



# Diarrheal diseases in children in a rural Indian setting – incidence, causes, and attributable risks from poultry using a One Health



Reshma Raju<sup>1</sup>, Rohan Michael Ramesh<sup>1</sup>, Selvakumar Prasad<sup>1</sup>, Zayina Zondervenni Manoharan<sup>1</sup>, Gowthaman Vasudevan<sup>2</sup>, Alagesan Alagersamy<sup>2</sup>, Balakrishnan A<sup>2</sup>, Rajeshkumar Rajendiran<sup>1</sup>, Dhanalakshmi Solaimalai<sup>1</sup>, Guillaume Fournié<sup>3,4,5</sup>, Fiona Tomley<sup>3</sup>, Balaji Veeraraghavan<sup>1</sup>, Sitara Swarna Rao Ajjampur<sup>1</sup>

<sup>1</sup>Christian Medical College Vellore, Tamil Nadu, India; <sup>2</sup>Tamil Nadu Veterinary and Animal Sciences, Namakkal, Tamil Nadu, India; <sup>3</sup>Royal Veterinary College, London, UK; <sup>4</sup>Université de Lyon, Marcy l'Etoile, France; <sup>5</sup>Université Clermont Auvergne, Saint-Gènes-Champanelle, France

## Introduction

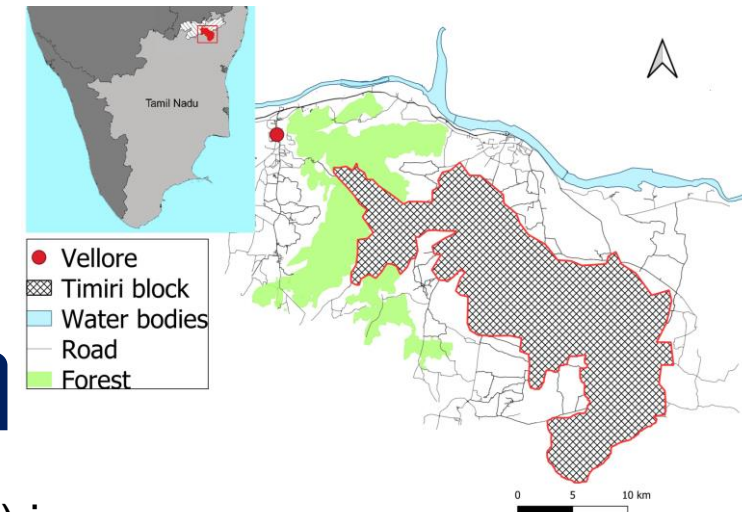
Early childhood diarrhoea in developing countries leads to a vicious cycle of repeated enteric infections and malnutrition, resulting in impaired cognition, poor scholastic performance, and economic potential.

Little is known about the transmission of pathogens such as *Campylobacter* and Non-typhoidal *Salmonella* (NTS) from poultry to humans in rural settings.

## Objectives

- 1) To determine the incidence of *Campylobacter*, non-typhoidal *Salmonella* (NTS) in children under 5 years in a rural block in Tamil Nadu
- 2) To determine the risk of transmission of *Campylobacter* from poultry to humans

## Study Site



# Methods

**Study Setting:** Timiri block in Ranipet district of Tamil Nadu

**Study participants:** Children between 6 and 59 months of age

**Approach:** Weekly surveillance for diarrhoea; diarrhoeal stool sample and caecal sample from poultry in the house or neighbouring house

