# Cholera and Other *Vibrio* Illness Surveillance (COVIS) System Annual Summary, 2019

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## Surveillance Summary

In 2019, **2,719** *Vibrio* infections were reported to COVIS.

- **2,708** were cases of vibriosis. Vibriosis is defined as infection with pathogenic species of the family *Vibrionaceae* other than toxigenic *Vibrio cholerae* serogroups O1 and O139 (which are generally associated with epidemic or pandemic cholera).
  - 1,585 were culture-confirmed cases.
  - 1,100 were probable cases detected by a culture-independent diagnostic test (CIDT) and not culture-confirmed.
  - 23 were probable cases linked epidemiologically to a laboratory-diagnosed case. Note: Epi-linked cases are not included in the analyses below.
- **11** were cholera cases. Cholera is defined as infection with toxigenic *cholerae* serogroup O1 or O139.

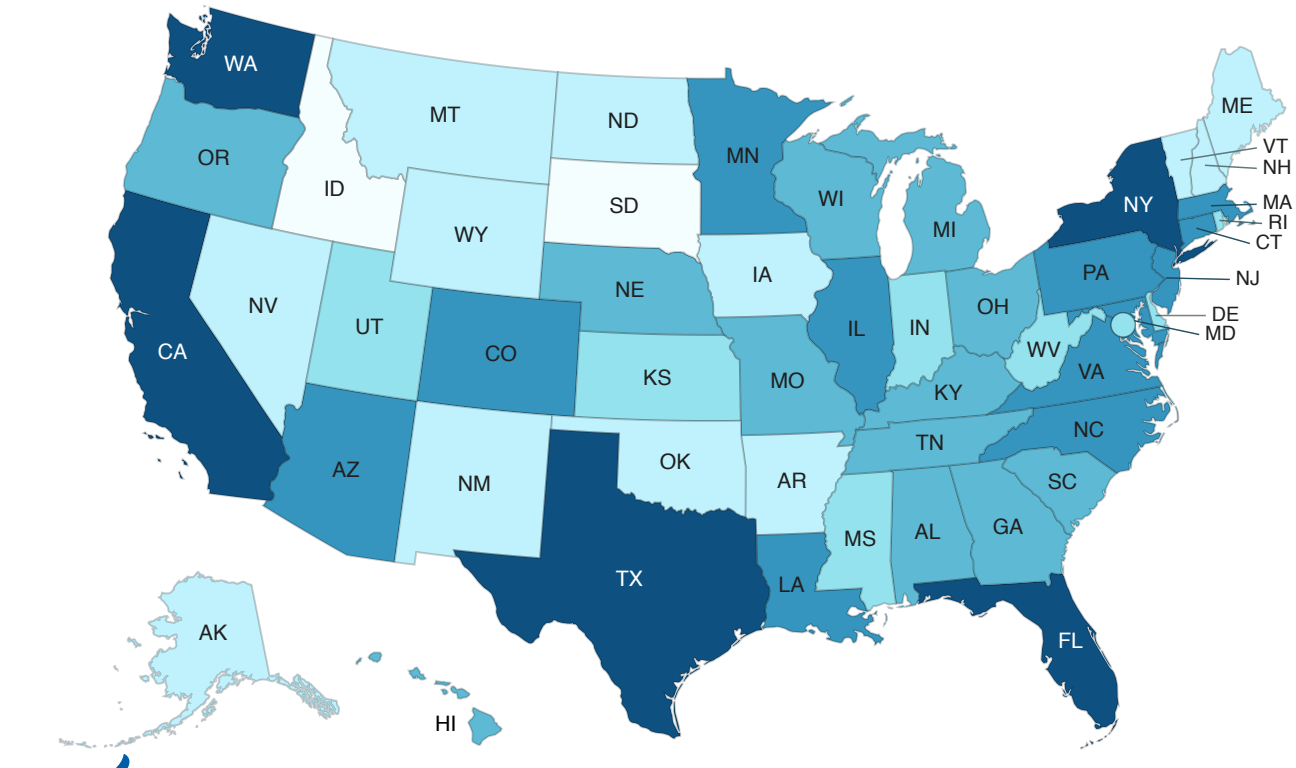
## Geographic Distribution of Vibriosis Cases in the United States

Jurisdictions that reported vibriosis cases to COVIS during 2019 are shown in Figures 1a–1c.

