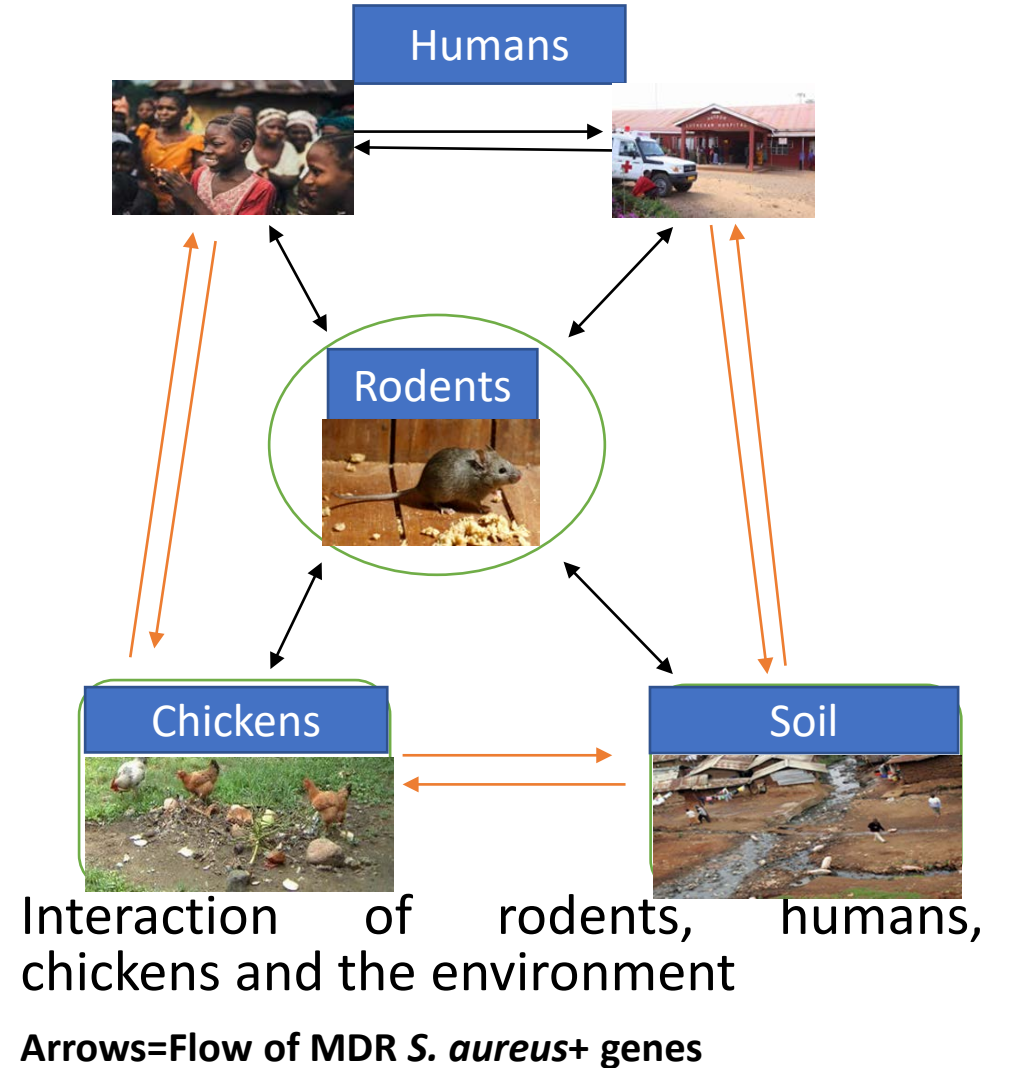
Rodents interact with humans & chickens in households and spread rodent-borne zoonotic diseases in Tz

## However

Studies on occurrence and patterns of MDR *E. coli* among H, C, R & E are missing in the area

