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STEC & HUS Epidemiology and NEDDS Reporting

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Texas Department of State Health Services

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Objectives



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The Epidemiology of STEC and HUS



STEC and HUS in Texas, 2019 – 2023



STEC and HUS NEDSS Case Reporting

- STEC = Shiga toxin-producing *Escherichia coli*
- HUS = Hemolytic Uremic Syndrome
- NEDSS = National Electronic Disease Surveillance System



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STEC Epidemiology

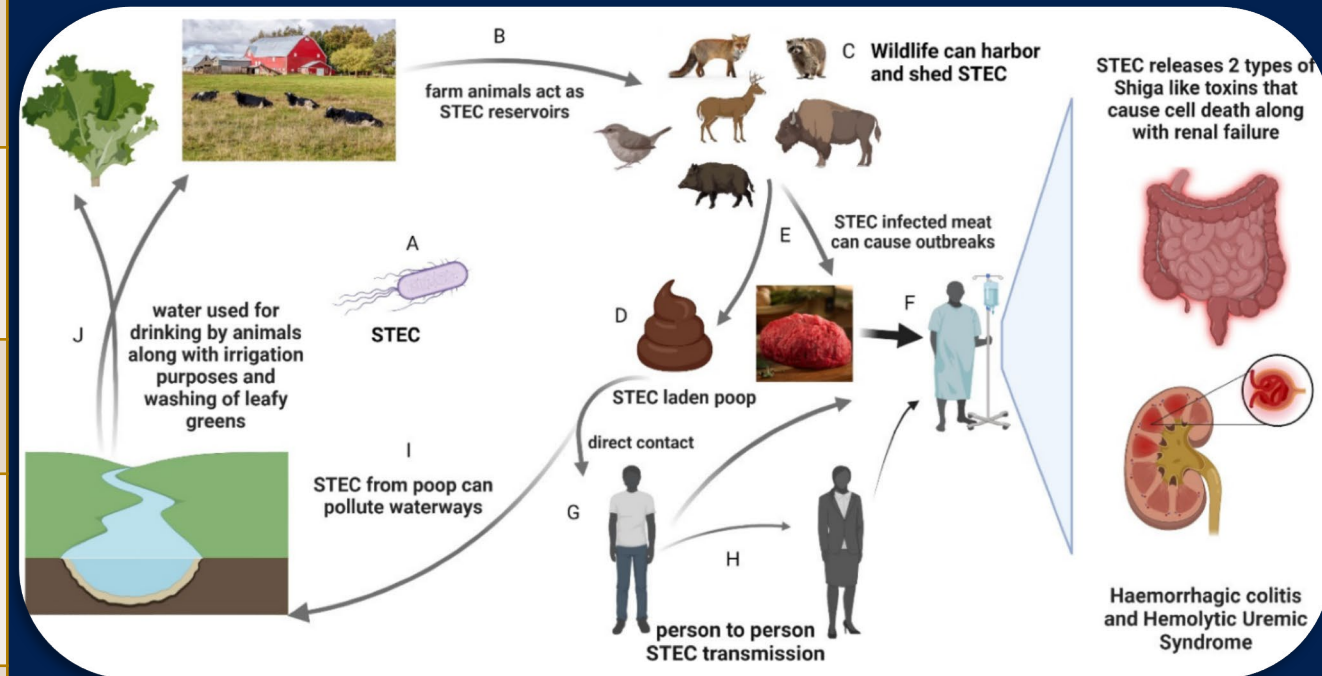
STEC Epidemiology



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Organism	bacteria Shiga toxin-producing <i>E.coli</i> (STEC)
Reservoir	guts of ruminant animals including cattle, deer, elk, goats, sheep
Symptoms	diarrhea (often bloody), vomiting, abdominal pain, fever, chills, nausea
Incubation period	1-10 days (average 3-4 days)
Transmission	contact with contaminated food, water, livestock or an infected person
Higher risk population	young children, elderly, people with weakened immune system



Available at: [Multidisciplinary Digital Publishing Institute \(MDPI\)](https://www.mdpi.com/), accessed January 31, 2024.

STEC Prevention



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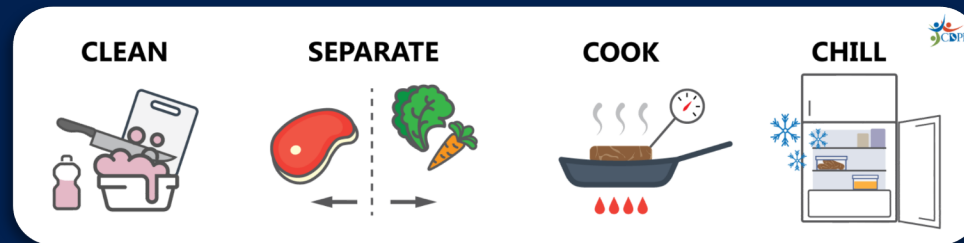
Keep hands clean¹



