2018 *E. coli* Outbreak Linked to Romaine Lettuce A

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This outbreak appears to be over. *E. coli* is an important cause of illness in the United States. More information about *E. coli*, and steps people can take to reduce their risk of infection, can be found on the *E. coli* and Food Safety web page.

Highlights

- This outbreak appears to be over as of June 28, 2018.
- CDC, public health and regulatory officials in several states, and the U.S. Food and Drug Administration (FDA) investigated a multistate outbreak of *E. coli* O157:H7 infections.
  - 210 people infected with the outbreak strain were reported from 36 states.
  - 96 people were hospitalized, including 27 people who developed a type of kidney failure called hemolytic uremic syndrome.
  - 5 deaths were reported from Arkansas, California, Minnesota (2), and New York.
- Epidemiologic, laboratory, and traceback evidence indicated that romaine lettuce from the Yuma growing region was the likely source of this outbreak.
- CDC laboratory testing identified the outbreak strain of *E. coli* O157:H7 in canal water samples taken from the Yuma growing region. FDA is continuing to investigate the outbreak to learn more about how the *E. coli* bacteria could have entered the water and ways this water could have contaminated romaine lettuce.
- According to the FDA , the last shipments of romaine lettuce from the Yuma growing region were harvested on April 16, 2018, and the harvest season has ended. Contaminated lettuce that made people sick in this outbreak should no longer be available.
- The Public Health Agency of Canada (PHAC) identified ill people in several Canadian provinces infected with the same DNA fingerprint of *E. coli* O157:H7. On June 22, 2018, PHAC reported that the outbreak in Canada appears to be over.
- Consumers should follow these steps to help keep fruits and vegetables safer to eat.
- Read more on general ways to prevent *E. coli* infection. Important steps to take are to cook meat thoroughly, and wash hands after using the restroom or changing diapers, before and after preparing or eating food, and after contact with animals.

Outbreak Summary

Introduction

CDC, public health and regulatory officials in several states, and the U.S. Food and Drug Administration (FDA) investigated a multistate outbreak of *E. coli* O157:H7 infections.

Public health investigators used the PulseNet system to identify illnesses that were part of this outbreak. PulseNet is the national subtyping network of public health and food regulatory agency laboratories coordinated by CDC. DNA fingerprinting is performed on *E. coli* bacteria isolated from ill people by using techniques called pulsed-field gel electrophoresis (PFGE) and whole genome sequencing (WGS). CDC PulseNet manages a national database of these DNA fingerprints to identify possible outbreaks. WGS gives a more detailed DNA fingerprint than PFGE. WGS performed on bacteria isolated from ill people in this outbreak showed that they were closely related genetically. This means that the ill people were more likely to share a common source of infection.

As of June 27, 2018, 210 people infected with the outbreak strain of *E. coli* O157:H7 were reported from 36 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to June 6, 2018. Ill people ranged in age from 1 to 88 years, with a median age of 28. Sixty-seven percent of ill people were female. Of 201 people with information available, 96 (48%) were hospitalized, including 27 people who developed hemolytic uremic syndrome, a type of kidney failure. Five deaths were reported from Arkansas, California, Minnesota (2), and New York.

WGS analysis of isolates from 184 ill people identified antibiotic resistance to chloramphenicol, streptomycin, sulfisoxazole, tetracycline, and trimethoprim-sulfamethoxazole. Standard antibiotic resistance testing of eight clinical isolates by CDC's National Antimicrobial Resistance Monitoring System (NARMS) laboratory confirmed these findings. Isolates from four of those ill people also contained genes for resistance to ampicillin and ceftriaxone. These findings do not affect treatment guidance since antibiotics are not recommended for patients with *E. coli* O157 infections.

Investigation of the Outbreak

Epidemiologic, laboratory, and traceback evidence indicated that romaine lettuce from the Yuma growing region was the likely source of this outbreak.

