Medical Xpress

Study on E. coli outbreak demonstrates increasing impact of climate change on public health and food security

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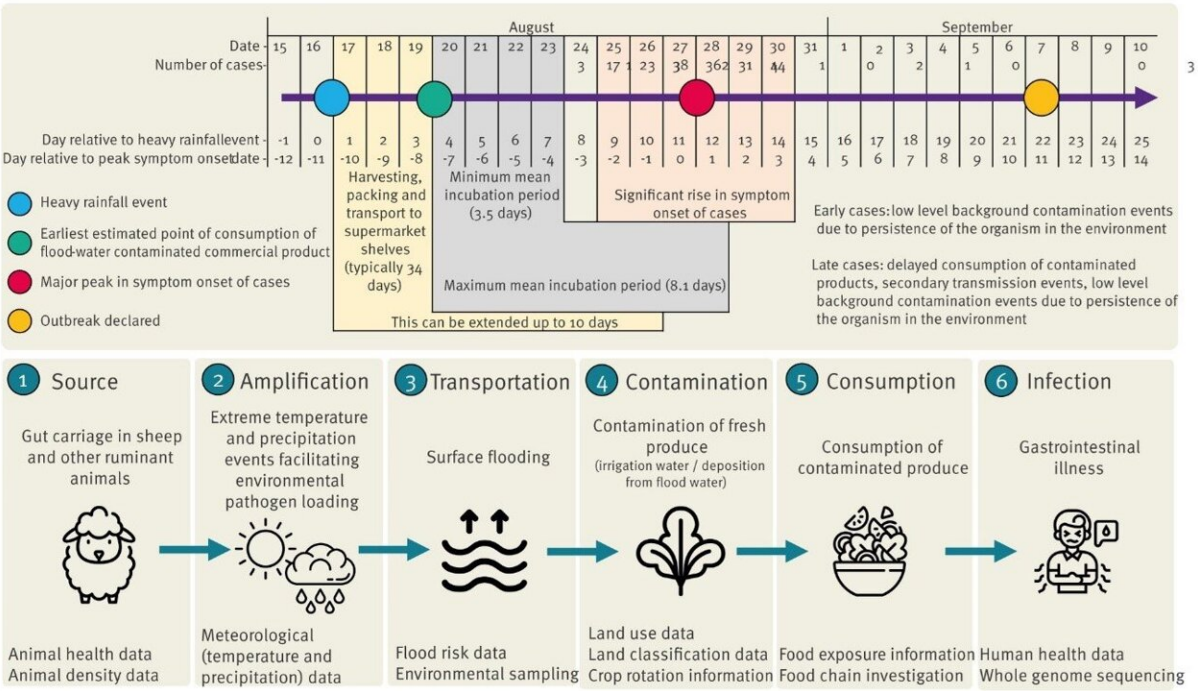

Timeline of events and cascading risk pathway and potential data sources, the United Kingdom, August–October 2022. Credit: Eurosurveillance

A study published in *Eurosurveillance* to investigate an outbreak of Shiga toxin-producing Escherichia coli (STEC) O157:H7 in the UK identified

contaminated lettuce as the most likely source of the infection, and determined that heavy rainfall and flooding may have carried STEC from animal feces to the lettuce crops. More heavy rainfall events are expected due to climate change in the future, leading to increased impacts on health and food security.

Ahead of Field Epidemiology Day 2024, this study demonstrates the value of field investigations in quickly responding to outbreaks, improving preparedness, and protecting public health, and possible novel methods for field epidemiology in the future.

It also demonstrates the value of new integrative techniques with a One Health approach, using weather data and information on animal and land use data to better understand the events and conditions that may have led to the STEC infection outbreak.

Outbreak detection and cases

After a large outbreak of STEC 0157:H7 was detected in the UK in September 2022, a national-level investigation was initiated to identify the source of the outbreak and inform risk mitigation strategies. Whole genome sequencing (WGS) was used to identify outbreak cases, and strongly suggested a link to a single source.

There were 259 cases and 7 secondary cases linked to the outbreak, with symptom onset reported from 5 August to 12 October 2022. In total, 75 cases were admitted to hospital, with no deaths being reported.

Epidemiological, food chain and environmental investigations

All confirmed cases were requested to complete a questionnaire to

provide information on demographics, clinical symptoms, environmental and food exposures, which was then analyzed. Hypothesis generation interviews were then undertaken with 19 cases to determine the source of exposure, with the most frequently reported exposures being eating out, eating chicken, exposure through salad leaves or prepacked salad, and beef.

A frequency-matched case-control study was undertaken across the UK with 41 cases and 206 controls. Multivariable and univariable analysis of each exposure variable was carried out, linking illness to consumption of chicken and salad items, both of which became the focus of early food chain investigations.

The only product with significant links identified between product type, purchase location and supply chain was lettuce, which became the main focus of investigation. Loyalty card data and supply chain investigations found that a single lettuce grower, Grower X, was directly or indirectly linked to all food service establishments and/or retailers of interest in this outbreak.

The harvesting period for Grower X had ended in October 2022, and competent authorities visited Grower X after the harvest had ended. All requirements had been met and no failures were identified.

Geospatial analysis of meteorological, flood risk, land use and sheep population data independently identified Grower X as the likely source of the outbreak.

Epidemiological, food chain and meteorological analysis then allowed researchers to establish a timeline of events and a cascading risk pathway for the outbreak, which determined that STEC present in contaminated feces from sheep may have been carried to lettuce crops through heavy rainfall.

Public health implications

The novel, integrative methods for this outbreak investigation showcase the benefits of approaching public health from the perspective of One Health, which takes into account the health of people, safe food production, animals, and the environment, and could help predict, prevent and tackle potential outbreaks.

As floods and heavy rainfall are expected to increase with climate change, this approach could also improve understanding of the impact of climate change on public health, and inform climate adaptation efforts in the future.

More information: Neil Cunningham et al, An outbreak of Shiga toxin-producing Escherichia coli (STEC) O157:H7 associated with contaminated lettuce and the cascading risks from climate change, the United Kingdom, August to September 2022., *Eurosurveillance* (2024). DOI: 10.2807/1560-7917.ES.2024.29.36.2400161

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