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**QMRA model to assess the human exposure to ESBL E. coli from poultry production through different pathways**

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**Abstract :** Antimicrobial resistance (AMR) is a significant public health threat, exacerbated by environmental pathways that facilitate the spread of resistant pathogens such as Extended-spectrum beta-lactamase (ESBL) producing E. coli from agricultural activities. Within the framework of the ENVIRE project, our research focuses on the complex dynamics of ESBL-producing *E. coli* transmission through environmental vectors originating from poultry manure.  
Manure from poultry production is an exceptional nutrient source for plants, having high mineral content. However, the manure may also be a source of contamination, and if originating from flocks positive for resistant bacteria, such as ESBL *E. coli*, it could potentially spread pathogens or resistance genes.

Utilizing a Quantitative Microbial Risk Assessment (QMRA) model approach, we aim to identify and quantify the pathways that could lead to human exposure to these bacteria, including surface water, soil, and groundwater.

A special focus will be placed on water contamination, exploring how manure-contaminated stream water may lead to human exposure, for example, through recreational swimming or the use of contaminated water for agricultural purposes.

Manure

Ground water

Surface water

Recreational swimming

Fresh produce

Soil

Tap water

Figure 1. Transmission pathways

Our model not only prioritizes these pathways (see Figure 1.) based on their risk contribution but also explores low-frequency, high-risk scenarios to assess the impact of less common but potentially more severe exposure events. The findings aim to fill critical knowledge gaps in the environmental transmission of AMR, serving as a foundation for further research and guiding targeted interventions. This research is pivotal for informing targeted interventions and regulatory measures to mitigate the spread of AMR in the environment, ultimately reducing public health risks. Future work will refine pathway assessments and explore the effectiveness of specific mitigation strategies to minimize human exposure to resistant *E. coli* from poultry production.

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**Keywords**: Antimicrobial resistance, poultry production, environmental AMR, water contamination, human exposure

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