Choose pasteurized milk, dairy products and juices²



Keep food and animals separate³



Practice the 4 steps of food safety:
clean, separate, cook and chill⁴



Avoid drinking or swallowing recreational water⁵

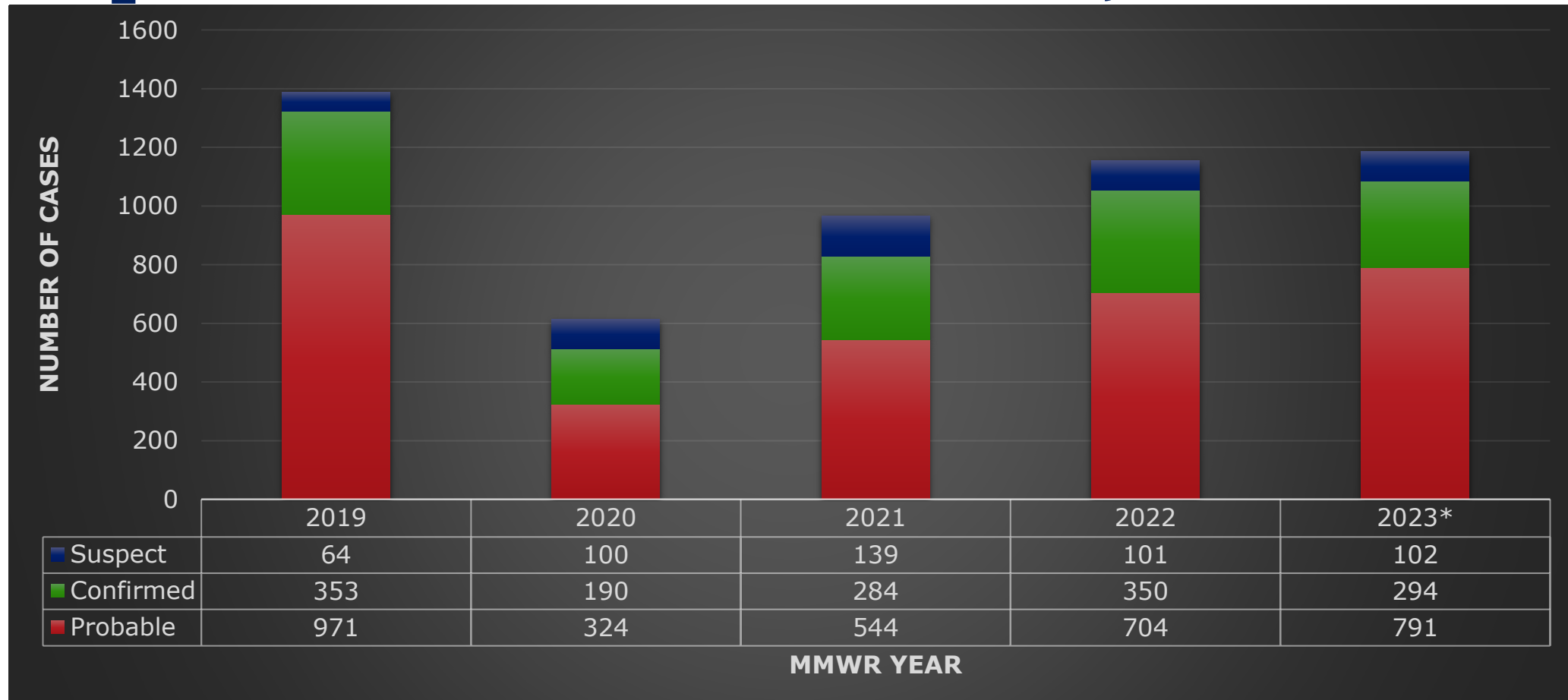
Available at:

¹: PAaustism.org

^{2,3,4}: CDPH.ca.gov (California Department of Public Health)

⁵: AZDHS.gov (Arizona Department of Health Services)

Reported STEC Cases in Texas, 2019 – 2023*

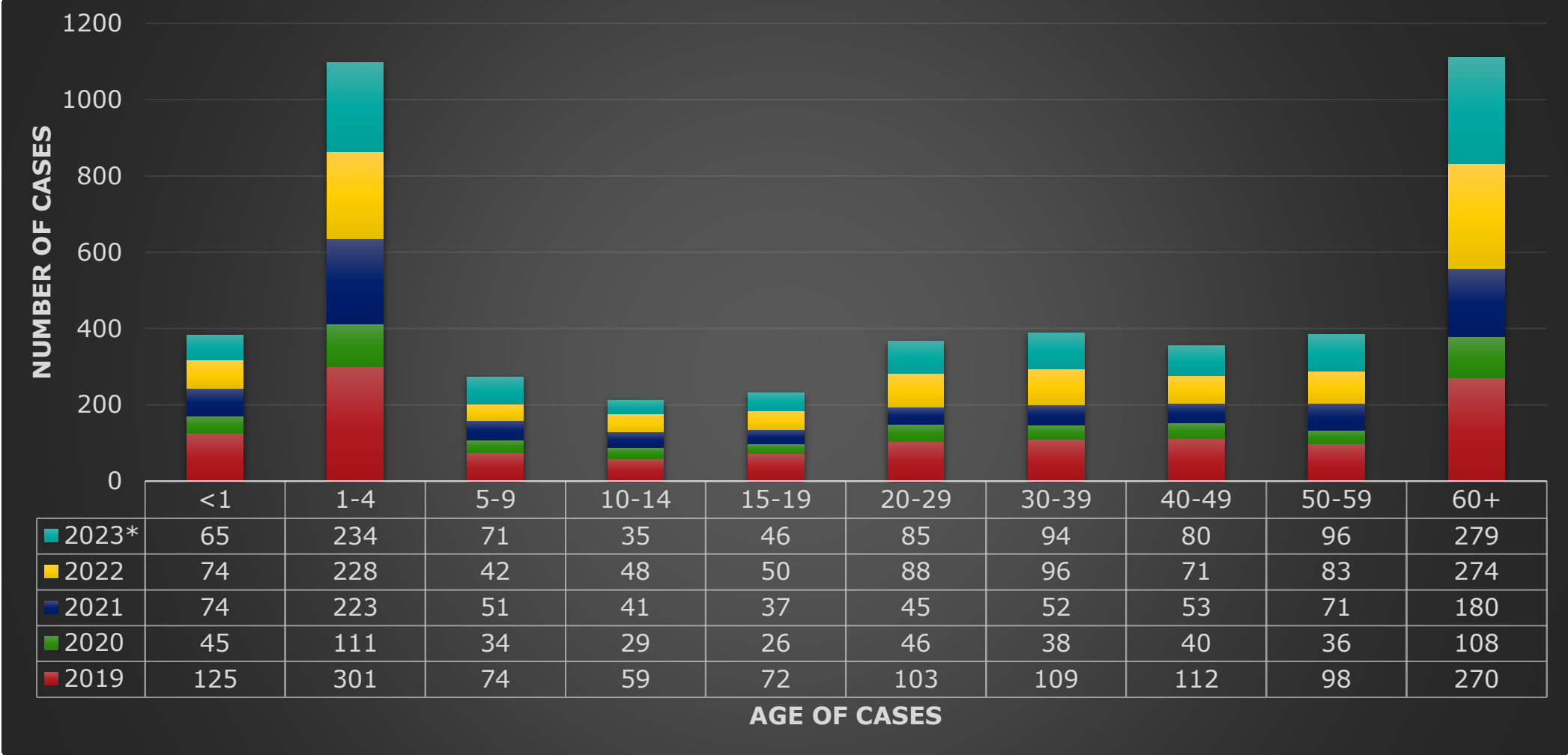


- 5,311 reported STEC cases** (average 1,063 per year)
- 1,269 hospitalizations (average 254 per year)
- 10 deaths (average 2 per year)
- 38 local outbreaks (average 8 per year)

*Data is provisional and may change.

