

# Characterization of *Campylobacter* associated with Childhood Diarrheal Disease in Wolaita, Ethiopia

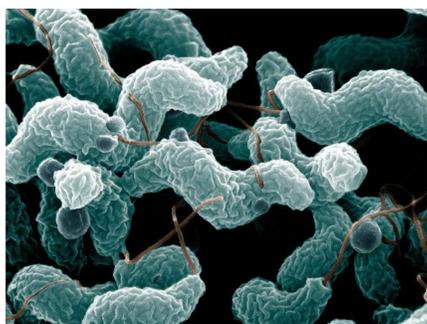
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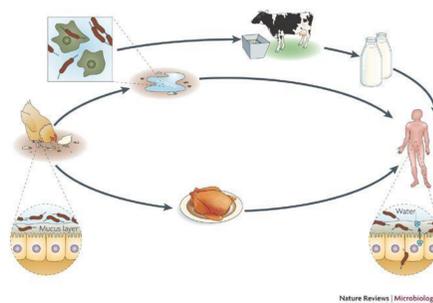
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## Background

- ❖ Children in Sub-Saharan Africa are over 15 times more likely to die before the age of 5 than children in high income countries, and diarrhoea is an important cause of morbidity and mortality in children under 5 in Africa[1].
- ❖ Up to 22% of children in Ethiopia suffer from diarrhoea at any given time[2 and *Campylobacter jejuni* is the common cause of bacterial gastroenteritis world-wide. The infection of children in the developing world can have an enduring impact on childhood growth [3].
- ❖ The WHO has listed *campylobacter* as one of the 12 priority pathogens due in part to the increase in resistance to fluoroquinolone antibiotics in low and middle-income countries [4]
- ❖ *Campylobacter jejuni* or *C. coli* can account for up to 12 % of diarrhoea in low resource settings [2]. However it has been suggested that for episodes of diarrhoea with multiple aetiologies *C. jejuni* or *C. coli* may be secondary causes.
- ❖ The presence of co-pathogens could alter the clinical phenotype of disease [3]. This raises the important question as to whether *Campylobacter* is a cause of diarrhoea in children in Africa or whether it could be a co-factor that contributes to the severity of diarrheal disease in the presence of other enteric bacterial, viral or parasitic infections.
- ❖ The inherent variation in the *Campylobacter* genome combined with adaptation to different environmental conditions has made it difficult to identify biomarkers that can identify pathogenic strains.



**Scanning electron microscopy image of *C. jejuni*.**  
In brown you can see the filamentous flagella. One of the key virulence factors of *C. jejuni* is motility. Source: Google images



## Environmental reservoirs of *C. jejuni*

*C. jejuni* colonizes the gastrointestinal tract of chickens and birds in high numbers. *C. jejuni* infects humans through drinking water or through consumption of contaminated animal products particularly poultry meat. In humans *C. jejuni* can invade the intestinal epithelial layer, causing inflammation and diarrhea.

## Aims and Objectives



**Aim**  
• To identify phenotypic and genotypic factors that contribute to *Campylobacter* pathogenicity in Ethiopia

**Objectives**  
• To determine if there is a difference between *Campylobacter* strains isolated from children with diarrhea and those isolated from other healthy family members.  
• To analyse the association between diarrhea and detected pathogens in children under five in Wolaita Zone Ethiopia. We will specifically look to see if infection with *Campylobacter* is associated with the presence of other enteric pathogens in children with diarrhea.  
• To identify specific genetic and phenotypic biomarkers, including drug resistance in strains of *Campylobacter* isolated from children with diarrhea

**Significance**  
• This work is important for the prediction of virulence in strains of *C. jejuni* associated with diarrhea in children and may inform the development of a diagnostic test that can be used for the detection of *Campylobacter* that cause diarrhea in Ethiopia, Africa.

## Work Packages of the Study

**WP1**  
Collection of stool specimens in Ethiopia from children with diarrhea and asymptomatic family members.  
Isolation of DNA for transport to Ireland and subsequent Multiplex PCR for identification of carriage of specific enteropathogens that cause gastroenteritis

**WP2**  
The isolation of *Campylobacter* from stool specimens and their phenotypic characterization will be done in Ethiopia  
DNA isolated from strains will be transported to UCD

**WP3**  
Genotypic characterization of strains with distinct phenotypes.  
Whole genome sequencing and analysis to identify genetic markers that correlate with specific phenotypic traits will be done in UCD

## References

1. Lee G, et al. Symptomatic and Asymptomatic *Campylobacter* Infections Associated with Reduced Growth in Peruvian Children. *PLoS Negl Trop Dis*, 2013;7(1)
2. Platts-Mills, J.A., et al., Pathogen-specific burdens of community diarrhoea in developing countries: a multisite birth cohort study (MAL-ED). *The Lancet Global health*, 2015. 3(9): p. e564-e575.
3. Platts-Mills, J.A., et al., Use of quantitative molecular diagnostic methods to assess the aetiology, burden, and clinical characteristics of diarrhoea in children in low-resource settings: a reanalysis of the MAL-ED cohort study. *The Lancet Global Health*, 2018. 6(12): p. e1309-e1318.
4. WHO. [Global Priority List of Antibiotic-resistant Bacteria to Guide Research, Discovery, and Development of New Antibiotics](#). 2017