In interviews, ill people answered questions about the foods they ate and other exposures they had before they became ill. Of the 166 people interviewed, 145 (87%) reported eating romaine lettuce in the week before their illness started. This percentage was significantly higher than results from a survey [PDF – 787 KB] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed. Some people who became sick in this outbreak did not report eating romaine lettuce, but had close contact with someone else who got sick from eating romaine lettuce.

The FDA and state and local regulatory officials traced the romaine lettuce to many farms in the Yuma growing region. The FDA, along with CDC and state partners, started an environmental assessment in the Yuma growing region and collected samples of water, soil, and manure. CDC laboratory testing identified the outbreak strain of *E. coli* O157:H7 in water samples taken from a canal in the Yuma growing region. WGS showed that the *E. coli* O157:H7 found in the canal water is closely related genetically to the *E. coli* O157:H7 from ill people. Laboratory testing for other environmental samples is continuing. FDA is continuing to investigate to learn more about how the *E. coli* bacteria could have entered the water and ways this water could have contaminated romaine lettuce in the region.

According to the FDA, the last shipments of romaine lettuce from the Yuma growing region were harvested on April 16, 2018, and the harvest season there has ended. Contaminated lettuce that made people sick in this outbreak should no longer be available.

As of June 28, 2018, this outbreak appears to be over.

Previous Outbreak Announcements

June 1, 2018

Case Count Update

Since the last update on May 16, 2018, 25 more ill people were added to this outbreak.

As of May 30, 2018, 197 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 35 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to May 12, 2018. Ill people range in age from 1 to 88 years, with a median age of 29. Sixty-eight percent of ill people are female. Of 187 people with information available, 89 (48%) have been hospitalized, including 26 people who developed hemolytic uremic syndrome, a type of kidney failure. Five deaths have been reported from Arkansas (1), California (1), Minnesota (2), and New York (1).

Illnesses that occurred after May 6, 2018 might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

Investigation Update

State and local health officials continue to interview ill people to ask about the foods they ate and other exposures they had before they became ill. Of the 158 people interviewed, 140 (89%) reported eating romaine lettuce in the week before their illness started. This percentage is significantly higher than results from a survey [PDF – 29 pages] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed.

Most of the people who recently became ill ate romaine lettuce when lettuce from the Yuma growing region was likely still available in stores, restaurants, or in peoples' homes. Some people who became sick did not report eating romaine lettuce, but had close contact with someone else who got sick from eating romaine lettuce.

This investigation is ongoing, and CDC will provide more information as it becomes available.

May 16, 2018

Case Count Update

Since the last update on May 9, 2018, 23 more ill people were added to this outbreak.

As of May 15, 2018, 172 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 32 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to May 2, 2018. Ill people range in age from 1 to 88 years, with a median age of 29. Sixty-five percent of ill people are female. Of 157 people with information available, 75 (48%) have been hospitalized, including 20 people who developed hemolytic uremic syndrome, a type of kidney failure. One death was reported from California.

Illnesses that occurred after April 21, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

Investigation Update

According to the FDA , the last shipments of romaine lettuce from the Yuma growing region were harvested on April 16, 2018, and the harvest season is over. It is unlikely that any romaine lettuce from the Yuma growing region is still available in people's homes, stores, or restaurants due to its 21-day shelf life. The most recent illnesses reported to CDC started when romaine lettuce from the Yuma growing region was likely still available in stores, restaurants, and in peoples' homes.

This investigation is ongoing, and CDC will provide more information as it becomes available.

May 9, 2018

Case Count Update

Since the last update on May 2, 2018, 28 more ill people were added to this outbreak.

As of May 8, 2018, 149 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 29 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to April 25, 2018. Ill people range in age from 1 to 88 years, with a median age of 30. Sixty-five percent of ill people are female. Of 129 people with information available, 64 (50%) have been hospitalized, including 17 people who developed hemolytic uremic syndrome, a type of kidney failure. One death was reported from California.