** Include confirmed, probable and suspect STEC cases

Reported Confirmed and Probable STEC Cases in Texas by Age, 2019 – 2023*



*Data is provisional and may change.

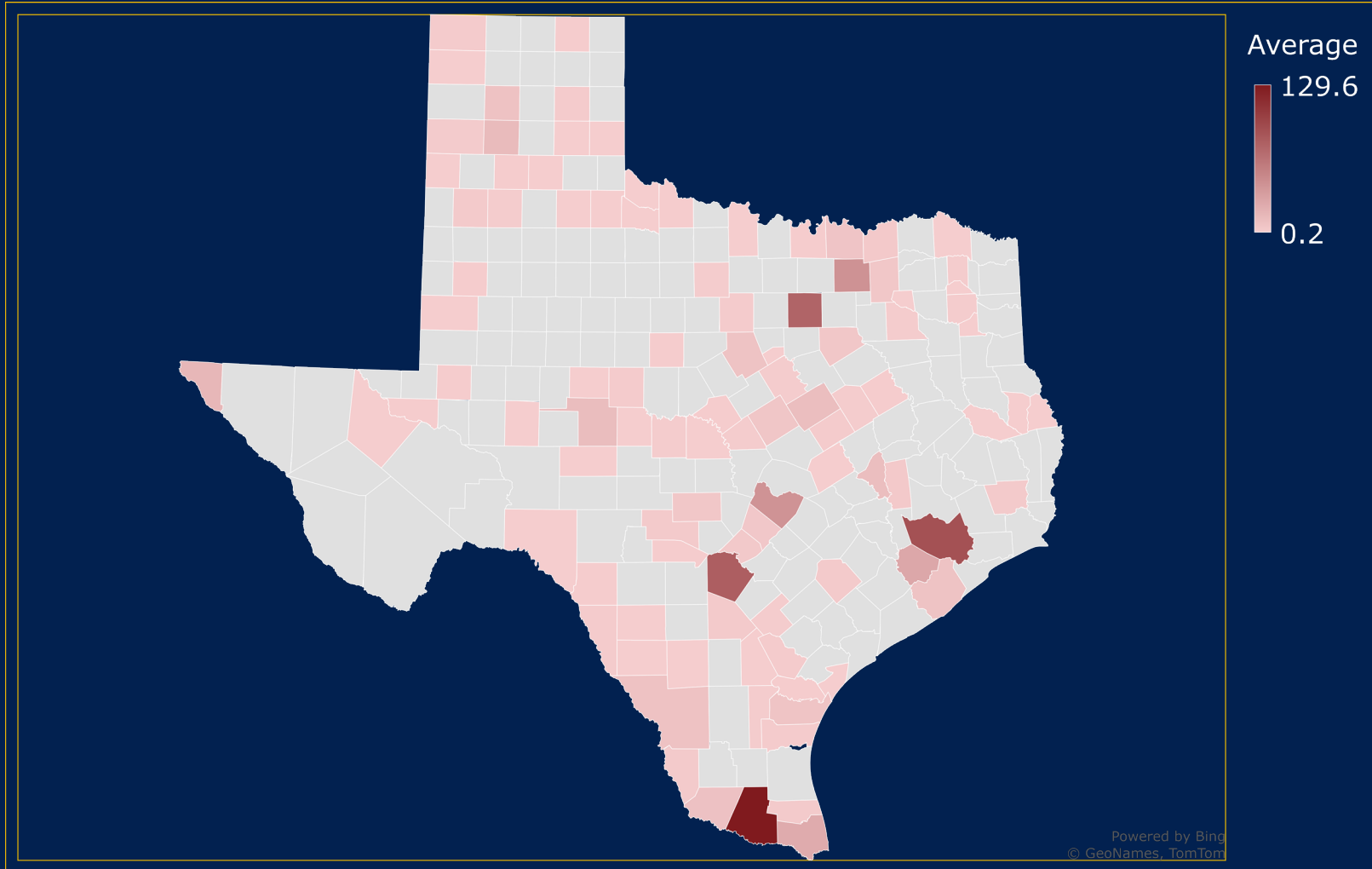
Five-Year-Average STEC Case Count in Texas by County, 2019 – 2023*



