

Shiga toxin-producing *E. coli* (STEC) Outbreak Report

**Maricopa County, Arizona
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Department of Public Health

Division of Epidemiology & Informatics



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Overview

This report summarizes the epidemiologic, laboratory, and environmental investigation conducted by the Maricopa County Department of Public Health (MCDPH) in response to reports of an unexpected increase in Shiga toxin-producing *Escherichia coli* (STEC) infections during October – November 2025.

In total, 18 STEC cases were identified as part of this outbreak. Most case-patients reported exposure to petting zoos or other animal exposures.

Background

STEC

E. coli are bacteria that live in the gastrointestinal tracts of humans and animals. Some strains, including Shiga toxin-producing *E. coli* (STEC), can cause diarrheal illness and, in severe cases, complications such as hemolytic uremic syndrome (HUS). STEC infections are commonly associated with exposures to contaminated food, water, or infected animals, including farm animals and petting zoos.

Outbreak Detection

On Monday, November 3, 2025, a local children's hospital notified MCDPH of an unexpected increase in STEC infections among pediatric patients, with nine cases identified over the weekend. Hospital staff noted that five patients reported attending Event A, a public event within Maricopa County with multiple food vendors and petting zoo exhibits.

Later that day, MCDPH received an aberration detection notification from the Arizona Department of Health Services (ADHS) indicating an increase in STEC cases reported statewide, including cases in Maricopa and Pinal counties.

Methods

Outbreak Investigation

Following the initial notification from the hospital, MCDPH initiated an outbreak investigation. MCDPH determined that Event A occurred within Maricopa County over multiple weekends, with the final event date on Sunday, October 26, 2025. In collaboration with ADHS, MCDPH obtained and reviewed detailed information related to animal venues at Event A, including animal area layouts, animal inventories, and documentation of hand washing and hand hygiene measures.

While Event A was identified early as a potential exposure source, MCDPH continued to pursue all possible explanations for the unexpected increase in STEC cases.

Case Definitions

Based on genomic and epidemiologic findings, outbreak case definitions were developed to guide case identification and analysis.

A **confirmed** outbreak case was defined as STEC infection in a person with illness onset during September 19 – November 30, 2025, with an isolate highly related to the outbreak strain (0-5 single nucleotide polymorphism [SNP] differences) by whole genome sequencing (WGS).

A **probable** outbreak case was defined as STEC infection in a person with illness onset during September 19 – November 30, 2025, with pending or no available WGS results, and who either attended Event A or who had contact with farm animals (e.g., cow, goat, pig) in the 20 days prior to their illness onset.

Case Investigations and Analysis

Standard case investigations were conducted via interview for all reported STEC cases. Information collected during interviews included demographic characteristics, illness onset dates, food exposures, and animal exposures; all data were entered into the statewide Medical Electronic Disease Surveillance Intelligence System (MEDSIS).

MEDSIS data were analyzed to assess epidemiologic links. Shopping records were reviewed to identify shared food purchases. In addition, geographic analysis was conducted using ArcGIS to assess spatial clustering.

Based on initial epidemiologic findings, a focused animal exposure questionnaire was developed to collect additional information regarding farm animal contact, attendance at petting zoo venues across Maricopa County, and hand hygiene practices before and after animal interaction. STEC case-patients reporting animal exposure prior to illness onset or whose isolates were highly related to the outbreak strain by WGS were re-interviewed using the focused questionnaire.

Enhanced Surveillance

MCDPH developed and implemented a syndromic surveillance query in the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) to identify emergency department and urgent care visits potentially associated with *E. coli*-related illness. Data were compared with historical baseline data to assess unusual increases in illness during the investigation period.

MCDPH coordinated with the Maricopa County Environmental Services Department (MCESD) to determine whether an increase in public complaints related to *E. coli* infection or gastrointestinal illness had been reported during the investigation period.

On November 12, 2025, ADHS released a statewide health alert notifying healthcare providers about the increase in *E. coli* and subsequent HUS. The health alert recommended that healthcare providers consider *E. coli* O157 infection in children presenting with abdominal pain, bloody diarrhea, vomiting, and fever and initiate appropriate diagnosis testing and supportive management.