## Aim of study

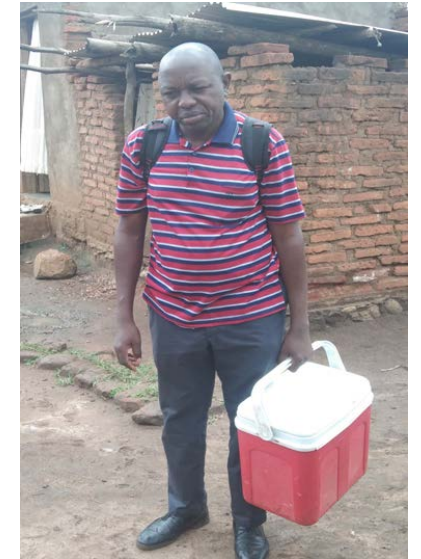
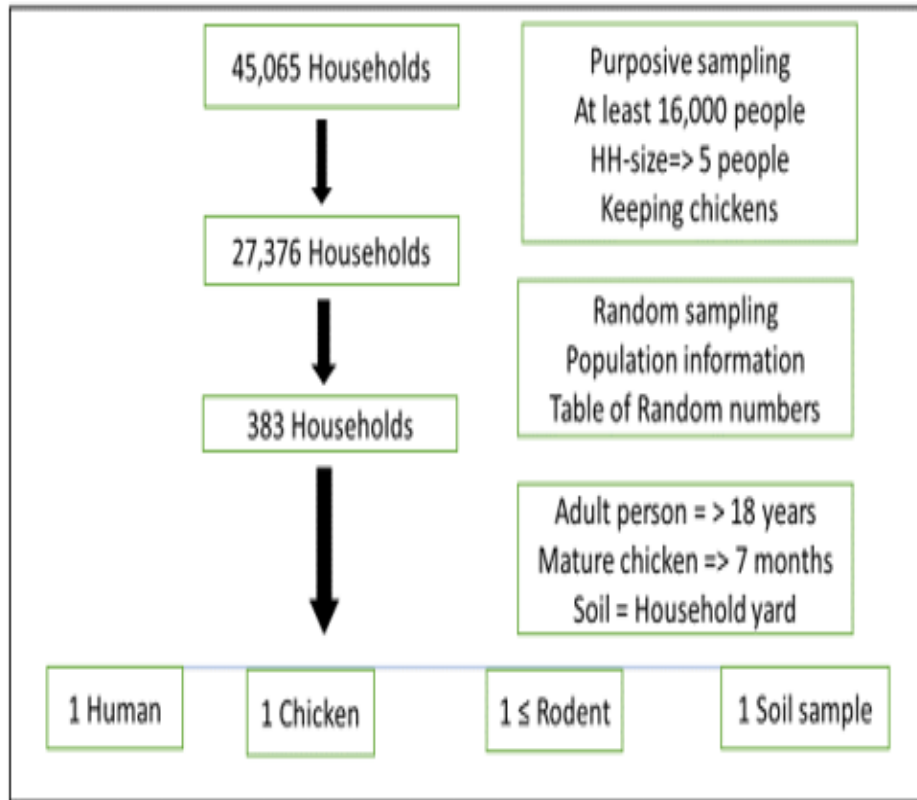
To determine occurrence of MDR *E. coli* isolates in humans, rodents, chickens and soil in households of Karatu, northern Tz.



# Materials and Methods

## Collection samples

### Sampling Design



# Materials and Methods

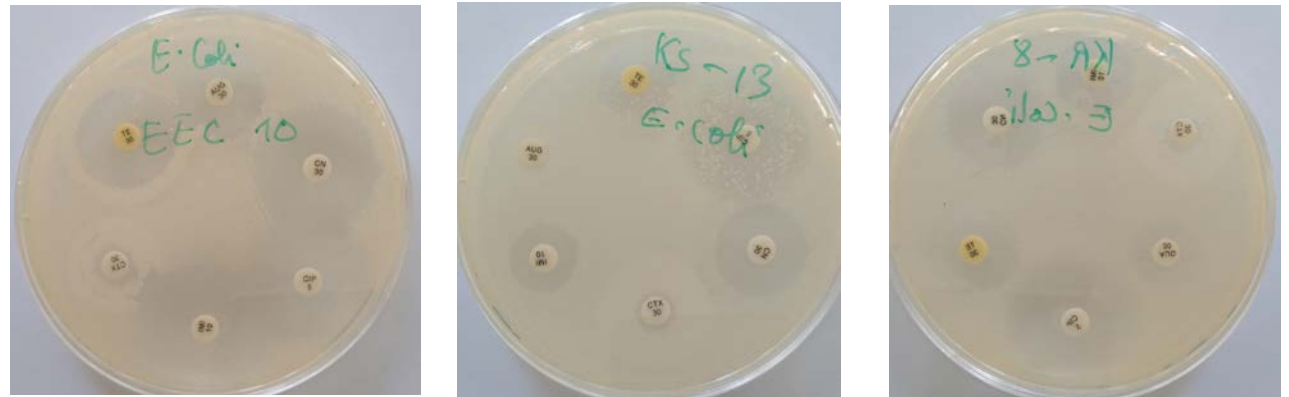
## Isolation and Identification of isolates