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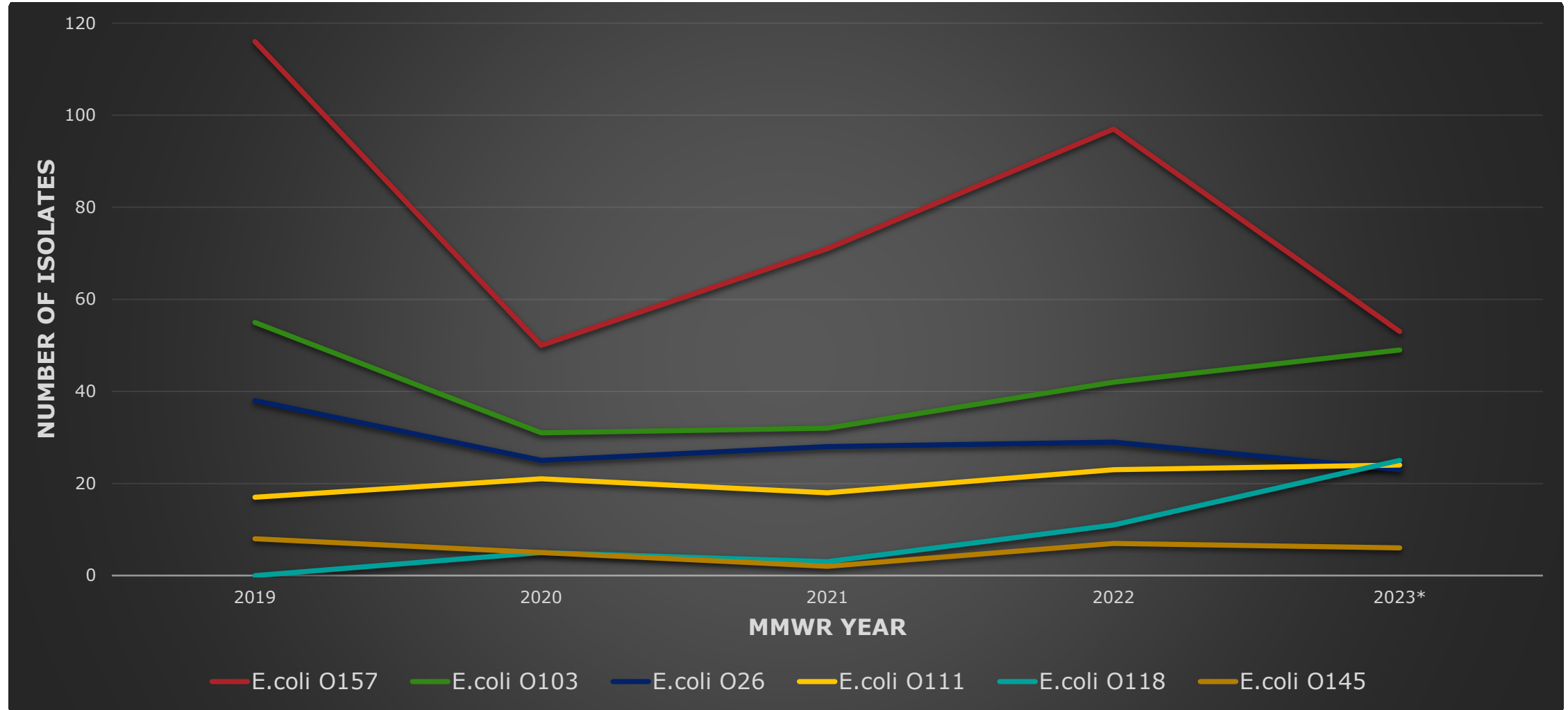
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Note: includes confirmed and probable cases

*Data is provisional and may change.

Most Commonly Identified STEC Serotypes in Texas, 2019 – 2023*



*Data is provisional and may change.



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STEC NEDSS Case Reporting

Missing Required Information in Patient Tab



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- Case's name
 - Name in NEDSS and on investigation form should be consistent
- Date of birth
- Sex
- Address
 - County and zip code are required
- Ethnicity and race
 - Ethnicity and race are required
- Death date if the case is deceased

Missing Required Information in Investigation Tab



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- Investigation start date
- Date of report
- Diagnosis date or illness onset date
 - If illness onset date is unknown, leave it blank and enter diagnosis date
- Case status
 - If epi-linked case, please enter NEDSS ID# or investigation ID# of the index case
- MMWR week and year
 - MMWR week and year are based on illness onset date
- Earliest date suspected
- Missing STEC investigation form
 - Lost to follow-up (LTF) case is required to submit an investigation form
 - Just need to complete the first 2 pages
 - Note LTF in comment section



Data Discrepancy

Information in NEDSS and STEC form are different

- Illness onset date and symptoms
- HUS diagnosis

Compatible clinical symptoms

- To meet the probable case definition, diarrhea (bloody) and/or abdominal pain must be reported. Otherwise, it's only a suspect case

Lab Result and Case Status Classification



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- A suspect case can be changed to a probable if the case had diarrhea (bloody) and/or abdominal pain
- If Shigella is isolated, report the case as Shigellosis instead of STEC
- Do not report as a new case within 180 days from the previous lab report without indication of new infection or different species
- Enteroaggregative *E.coli* (EAEC), Enteropathogenic *E.coli* (EPEC), Enterotoxigenic *E.coli* (ETEC) and Enteroinvasive *E.coli* (EIEC) are not reportable as STEC

Confirmed

- Whole genome sequencing
- Culture
- Isolation of *E.coli* O157:H7; or non-O157 with PCR and/or EIA +

Probable


- PCR
- EIA
- Isolation of *E.coli* O157 without PCR and/or EIA +
- Known diarrhea (bloody) and/or abdominal pain
- Epi-linked to a confirmed or probable case

Suspect

- PCR
- EIA
- Unknown diarrhea (bloody) and/or abdominal pain
- HUS diagnosis without STEC lab

STEC Investigation Form

- Case investigation form: [STEC Form \(texas.gov\)](http://texas.gov)
- 7 pages
- Collects case's information, clinical symptoms, laboratory results and epi information
- If case is LTF, complete the first 2 pages and note LTF
- Surveillance Control Measure form: [PHEP Surveillance Measure Intervention Tracking Form \(texas.gov\)](http://texas.gov)
- Collects information for OBNE Metrics to report to CDC at the end of the year
- It's required for LTF case


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Local health departments should fax completed investigation form to regional DSHS office. Regional DSHS offices should fax completed investigation form to 512-776-7616.