- 49 jurisdictions reported 2,685 vibriosis cases (Figure 1a).
  - Atlantic Coast states reported 789 (29%)
  - Gulf Coast states reported 689 (26%)
  - Non-coastal states reported 685 (26%)
  - Pacific Coast states reported 522 (19%)
- 43 jurisdictions reported 670 *V. parahaemolyticus* cases (Figure 1b).
  - Pacific Coast states reported 221 (33%)
  - Atlantic Coast states reported 208 (31%)
  - Non-coastal states reported 137 (20%)
  - Gulf Coast states reported 104 (16%)
- 26 jurisdictions reported 159 *V. vulnificus* cases (Figure 1c).
  - Gulf Coast states reported 83 (52%)
  - Atlantic Coast states reported 50 (31%)
  - Non-coastal states reported 15 (9%)
  - Pacific Coast states reported 11 (7%)

**Figure 1a** Figure 1b Figure 1c

Number of vibriosis cases reported to COVIS, by jurisdiction,* United States, 2019 (n=2,685)




*Jurisdictions include states and Washington, D.C.

Data Table

| Location | Vibriosis Range |
|---|---|
| Wyoming | 1 to 9 |
| West Virginia | 10 to 24 |
| Wisconsin | 25 to 49 |
| Washington | 150+ |
| Vermont | 1 to 9 |
| Virginia | 50 to 149 |
| Utah | 10 to 24 |
| Texas | 150+ |
| Tennessee | 25 to 49 |
| South Dakota | 0 |
| South Carolina | 25 to 49 |
| Rhode Island | 10 to 24 |
| Pennsylvania | 50 to 149 |
| Oregon | 25 to 49 |
| Oklahoma | 1 to 9 |
| Ohio | 25 to 49 |
| New York | 150+ |
| Nevada | 1 to 9 |
| New Mexico | 1 to 9 |
| New Jersey | 50 to 149 |
| New Hampshire | 1 to 9 |
| Nebraska | 25 to 49 |
| North Dakota | 1 to 9 |
| North Carolina | 50 to 149 |
| Montana | 1 to 9 |
| Mississippi | 10 to 24 |
| Missouri | 25 to 49 |
| Minnesota | 50 to 149 |
| Michigan | 25 to 49 |
| Maine | 1 to 9 |
| Maryland | 50 to 149 |
| Massachusetts | 50 to 149 |
| Louisiana | 50 to 149 |
| Kentucky | 25 to 49 |
| Kansas | 10 to 24 |
| Indiana | 10 to 24 |
| Illinois | 50 to 149 |
| Idaho | 0 |
| Iowa | 1 to 9 |
| Hawaii | 25 to 49 |
| Georgia | 25 to 49 |
| Florida | 150+ |

| Location | Vibriosis Range |
|---|---|
| Delaware | 10 to 24 |
| District Of Columbia | 10 to 24 |
| Connecticut | 50 to 149 |
| Colorado | 50 to 149 |
| California | 150+ |
| Arizona | 50 to 149 |
| Arkansas | 1 to 9 |
| Alabama | 25 to 49 |
| Alaska | 1 to 9 |