- MacConkey agar plates
- Incubated aerobically at 37 °C for 24 h
- Presumptive colonies subjected to motility and IMViC tests for identification
- *E. coli* (ATCC) 29522-std organism



## Antibiotic susceptibility testing

- Kirby-Bauer disc diffusion method on MHA plates with commercial discs (CLSI, 2020)
  - tetracycline (30 µg)
  - imipenem (10 µg)
  - gentamicin (10 µg)
  - ciprofloxacin (5 µg)
  - cefotaxime (30 µg)
  - amoxicillin-clavulanate (20 µg/10 µg)



## Statistical Analyses

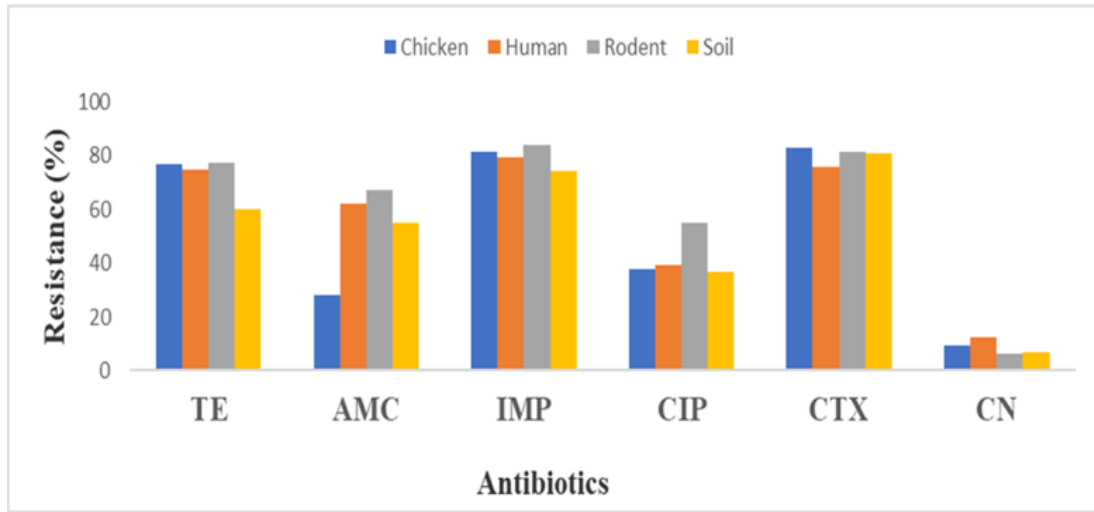
- Descriptive analysis-IF +ABR profiles (Excel 2010)
- Chi-square test: Assoc. variables (R version 3.4.2)
- PCA: Distribution of MDR isolates (R version 3.4.2)

# Results

## Isolation frequencies of *Escherichia coli* from different samples

Type of samples	Number of samples n (%)	Positive samples n (%)	Chi-Square	P-value
Chickens	288 (30.0)	236 (81.9)	X <sup>2</sup> = 147.58, df = 3	< 0.001
Humans	281 (29.3)	243 (86.5)		
Rodents	101 (10.5)	81 (80.2)		
Soil	290 (30.2)	90 (31.0)		
Total	960 (100.0)	650 (67.7)		