Shiga Toxin-Producing *Escherichia coli* (E. coli) and/or Hemolytic Uremic Syndrome (HUS) Investigation Form

NBS ID: _____ DSHS specimen ID: _____

Outbreak related? Outbreak code: _____

CASE STATUS:
 CONFIRMED PROBABLE
 NOT A CASE OUT OF STATE
 EPI-LINKED (NBS ID): _____

Patient's name: _____
 Address: _____
 City: _____ County: _____ Zip: _____
 Phone/Email (): _____
 DOB: ___/___/___ Age: _____ Sex: Male Female Unknown
 Race: White Black Asian Pacific Islander Native American/Alaskan
 Unknown Other: _____ Hispanic: Yes No Unknown
 Occupation: _____
 Name and address for day care, early childhood development, or food service employment: _____

Reported by: _____
 Phone: () _____ Date reported: ___/___/___
 Investigated by: _____
 Agency: _____
 Phone: () _____
 Email: _____
 Investigation start date: ___/___/___

CLINICAL DATA Symptom Onset: ___/___/___

Signs and symptoms (mark all that apply): Bloody diarrhea Diarrhea
 Fever (Max temp: _____) Vomiting Nausea Chills
 Poor feeding Headache Irritable Abdominal cramps or pain
 Other: _____

Hospitalized? Yes No Emergency room visit only Unknown

(*mark all that apply / Please submit medical records that support the HUS diagnosis)
 Hemolytic uremic syndrome (HUS) (postdiarrheal)
 Acute anemia
 Renal (kidney) injury or failure
 Hematuria (blood in urine)
 Hematuria (blood in urine)

PHEP Surveillance Control Measure Tracking Form – Shiga Toxin Producing *Escherichia coli* (STEC)

Patient Name: _____ Case Status: _____ Date Reported: ___/___/___ Date Reported to Central Office: ___/___/___ : _____ mg/dL
 Onset Date: ___/___/___ Food handler: Yes No Day care worker/attende: Yes No Institutional resident: Yes No _____ peripheral blood smear

Action	Public Health Control Measure Initiated	Date Initiated	Within 3 days of Report?
1. Interview case patient or parent/guardian. Complete patient history to identify potential source of exposure, close contacts during period of communicability and others at risk due to case patient's occupation and living accommodations, day care, school/grade, residence in a closed institution or high risk setting, or food handling.	<input type="checkbox"/> Educate case patient on measures to avoid disease transmission including recommended exclusion from school or work, (food handling or patient care). <input type="checkbox"/> Identify potential source of infection, determine risk factors and transmission settings. Complete Enteric Disease Investigation Form for HUS and E.coli O157:H7 and E.coli O157:H7 Food History Questionnaire . <input type="checkbox"/> Identify close contacts. Contacts: # Identified _____ # Contacted _____	1. ___/___/___	1. <input type="checkbox"/> Yes <input type="checkbox"/> No If no, reason: _____
2. Consult with case patient's day care, school, work place, or residential facility to identify possible additional cases and possible sources of infection	<input type="checkbox"/> Review case patient's activities and potential sources of infection. <input type="checkbox"/> Recommend appropriate exclusion criteria (exclusion from food related work, daycare, or patient care until diarrhea and fever resolve). <input type="checkbox"/> Recommend appropriate disinfection measures. <input type="checkbox"/> Provide information for a letter to parents if requested.	2. ___/___/___	2. <input type="checkbox"/> Yes <input type="checkbox"/> No If no, reason: _____
3. Investigate possible food sources, if appropriate.	<input type="checkbox"/> Work with sanitarian to arrange specimen collection. <input type="checkbox"/> Contact IDPS to arrange shipping and testing. Food items should never be sent to the DSHS lab without prior arrangements made through IDPS.	3. ___/___/___	3. <input type="checkbox"/> Yes <input type="checkbox"/> No If no, reason: _____
4. Investigate and educate contacts.	<input type="checkbox"/> Educate contacts on exposure, symptoms, and measures to avoid disease transmission including recommended exclusion from school or work.	4. ___/___/___	4. <input type="checkbox"/> Yes <input type="checkbox"/> No If no, reason: _____
Outbreaks			
5. Investigate source of outbreak.	<input type="checkbox"/> Compare detailed food histories of all cases, collect information on ingredients and preparation, look for potential common source foods. <input type="checkbox"/> Utilize case control study, if appropriate. <input type="checkbox"/> Explore Non-food common exposure histories such as recreational water and animal contact. <input type="checkbox"/> Discuss testing of any suspect food or other vehicle with IDPS. Do not send food or other vehicle to the DSHS lab without prior approval from IDPS. <input type="checkbox"/> Educate public through press release as needed to find additional cases.	5. ___/___/___	
6. Work with other agencies to mitigate source of infection.	<input type="checkbox"/> Work with local sanitarians to guide control measure implementation. <input type="checkbox"/> Work with IDPS and regulatory to recall manufactured products and publicize recall. <input type="checkbox"/> Provide findings to IDPS for potential regulatory action if a DSHS regulated product is implicated.	6. ___/___/___	