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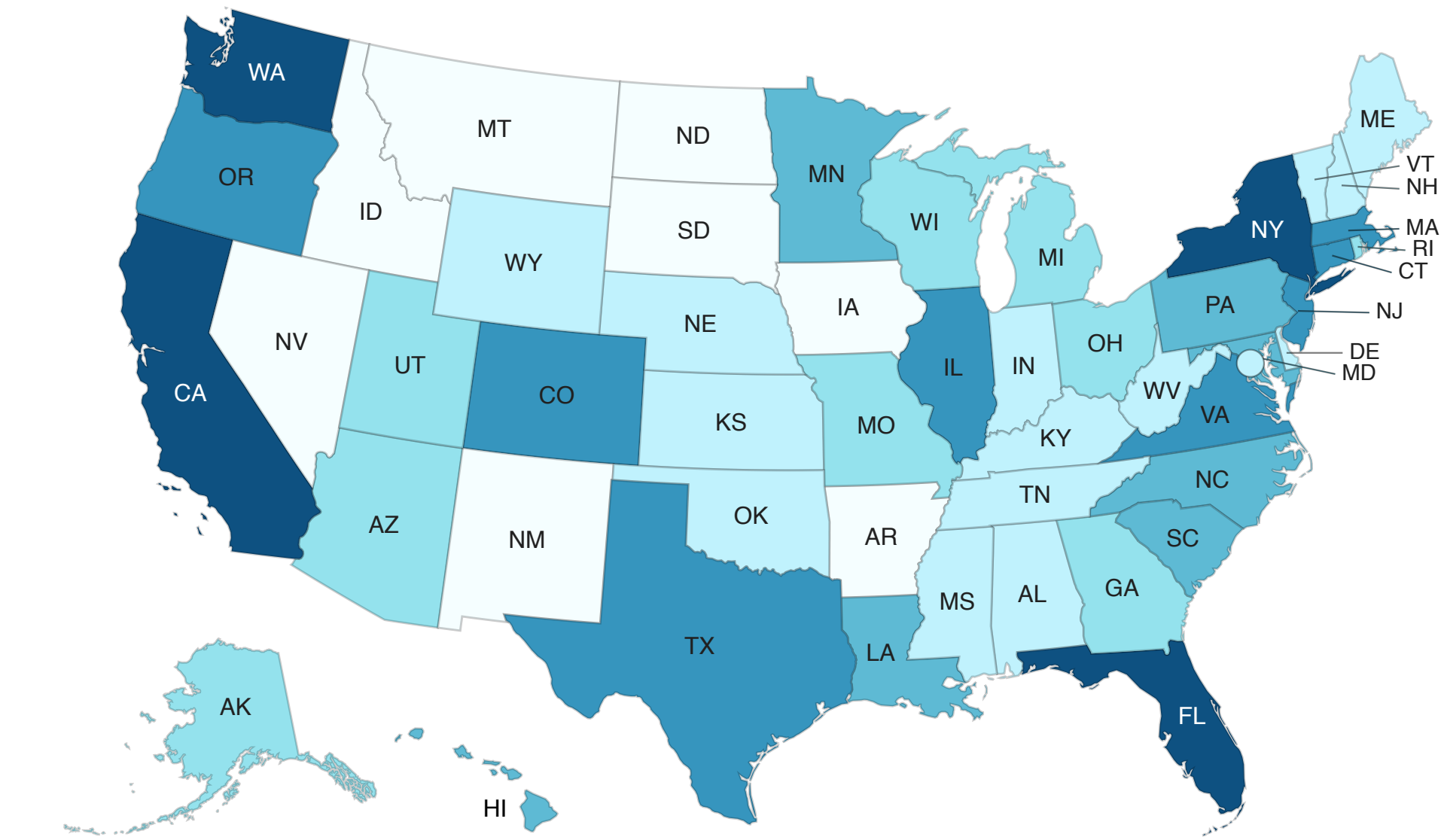
Number of *V. parahaemolyticus* cases reported to COVIS,* by jurisdiction,† United States, 2019 (n=670)