Illnesses that occurred after April 17, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

Investigation Update

State and local health officials continue to interview ill people to ask about the foods they ate and other exposures they had before they became ill. Of the 112 people interviewed, 102 (91%) reported eating romaine lettuce in the week before their illness started. This percentage is significantly higher than results from a survey [787 KB] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed.

Information collected to date indicates that romaine lettuce from the Yuma growing region could be contaminated with *E. coli* O157:H7 and could make people sick. Read CDC's advice to consumers, restaurants, retailers, and clinicians.

This investigation is ongoing, and CDC will provide more information as it becomes available.

May 2, 2018

Case Count Update

Since the last update on April 27, 2018, 23 more ill people were added to this outbreak.

As of May 1, 2018, 121 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 25 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to April 21, 2018. Ill people range in age from 1 to 88 years, with a median age of 29. Sixty-three percent of ill people are female. Of 102 people with information available, 52 (51%) have been hospitalized, including 14 people who developed hemolytic uremic syndrome, a type of kidney failure. One death was reported from California.

Illnesses that occurred after April 11, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

April 27, 2018

Case Count Update

Since the last update on April 25, 2018, 14 more ill people were added to this outbreak.

As of April 26, 2018, 98 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 22 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to April 20, 2018. Ill people range in age from 1 to 88 years, with a median age of 31. Sixty-five percent of ill people are female. Of 87 people with information available, 46 (53%) have been hospitalized, including 10 people who developed hemolytic uremic syndrome, a type of kidney failure. No deaths have been reported.

Illnesses that occurred after April 7, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

April 25, 2018

Case Count Update

Since the last update on April 18, 2018, 31 more people were added to this outbreak.

As of April 25, 2018, 84 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 19 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to April 12, 2018. Ill people range in age from 1 to 88 years, with a median age of 31. Sixty-five percent of ill people are female. Forty-two ill people have been hospitalized, including nine people who developed hemolytic uremic syndrome, a type of kidney failure. No deaths have been reported.

Illnesses that occurred after April 5, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

Investigation Update

State and local health officials continue to interview ill people to ask about the foods they ate and other exposures before they became ill. Sixty-four (96%) of 67 people interviewed reported eating romaine lettuce in the week before their illness started. This percentage is significantly higher than results from a survey [787 KB] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed.

Information collected to date indicates that romaine lettuce from the Yuma, Arizona growing region could be contaminated with *E. coli* O157:H7 and could make people sick. Read CDC's advice to consumers, restaurants, and retailers.

This investigation is ongoing, and CDC will provide more information as it becomes available.

April 20, 2018

Investigation Update

State and local health officials in Alaska interviewed ill people at a correctional facility in that state to ask about the foods they ate and other exposures before they became ill. Ill people reported eating romaine lettuce. Traceback investigations show that the lettuce ill people ate came from whole heads of romaine lettuce from the Yuma, Arizona growing region.

The new information from the investigation in Alaska along with other information collected to date indicates that romaine lettuce from the Yuma, Arizona growing region could be contaminated with *E. coli* O157:H7 and could make people sick. Read CDC's advice to consumers, restaurants, and retailers.

This investigation is ongoing, and CDC will provide more information as it becomes available. The new Alaska cases will be included in the next case count update; they are not reflected on the epi curve and map for this posting.

April 18, 2018

Case Count Update

Since the last update on April 13, 2018, 18 more people were added to this outbreak.

As of April 18, 2018, 53 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 16 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 13, 2018 to April 6, 2018. Ill people range in age from 10 to 85 years, with a median age of 34. Seventy percent of ill people are female. Thirty-one ill people have been hospitalized, including five people who developed hemolytic uremic syndrome, a type of kidney failure. No deaths have been reported.

Illnesses that occurred after March 29, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

Investigation Update

State and local health officials continue to interview ill people to ask about the foods they ate and other exposures before they became ill. Forty-one (95%) of 43 people interviewed reported eating romaine lettuce in the week before their illness started. This percentage is significantly higher than results from a survey [787 KB] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed. Most people reported eating a salad at a restaurant, and romaine lettuce was the only common ingredient identified among the salads eaten. The restaurants reported using bagged, chopped romaine lettuce to make salads. At this time, ill people are not reporting whole heads or hearts of romaine.