## ABR of *E. coli* isolates from chickens, humans, rodents and soil



## Distribution of MDR *E. coli* isolates in different areas of Karatu district

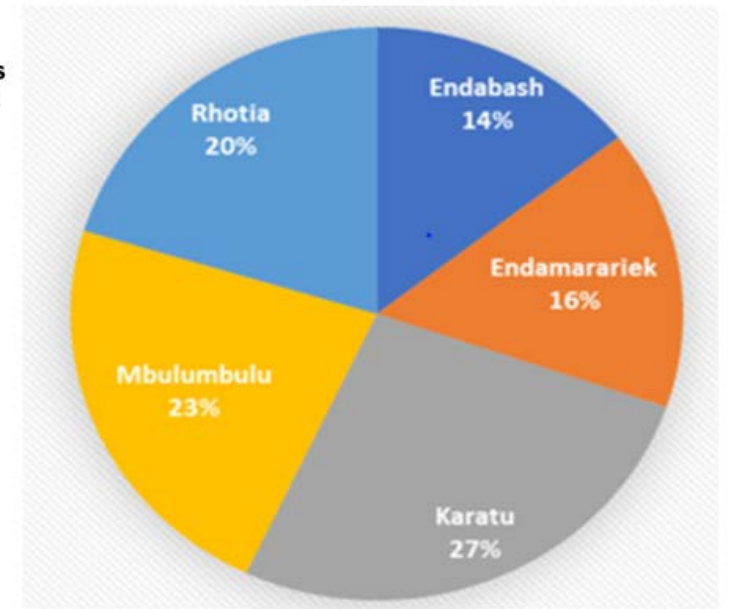
Sign. variation MDR:

- > Karatu (27%) vs
- > Endabash (14%) ward (P<0.001)

Why?

Karatu is;

- > Urban area
- > highly populated
- > intense interaction (H+C+R+S)
- > low levels of waste mgt
- > higher levels of antibiotics use



## PCA biplots of ABR profiles of *E. coli* from different sample sources

PC 1: Susceptibility of isolates

PC 2: Resistance of isolates to drugs

Arrows: Antibiotics tested

Dots: Resistant isolates-various samples

Eclipses: 95% CI of isolates from respective sample sources

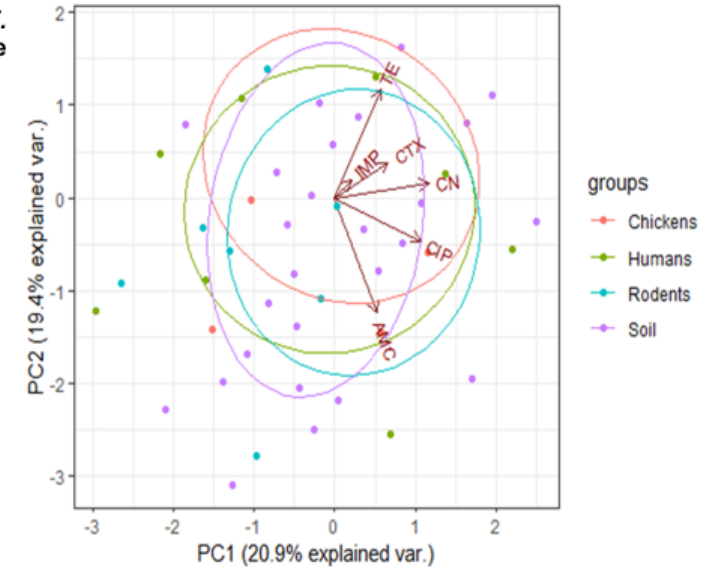
Arrows close to PC2 (TE,IMP,CTX,AMC)  
 • High variances, higher resist. of isolates

Large positive loadings (TE,IMP,CTX)

• Greater positive correlation in resistance

Overlapping eclipses

• No signif. var of proportions of resist. isolates across different sample sources



## Discussion

### Why Karatu?

- High & frequent interaction (R+H+C)-infections spread (Kilonzo *et al.*, 2006; Makundi *et al.*, 2008; Haule *et al.*, 2013; Ziwa *et al.*, 2013; Makundi *et al.*, 2015)

### High resistance to IMP, CTX & TE

- Commonly used antibiotics
- Readily available, over-counter, no prescription

### MDR=78.8%

- Ch + Humans: frequent use & misuse of antibiotics
- R: Potential hosts/vectors spread *E. coli* to H+C
- S: Potential reservoir of MDR *E. coli*
- Poor disposal of wastes and manure in HHs

### Higher MDR in Karatu (21.1%) vs Endabash (11.4%)

- Karatu: urban area & district HQ
- High population than Endabash (rural area)
- High interaction of R+H+C+E
- Higher levels of antibiotic use
- Lower levels of waste management

### Conclusion

- Potential carriage of MDR *E. coli* in H, C, R & S
- Failure of antibiotics used in the area

### Recommendations

- Improve community awareness on use of antibiotics
- Proper waste mgt at home
- Rodents control strategies