Number of Cases

- 0
- 1 to 4
- 5 to 9
- 10 to 19
- 20 to 39
- 40+

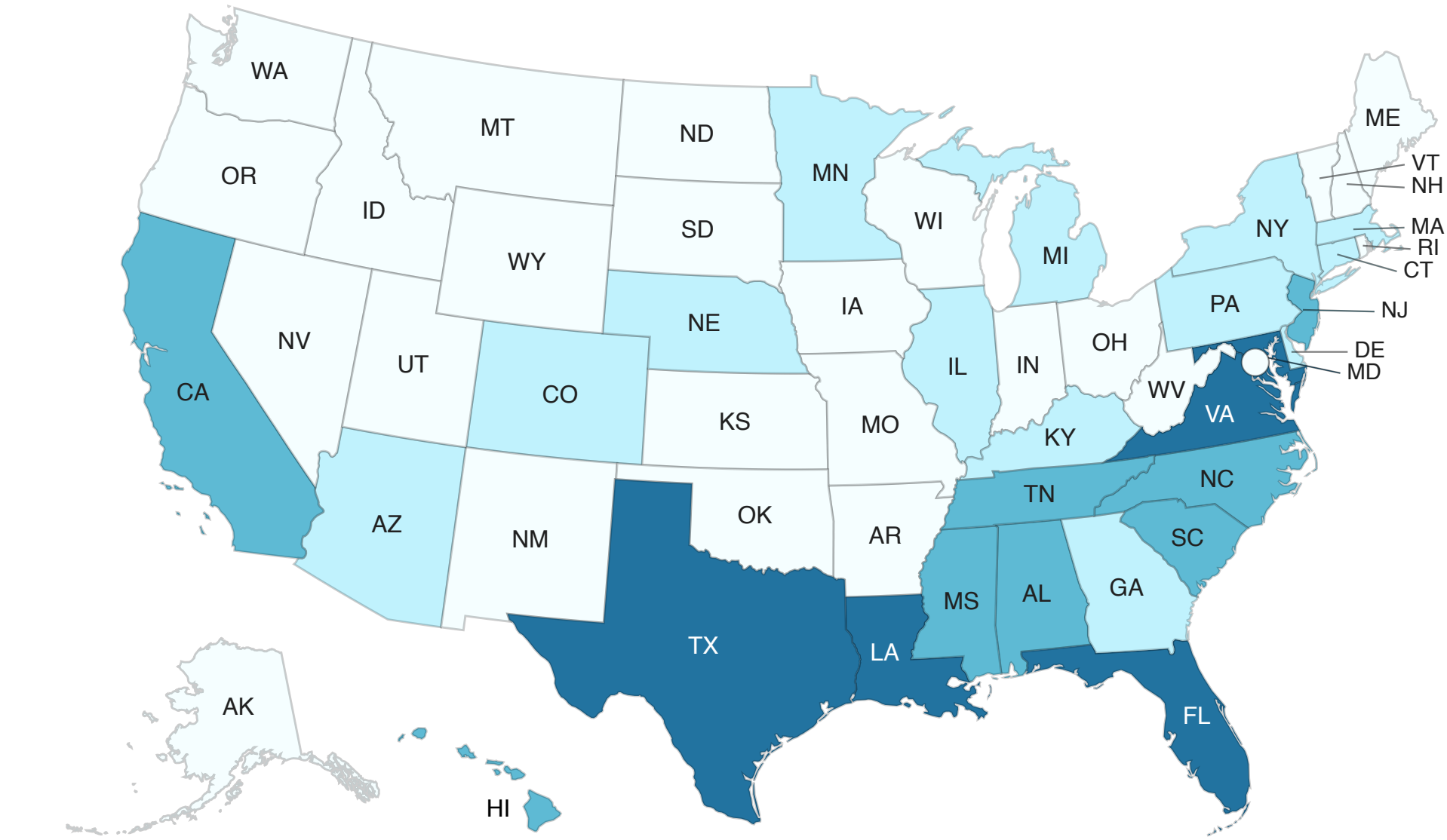
*Includes 15 probable *V. parahaemolyticus* cases reported by Texas (4), North Carolina (3), Arizona (2), California (1), Colorado (1), Florida (1), Michigan (1), Tennessee (1), and West Virginia (1).
†Jurisdictions include states and Washington D.C.

Data Table +

| Location | V. parahaemolyticus Range |
|---|---|
| Wyoming | 1 to 4 |
| West Virginia | 1 to 4 |
| Wisconsin | 5 to 9 |
| Washington | 40+ |
| Vermont | 1 to 4 |
| Virginia | 20 to 39 |
| Utah | 5 to 9 |
| Texas | 20 to 39 |
| Tennessee | 1 to 4 |
| South Dakota | 0 |
| South Carolina | 10 to 19 |
| Rhode Island | 5 to 9 |