Information collected to date indicates that chopped romaine lettuce from the Yuma, Arizona growing region could be contaminated with *E. coli* O157:H7 and could make people sick. Read CDC's advice to consumers, restaurants, and retailers.

This investigation is ongoing, and CDC will provide more information as it becomes available.

April 13, 2018

Case Count Update

Since the last update on April 10, 2018, 18 more people from 9 states were added to this outbreak.

As of April 12, 2018, 35 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 11 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 22, 2018 to March 31, 2018. Ill people range in age from 12 to 84 years, with a median age of 29. Sixty-nine percent of ill people are female. Twenty-two ill people have been hospitalized, including three people who developed hemolytic uremic syndrome, a type of kidney failure. No deaths have been reported.

Illnesses that occurred after March 27, 2018, might not yet be reported due to the time it takes between when a person becomes ill with *E. coli* and when the illness is reported. This takes an average of two to three weeks.

The current outbreak is not related to a recent multistate outbreak of *E. coli* O157:H7 infections linked to leafy greens. People in the previous outbreak were infected with a different DNA fingerprint of *E. coli* O157:H7 bacteria.

Investigation Update

Epidemiologic evidence collected to date indicates that chopped romaine lettuce is the likely source of this outbreak. Twenty-six (93%) of 28 people interviewed reported consuming romaine lettuce in the week before their illness started. This percentage is significantly higher than results from a survey [787 KB] of healthy people in which 46% reported eating romaine lettuce in the week before they were interviewed. Most people reported eating a salad at a restaurant, and romaine lettuce was the only common ingredient identified among the salads eaten. The restaurants reported using bagged, chopped romaine lettuce to make salads. At this time, ill people are not reporting whole heads or hearts of romaine.

Traceback investigations are ongoing to determine the source of chopped romaine lettuce supplied to restaurant locations where ill people ate. At this time, no common grower, supplier, distributor, or brand has been identified. However, preliminary information indicates that the chopped romaine lettuce was from the Yuma, Arizona growing region.

Information collected to date indicates that chopped romaine lettuce from the Yuma, Arizona growing region could be contaminated with *E. coli* O157:H7 and could make people sick. Read CDC's advice to consumers, restaurants, and retailers.

This investigation is ongoing, and CDC will provide more information as it becomes available.

Initial Announcement

April 10, 2018

CDC, several states, the U.S. Food and Drug Administration, and the U.S. Department of Agriculture's Food Safety and Inspection Service are investigating a multistate outbreak of Shiga toxin-producing *E. coli* O157:H7 infections. This investigation includes *E. coli* O157:H7 infections recently reported by the New Jersey Department of Health .

Public health investigators are using the PulseNet system to identify illnesses that may be part of this outbreak. PulseNet is the national subtyping network of public health and food regulatory agency laboratories coordinated by CDC. DNA fingerprinting is performed on *E. coli* bacteria isolated from ill people using techniques called pulsed-field gel electrophoresis (PFGE) and whole genome sequencing (WGS). CDC PulseNet manages a national database of these DNA fingerprints to identify possible outbreaks. WGS gives a more detailed DNA fingerprint than PFGE.

Illnesses reported by investigators in New Jersey also included ill people who had a diagnostic test showing they were infected with *E. coli* bacteria. Laboratory testing is ongoing to link their illnesses to the outbreak using DNA fingerprinting. Some people may not be included in CDC's case count because no bacterial isolates are available for the DNA fingerprinting needed to link them to the outbreak.

As of April 9, 2018, 17 people infected with the outbreak strain of *E. coli* O157:H7 have been reported from 7 states. A list of the states and the number of cases in each can be found on the Case Count Map page. Illnesses started on dates ranging from March 22, 2018 to March 31, 2018. Ill people range in age from 12 to 84 years, with a median age of 41. Among ill people, 65% are female. Six ill people have been hospitalized, including one person who developed hemolytic uremic syndrome, a type of kidney failure. No deaths have been reported.