**Reporting period:** March 2023 to November 2023

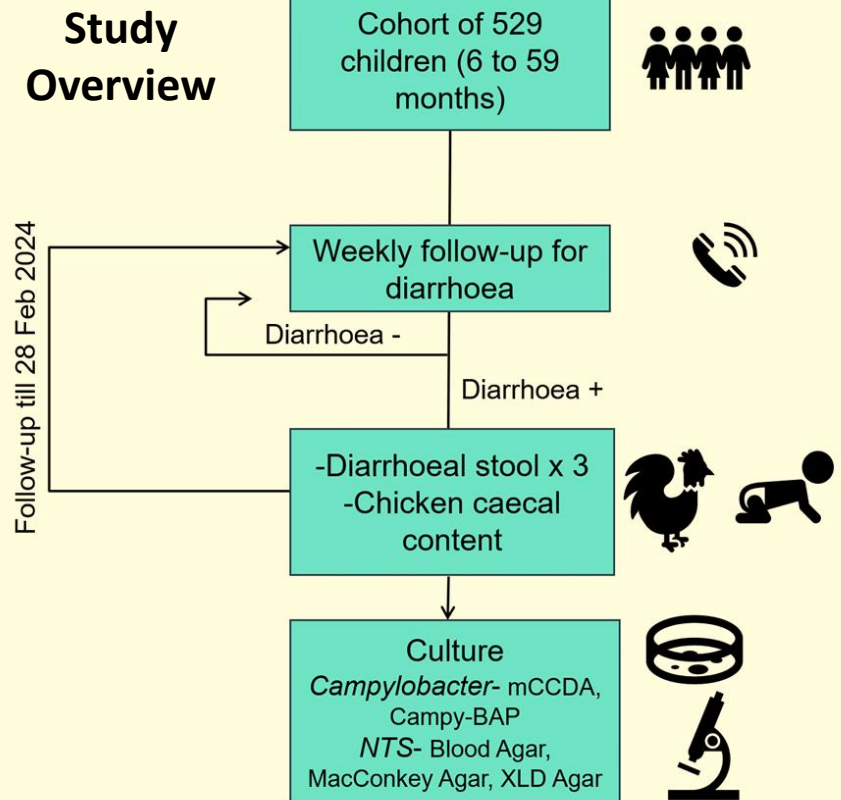
# Results

Mean age of the cohort at recruitment: 25.8 months (SD:14.3); and male: female ratio: 1:1

**Incidence of diarrhoea: 72 episodes per 100 Child-Years (CY) of follow-up (95%CI: 62.1-80.5)**

**Incidence rate of *Campylobacter* diarrhoea: 15.2 per 100 CY of follow-up; NTS: 8.5 per 100 CY and *Shigella*: 8.8 per 100 CY**

In 74 households, 98 chicken caecal sample culture showed *Campylobacter* prevalence of 25.5%



**Incidence rate of bacterial diarrhoea per 100 CY**

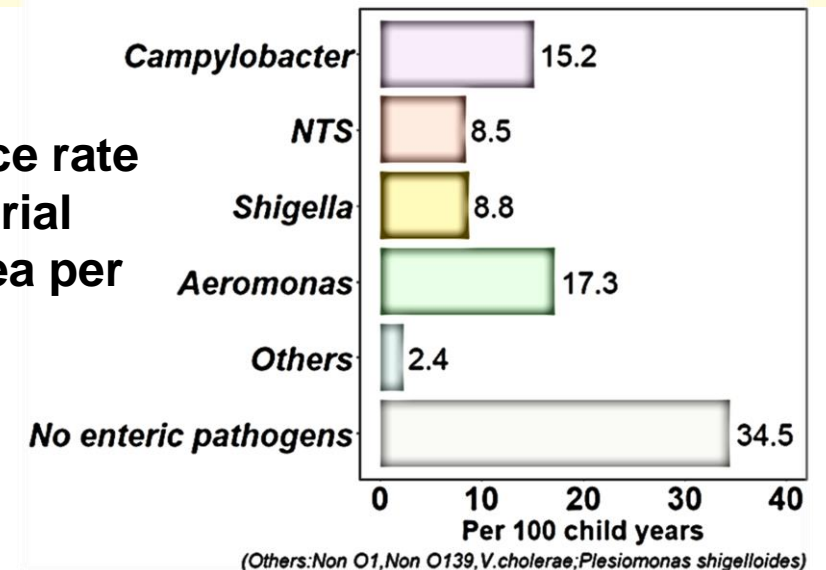


Table 1: Demographic profile of the children with diarrhoea

	Category	n(238)	%
<b>Age during an episode (n=238)</b>	<24 months	172	72.3
	>=24 months	66	27.7
<b>Gender (n=195)</b>	Male	100	51.3
	Female	95	48.7
<b>Mother's education (n=159)</b>	Up to Primary	19	11.9
	Above Primary	140	88.1
<b>Father's education (n=159)</b>	Up to Primary	30	18.9
	Above Primary	129	81.1
<b>Father's occupation (n=159)</b>	Unskilled	81	50.9
	Skilled	71	44.7
	Professional	7	4.4
<b>Birth weight (n=156)</b>	<2.5Kg	28	17.9
	>=2.5Kg	128	82.1
<b>Month of diarrhoea (n=238)</b>	Mar to June	125	52.5
	July to Sept	89	37.4
	Oct to Dec	24	10.1

Table 2: IRR, AR and PAR of childhood *Campylobacter* diarrhoea after exposure to *Campylobacter* in chicken

	Campylobacter in chicken	
	Exposed	Unexposed
<b>Incidence rate Campylobacter diarrhoea/100 CY</b>	64.6	11.9
<b>Incidence Rate Ratio (IRR)</b>	5.4 (2.6-10.7)	
<b>Attributable Risk (AR)</b>	81.6% (61.3-90.6%)	
<b>Population Attributable Risk (PAR)</b>	20%	

## Conclusion

**Children exposed to household chickens infected with *Campylobacter* have five times (IRR=5.4) increased risk of *Campylobacter* diarrhoea than unexposed children**

**Funding:** One Health Poultry Hub funded by the UKRI Global Challenges Research Fund (GCRF)

**Principal Investigator:** F Tomley