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HUS Epidemiology

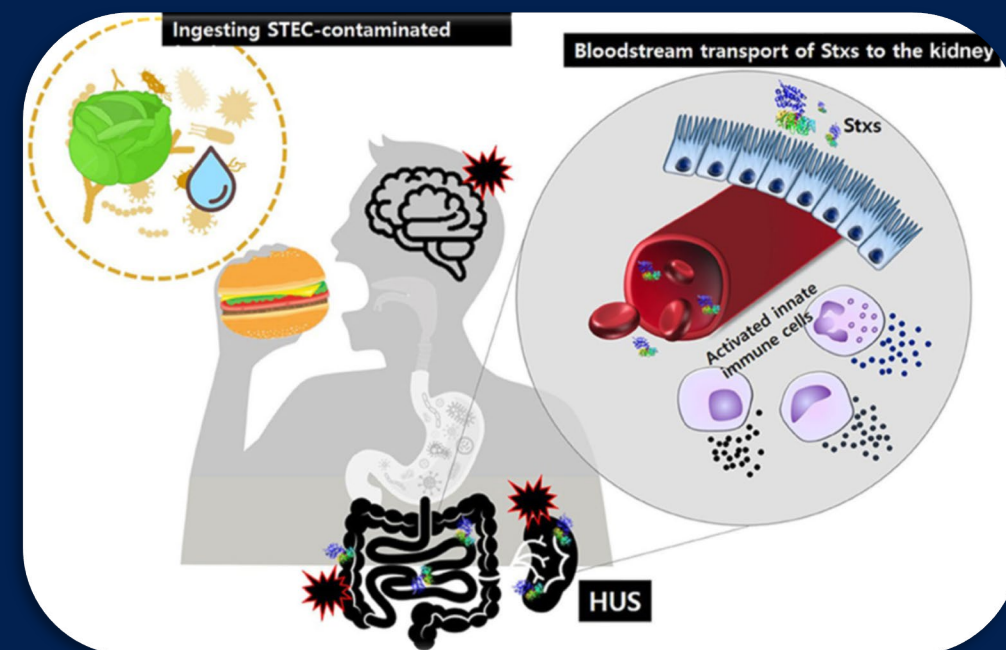
HUS Epidemiology



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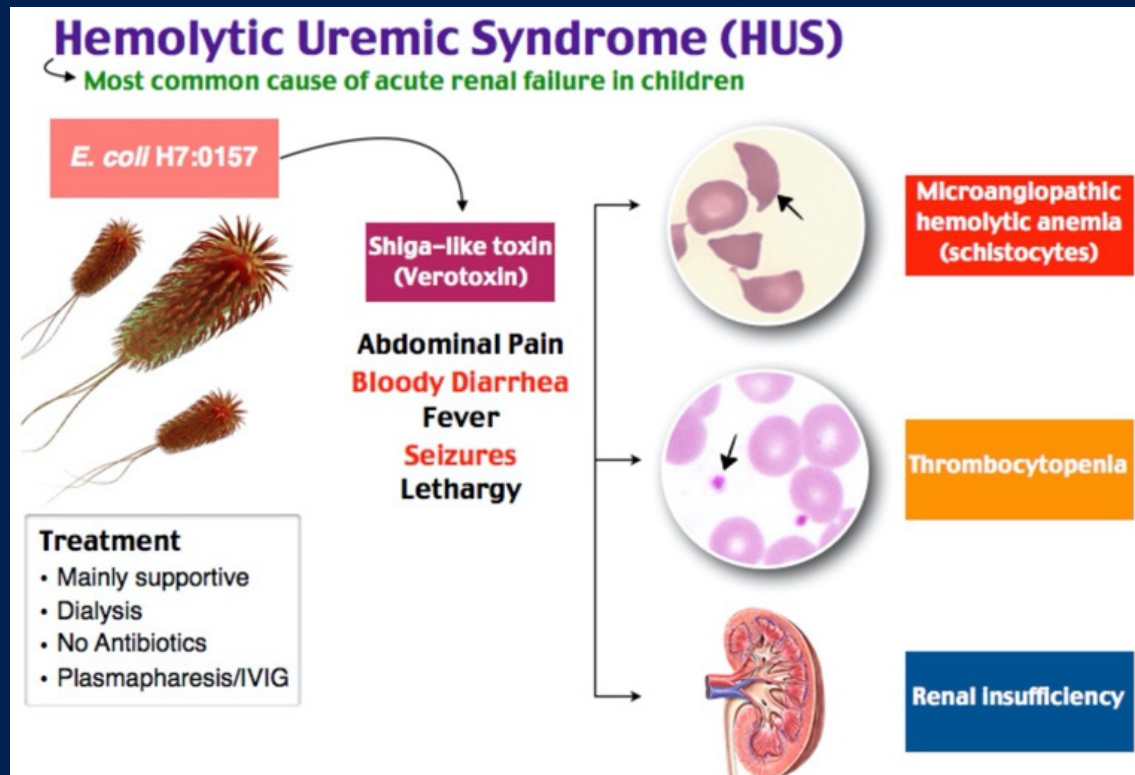
Organism	no specific organism. HUS can be caused by STEC infection or other infections (i.e., HIV, flu viruses), certain medicines, conditions such as pregnancy, cancers or autoimmune disease
Symptoms	diarrhea (often bloody), abdominal pain, vomiting, fever, chills and headache. Complication: high blood pressure, seizures, blood-clotting problems, kidney disease, stroke or coma
Incubation period	7 days (up to 3 weeks) after onset of diarrhea
Transmission	consumption of contaminated food or water or after physical contact with an infected person or animal
Higher risk population	children 5 or younger, and people with weakened immune system



Available at: [Frontier in Cellular and Infection Microbiology](#), accessed January 31, 2024.