The investigation is still ongoing and a specific food item, grocery store, or restaurant chain has not been identified as the source of infections. State and local public health officials are interviewing ill people to determine what they ate and other exposures in the week before their illness started.

CDC will provide more information as it becomes available.

At A Glance

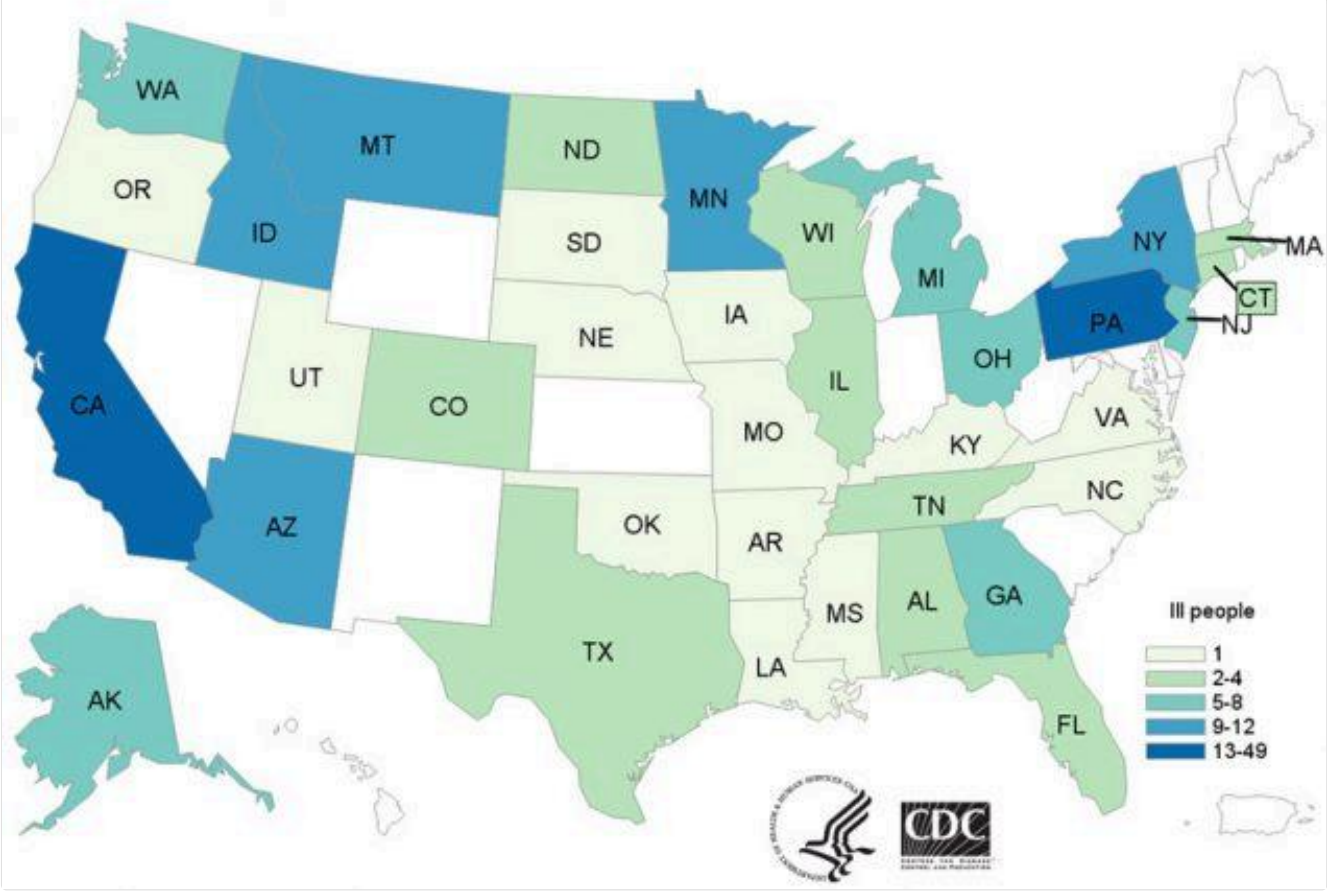
- Case Count: 210
- States: 36
- Deaths: 5
- Hospitalizations: 96
- Recall: No