Case-Case Analysis

A case-case analysis compared outbreak STEC cases with historic STEC cases (non-outbreak cases) to identify unique risk factors or exposure sources. Outbreak cases included STEC case-patients with illness onsets on or after September 19, 2025, and historic STEC cases included STEC case-patients with illness onsets during January 1 – September 18, 2025.

Laboratory Investigation

Clinical isolates were submitted to the Arizona State Public Health Laboratory (ASPHL) for WGS. The SNP differences between isolates were used to assess genetic relatedness and to inform outbreak case classification. Analyses were conducted as WGS results became available.

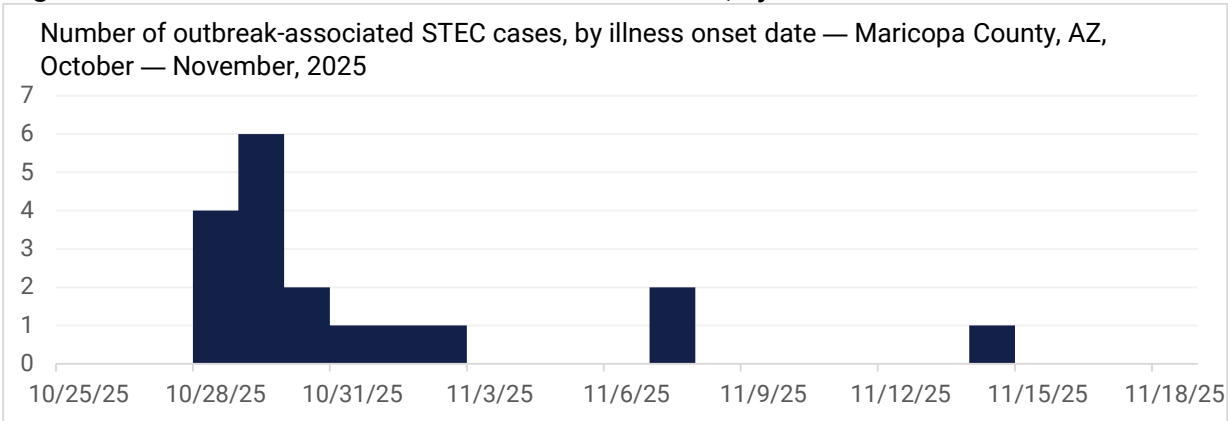
Results

During September 19 – November 30, 2025, 58 STEC cases were reported to MCDPH, representing a statistically significant increase compared with the 5-year average of 32 cases during the same period ($p < 0.001$, Poisson test).

Descriptive Epidemiology

Of the 18 outbreak cases, 16 (89%) were confirmed outbreak cases and 2 (11%) were probable. The median age was 10 years (range = 2-28 years), and 56% were male. Eleven (61%) case-patients were hospitalized and 6 (33%) developed HUS. The majority (72%) of case-patients were white, 2 (11%) were black, and 3 (17%) were of unknown race. Eight (50%) case-patients were Hispanic or Latino and eight (50%) were non-Hispanic or Latino. The illness onsets for the 18 outbreak case-patients ranged from October 28 – November 14, 2025, with a peak in onsets occurring on October 29, 2025 (figure 1).

Figure 1. Number of Outbreak-Associated STEC Cases, by Illness Onset Date



In total, 16 (89%) case-patients reported animal contact. Thirteen (72%) case-patients reported attending Event A on October 26, 2025; of those, 11 (85%) reported visiting the animal areas. Of those who visited the animal areas, five (45%) reported the availability of handwashing stations, eight (73%) reported the availability of hand sanitizer stations, and eight (73%) reported washing their hands after animal contact. One (6%) case-patient who did not attend Event A reported visiting a different petting zoo on October 26, 2025; this petting zoo was unassociated with Event A. The most frequently reported animal exposures for any petting zoo visits were goats (83%); pigs, hogs, or piglets (67%); and donkeys (42%).