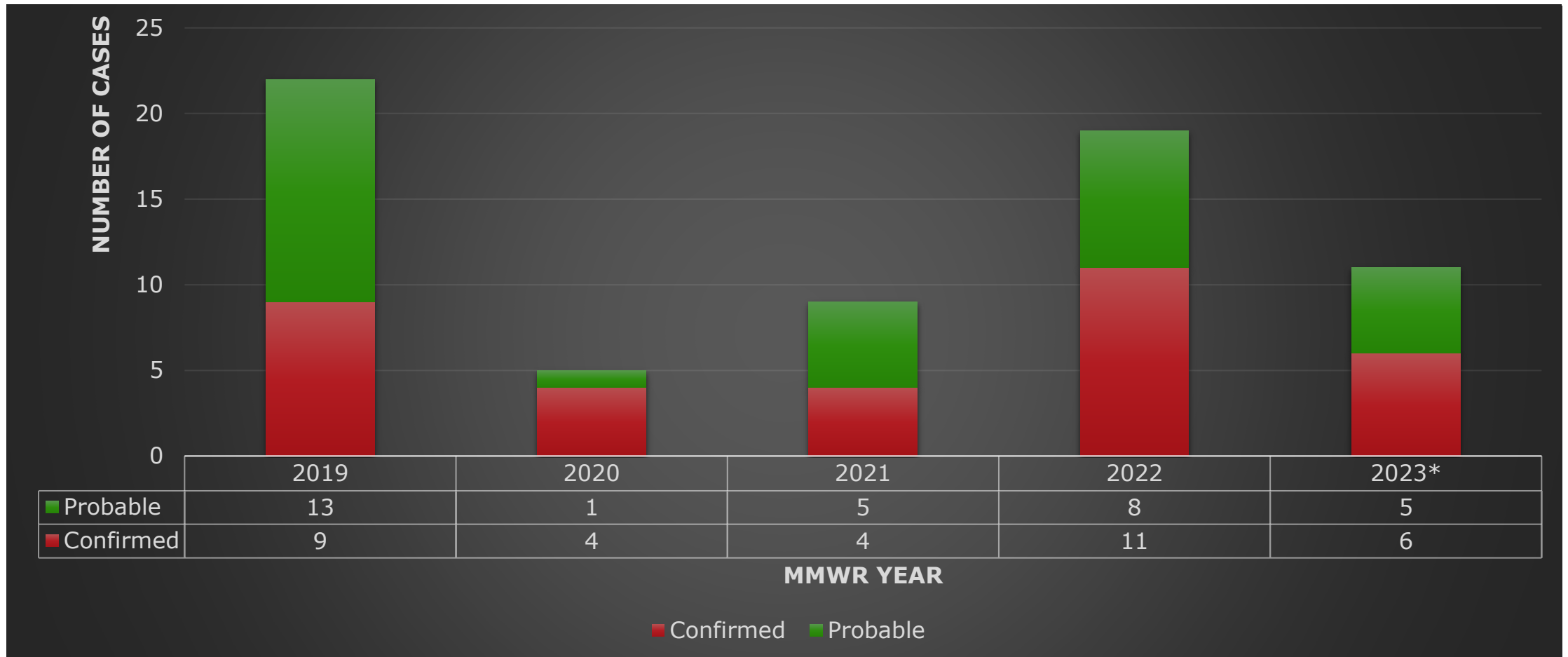


HUS Characteristics



- Triad of microangiopathic hemolytic anemia, thrombocytopenia, and acute renal failure
- No single diagnostic test for HUS
- HUS diagnosis is based on clinical picture
- The blood test: anemia, thrombocytopenia and elevated creatinine (consistent with acute kidney injury)
 - Schistocytes in blood smear
- Urinalysis: hematuria and proteinuria
- Stool culture or PCR

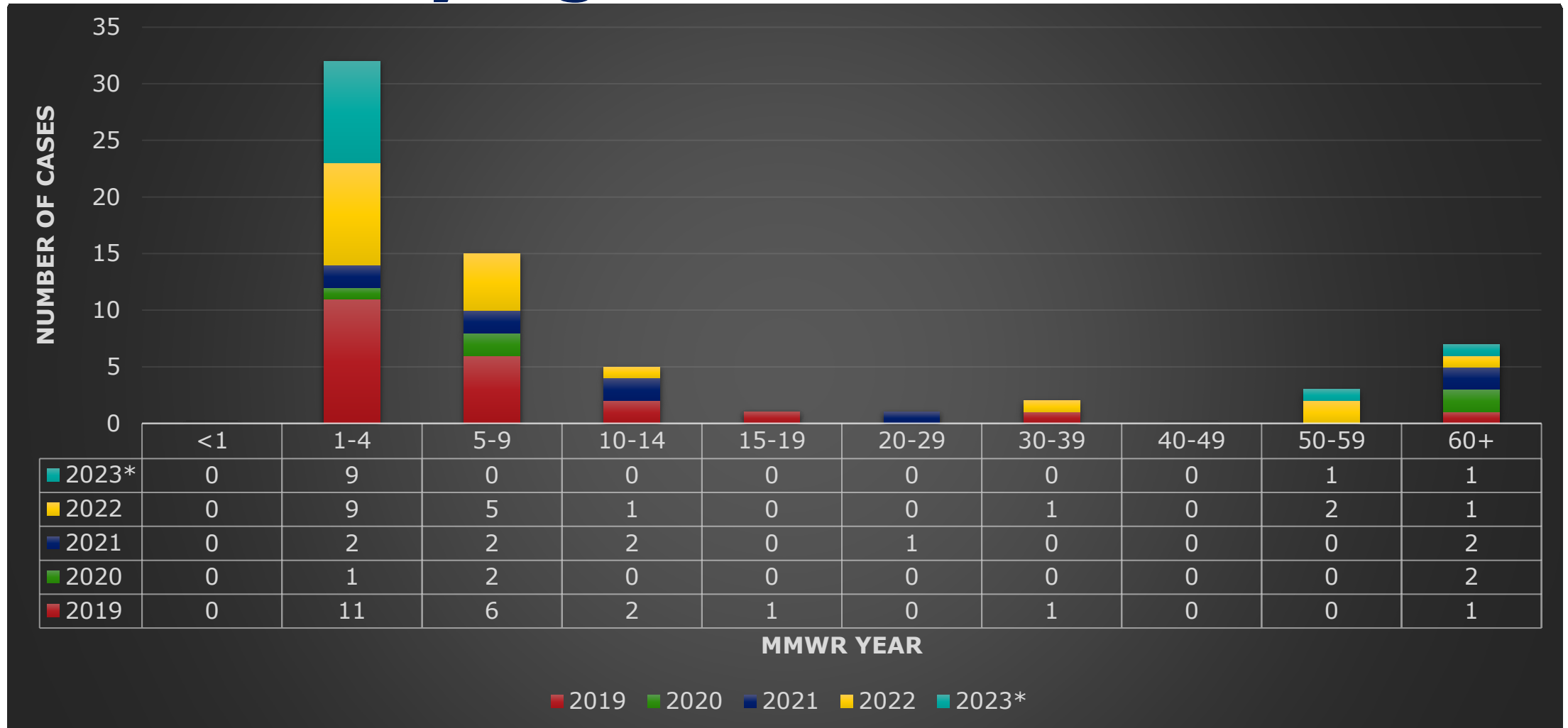
Reported HUS Cases in Texas, 2019 – 2023*



- 66 reported HUS cases (Average 13 per year)
- 64 hospitalizations (Average 12 per year)
- 2 deaths

*Data is provisional and may change.

Reported HUS Cases in Texas by Age, 2019 – 2023*



*Data is provisional and may change.