| Location | V. parahaemolyticus Range |
|---|---|
| Pennsylvania | 10 to 19 |
| Oregon | 20 to 39 |
| Oklahoma | 1 to 4 |
| Ohio | 5 to 9 |
| New York | 40+ |
| Nevada | 0 |
| New Mexico | 0 |
| New Jersey | 20 to 39 |
| New Hampshire | 1 to 4 |
| Nebraska | 1 to 4 |
| North Dakota | 0 |
| North Carolina | 10 to 19 |
| Montana | 0 |
| Mississippi | 1 to 4 |
| Missouri | 5 to 9 |
| Minnesota | 10 to 19 |
| Michigan | 5 to 9 |
| Maine | 1 to 4 |
| Maryland | 10 to 19 |
| Massachusetts | 20 to 39 |
| Louisiana | 10 to 19 |
| Kentucky | 1 to 4 |
| Kansas | 1 to 4 |
| Indiana | 1 to 4 |
| Illinois | 20 to 39 |
| Idaho | 0 |
| Iowa | 0 |
| Hawaii | 10 to 19 |
| Georgia | 5 to 9 |
| Florida | 40+ |
| Delaware | 1 to 4 |
| District Of Columbia | 1 to 4 |
| Connecticut | 20 to 39 |
| Colorado | 20 to 39 |
| California | 40+ |
| Arizona | 5 to 9 |
| Arkansas | 0 |
| Alabama | 1 to 4 |
| Alaska | 5 to 9 |

Number of *V. vulnificus* cases reported to COVIS,* by jurisdiction,† United States, 2019 (n=159)




Number of Cases

- 0
- 1 to 2
- 3 to 9
- 10+

*Includes 1 probable *V. vulnificus* case reported by Texas (1).
†Jurisdictions include states and Washington D.C.

Data Table

| Location | V. vulnificus Range |
|---|---|
| Wyoming | 0 |
| West Virginia | 0 |
| Wisconsin | 0 |
| Washington | 0 |
| Vermont | 0 |
| Virginia | 10+ |
| Utah | 0 |
| Texas | 10+ |
| Tennessee | 3 to 9 |
| South Dakota | 0 |
| South Carolina | 3 to 9 |
| Rhode Island | 0 |
| Pennsylvania | 1 to 2 |
| Oregon | 0 |
| Oklahoma | 0 |
| Ohio | 0 |
| New York | 1 to 2 |
| Nevada | 0 |
| New Mexico | 0 |
| New Jersey | 3 to 9 |
| New Hampshire | 0 |
| Nebraska | 1 to 2 |
| North Dakota | 0 |
| North Carolina | 3 to 9 |
| Montana | 0 |
| Mississippi | 3 to 9 |
| Missouri | 0 |
| Minnesota | 1 to 2 |
| Michigan | 1 to 2 |
| Maine | 0 |

| Location | V. vulnificus Range |
|---|---|
| Maryland | 10+ |
| Massachusetts | 1 to 2 |
| Louisiana | 10+ |
| Kentucky | 1 to 2 |
| Kansas | 0 |
| Indiana | 0 |
| Illinois | 1 to 2 |
| Idaho | 0 |
| Iowa | 0 |
| Hawaii | 3 to 9 |
| Georgia | 1 to 2 |
| Florida | 10+ |
| Delaware | 1 to 2 |
| District Of Columbia | 0 |
| Connecticut | 1 to 2 |
| Colorado | 1 to 2 |
| California | 3 to 9 |
| Arizona | 1 to 2 |
| Arkansas | 0 |
| Alabama | 3 to 9 |
| Alaska | 0 |

## Demographic and Clinical Characteristics of Patients

Demographic characteristics and clinical outcomes of patients with vibriosis are shown in Table 1.

- Among culture-confirmed infections, the most frequently reported species was *V. parahaemolyticus* (655 cases, 41%).
- The median age of patients was 51 years (range <1–103 years); 1,628 (61%) were male.
- 772 (33%) hospitalizations and 70 (3%) deaths were reported.