Analytic Epidemiology

Initial case-case analysis identified multiple exposures associated with increased odds of being an outbreak case, including consumption of pre-cut apples (odds ratio [OR] = 15.7; 95% confidence interval [CI] = 1.7-146.4), consumption of turkey outside the home (OR = 13.3; 95% CI 1.3-133.8), animal exposures (e.g., petting zoos, carnivals, zoos) (OR = 12.7; 95% CI 3.1-53.0), and attendance at social gatherings (OR=3.3; 95% CI 1.1-10.2). When specific animal exposures were assessed, petting zoo

exposure was strongly associated with outbreak cases (OR = 190.0; 95% CI: 34.6-1092.0). There were small numbers for all exposures in either cases or controls except for social gatherings, resulting in wide confidence intervals.

The most commonly reported food exposures among outbreak-associated case-patients were eggs, chicken, and strawberries; however, none were statistically significant following case-case analyses. Additional analyses assessing grocery stores, restaurants, and geographical clustering did not identify a common source.

Enhanced Surveillance

Analyses conducted using the ESSENCE syndromic surveillance query did not identify a statistically significant increase in hospital or urgent care visits due to *E. coli* infections. Additionally, MCESD did not identify an increase in public complaints related to *E. coli* infections or gastrointestinal illness during the outbreak period.

Laboratory Findings

WGS identified 16 highly related isolates (0-2 SNP differences), indicating a common source; however, a single source could not be definitively identified. Although specific animal exposure information was collected, there is no conclusive evidence linking a specific animal source to the outbreak.

Key Findings

Results of the investigation indicated no geographic clustering and temporal clustering indicated most case-patients had animal exposures reported on the last day of event A. Animal exposures, predominantly through petting zoos, were the most strongly associated risk factor in the STEC outbreak; no other statistically significant risk factors (food, exposure events, travel) were identified.

Discussion

This report describes an outbreak of STEC in Maricopa County, Arizona in which epidemiologic evidence suggests animal exposure as the most likely source of infection. This outbreak was notable for its severity, with 61% of case-patients hospitalized and 33% developing HUS, highlighting the potential for serious outcomes associated with STEC infection, particularly among pediatric populations.

Case-case analysis identified strong associations with animal exposures, particularly petting zoo exposure, which had the highest observed odds ratio. WGS identified a cluster of highly related isolates, supporting a common outbreak strain. However, no single animal source was identified. No other statistically significant exposures were identified, despite multiple analytic approaches. Although several food exposures were initially associated with illness, these findings were based on small numbers. The absence of a common food source, combined with strong associations with animal exposure, further supports animal contact as the primary driver of this outbreak. As the majority of case-patients indicated an exposure to Event A on the Event's last day (October 26, 2025), no intervention at Event A was possible to prevent additional cases related to that exposure.

Limitations

There were some limitations in this outbreak investigation. Not all case-patients completed initial or focused interviews, which may have limited the scope of exposure data gathered. Recall bias and misclassification of exposures are also possible, particularly for common exposures such as food and

social activities. The small sample size limited statistical power and resulted in wide confidence intervals, reducing the dependability of estimates. Additionally, WGS results were unavailable for two case-patients since they were tested with culture-independent diagnostic tests (CIDT). Consequently, identifying these cases as part of the cluster relied on exposure data (i.e., attendance at Event A). Finally, although epidemiologic evidence strongly suggested animal exposure, no environmental or laboratory confirmation of a specific animal or environmental source was identified.

Public Health Implications

Findings from this investigation highlight the importance of prevention measures in settings with animal contact. Among case-patients who completed the focused questionnaire, most reported visiting animal areas, and not all reported consistent hand hygiene practices. Ensuring the availability and visibility of handwashing stations, clear and prominent signage regarding hand hygiene, and separation of animal contact areas from food and drink consumption areas is critical for reducing the risk of STEC transmission in these environments.

Experience gained from this outbreak will inform ongoing prevention efforts, including collaboration with local and state partners to develop guidance for petting zoos and similar venues. Improved hygiene infrastructure and targeted risk communication will be important components of strategies to prevent future outbreaks associated with animal exposures.