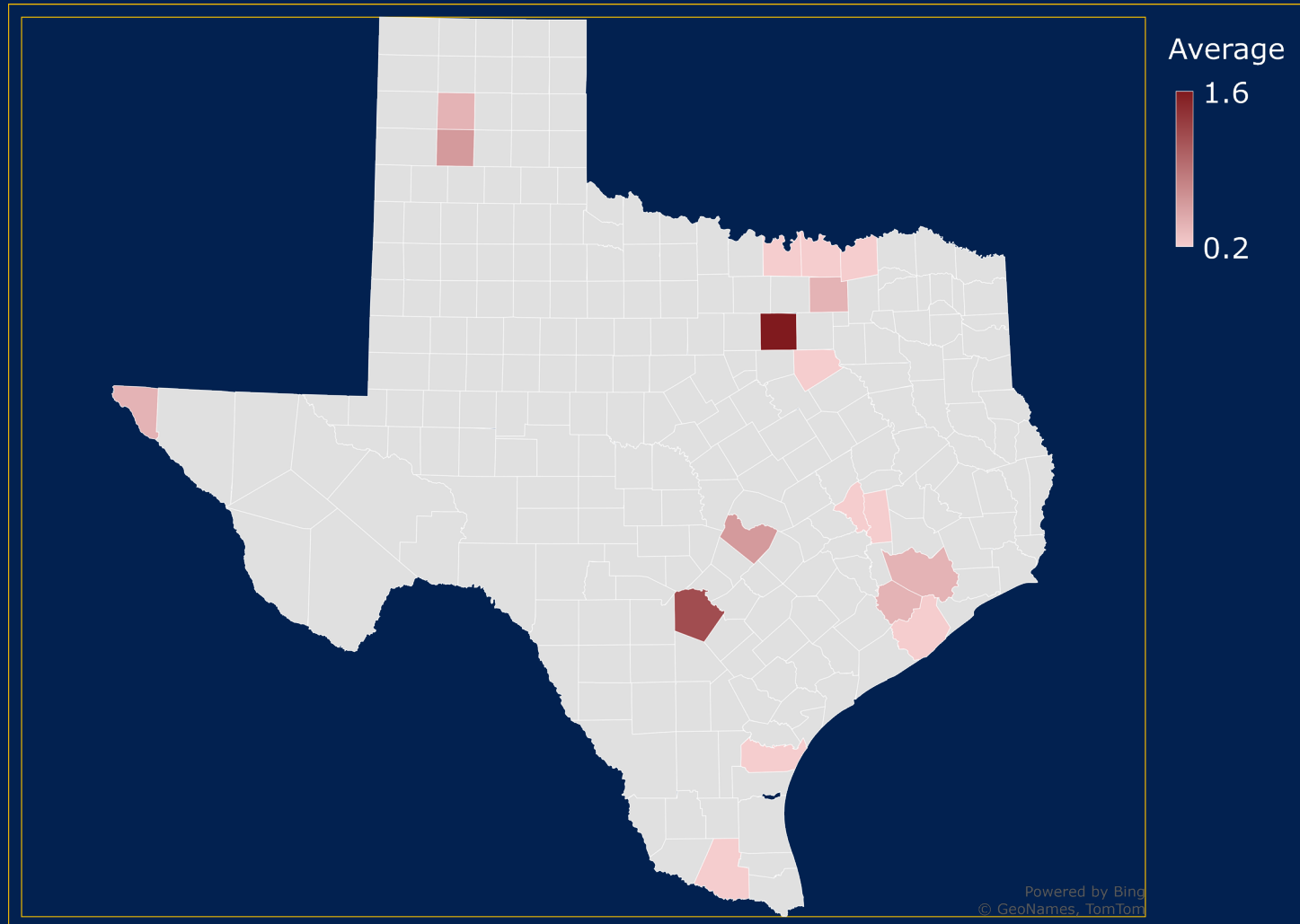
Five-Year-Average HUS Case Count in Texas by County, 2019 – 2023*



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Note: includes confirmed and probable cases

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HUS NEDSS Case Reporting

HUS Reporting



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- **Lab confirmation:** The following must **both** be present during the illness:
 - Anemia (acute onset) with microangiopathic changes on peripheral blood smear
 - Schistocytes (fragmented red blood cells)
 - Burr cells (echinocyte)
 - Helmet cells (keratocyte)
 - Renal injury (acute onset)
 - Hematuria (blood in urine)
 - Proteinuria (protein in urine)
 - Elevated creatinine level
 - $\geq 1.0\text{mg/dL}$ for 0-12 y/o
 - $\geq 1.5\text{mg/dL}$ for 13+ y/o

HUS Reporting



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- **Case classification**

- **Confirmed**

- The lab criteria is met in a patient who had acute or bloody diarrhea in preceding 3 weeks

- **Probable**

- The lab criteria is met in a patient who does not have a clear history of acute or bloody diarrhea in preceding 3 weeks
- The lab criteria is met in a patient who had acute or bloody diarrhea in preceding 3 weeks but microangiopathic changes are not confirmed

- ❖ HUS diagnosis without STEC lab = suspect STEC case

Common Mistakes in HUS NEDSS Case Reporting

- Missing investigation form
 - [STEC Form \(texas.gov\)](https://www.texas.gov)
- Missing medical records
 - Medical records should be sent along with the investigation form
- Missing NEDSS investigation for HUS
 - Investigation for HUS should be entered separately from STEC in NEDSS
 - Urine and blood test results for HUS are needed to be entered in NEDSS
 - See NEDSS Data Entry Guide for guidance



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Summary



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- HUS is a complication of STEC infection which can be fatal without timely medical treatment
- STEC/HUS case investigation form is required for all confirmed and probable cases
- A suspect STEC case can be changed to a probable if the case had diarrhea (bloody) and/or abdominal pain
- HUS reporting requires the evidence of both renal injury and anemia with microangiopathic changes
- Diagnosis of HUS without STEC testing meets the case definition of suspect STEC



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Questions?



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Thank you!

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