More Information

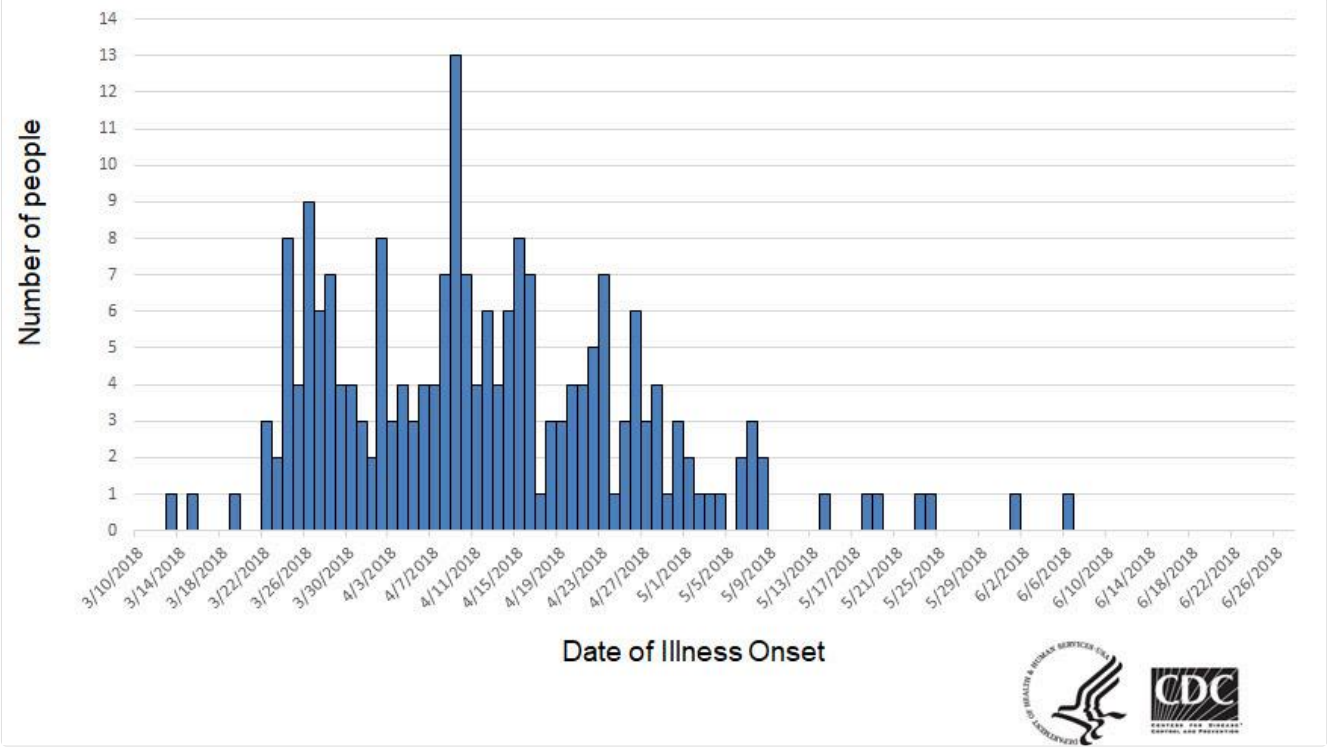
- Advice to Consumers, Restaurants, Retailers, and Clinicians
- Signs & Symptoms

- Key Resources

CLICK TO VIEW CASE COUNT MAPS



CLICK TO VIEW EPI CURVE GRAPHS



Last Reviewed: April 13, 2018