Table 1

Demographic characteristics and clinical outcomes of patients with vibriosis,* by species, United States, 2019.

| | | Demographic Characteristics | | | | Clinical Outcomes | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cases | Age (years) | | Sex | | Hospitalizations | | Deaths | |
| Genus and Species | N | Median | Range | Male (n/N) | % | n/N | % | n/N | % |
| Confirmed cases | 1,585 | 50 | <1–93 | 1,092/1,574 | 69 | 454/1,370 | 33 | 57/1,426 | 4 |
| *V. parahaemolyticus* | 655 | 48 | <1–93 | 456/646 | 71 | 114/578 | 20 | 7/586 | 1 |
| *V. alginolyticus* | 277 | 34 | 2–92 | 189/276 | 68 | 35/213 | 16 | 5/252 | 2 |
| *V. cholerae* (excluding toxigenic O1 and O139)† | 174 | 51.5 | <1–91 | 104/173 | 60 | 67/161 | 42 | 5/162 | 3 |
| *V. vulnificus* | 158 | 65 | 6–93 | 138/158 | 87 | 125/146 | 86 | 30/142 | 21 |
| *V. fluvialis* | 110 | 60 | 6–92 | 63/110 | 57 | 44/94 | 47 | 4/99 | 4 |
| *V. mimicus* | 37 | 55 | 13–88 | 25/37 | 68 | 8/29 | 28 | 1/33 | 3 |
| *G. hollisae* | 13 | 43 | 26–65 | 11/13 | 85 | 6/11 | 55 | 0/10 | 0 |
| *V. furnissii* | 7 | 59 | 29–78 | 3/7 | 43 | 4/4 | 100 | 0/7 | 0 |
| *V. harveyi* | 6 | 57 | 15–64 | 2/6 | 33 | 1/6 | 17 | 0/5 | 0 |
| *V. metschnikovii* | 6 | 71.5 | 10–85 | 5/6 | 83 | 3/6 | 50 | 0/6 | 0 |
| *P. damselae* | 5 | 54 | 6–77 | 4/5 | 80 | 3/4 | 75 | 1/4 | 25 |
| *V. cincinnatiensis* | 2 | 85.5 | 78–93 | 2/2 | 100 | 2/2 | 100 | 1/2 | 50 |
| *V. metoecus* | 1 | 41 | 41–41 | 0/1 | 0 | 1/1 | 100 | 0/1 | 0 |
| *V. navarrensis* | 1 | 4 | 4–4 | 1/1 | 100 | 0/0 | – | 0/1 | 0 |
| *V. ponticus* | 1 | 30 | 30–30 | 0/1 | 0 | 0/1 | 0 | 0/1 | 0 |
| Multiple Species | 44 | 53 | 4–89 | 29/44 | 66 | 12/36 | 33 | 1/36 | 3 |
| Species not identified | 88 | 47.5 | 1–90 | 60/88 | 68 | 29/78 | 37 | 2/79 | 3 |
| Probable cases†† | 1,100 | 53 | <1–103 | 536/1,091 | 49 | 318/978 | 33 | 13/971 | 1 |

| | | Demographic Characteristics | | | | Clinical Outcomes | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cases | Age (years) | | Sex | | Hospitalizations | | Deaths | |
| Genus and Species | N | Median | Range | Male (n/N) | % | n/N | % | n/N | % |
| *V. cholerae* (serogroup not specified) | 197 | 49 | <1–97 | 98/196 | 50 | 56/166 | 34 | 3/176 | 2 |
| *V. parahaemolyticus* | 15 | 65.5 | 24–85 | 8/15 | 53 | 0/14 | 0 | 0/15 | 0 |
| *V. vulnificus* | 1 | 57 | 57–57 | 0/1 | 0 | 1/1 | 100 | 0/1 | 0 |
| Species not identified | 887 | 53 | <1–103 | 430/879 | 49 | 261/797 | 33 | 10/779 | 1 |
| **Total** | 2,685 | 51 | <1–103 | 1,628/2,665 | 61 | 772/2,348 | 33 | 70/2,397 | 3 |

*Proportions of demographic characteristics and clinical outcomes are based on total cases with known information, by genus and species.
†Includes non-toxigenic *V. cholerae* non-O1, non-O139 (123 cases); non-O1 (19 cases); serogroup not specified (19 cases); O1 (7 cases); O141 (4 cases); and O75 (2 cases).
††Species are summarized according to how they were reported to COVIS. Multiplex polymerase chain reaction (PCR) panels used to identify the vast majority of probable vibriosis cases are not known to provide species-level results; such cases are considered "Species not identified." However, some brands or laboratory-developed "in-house" PCR tests that are designed to provide species-level results have been reported to COVIS and are therefore included in this table.

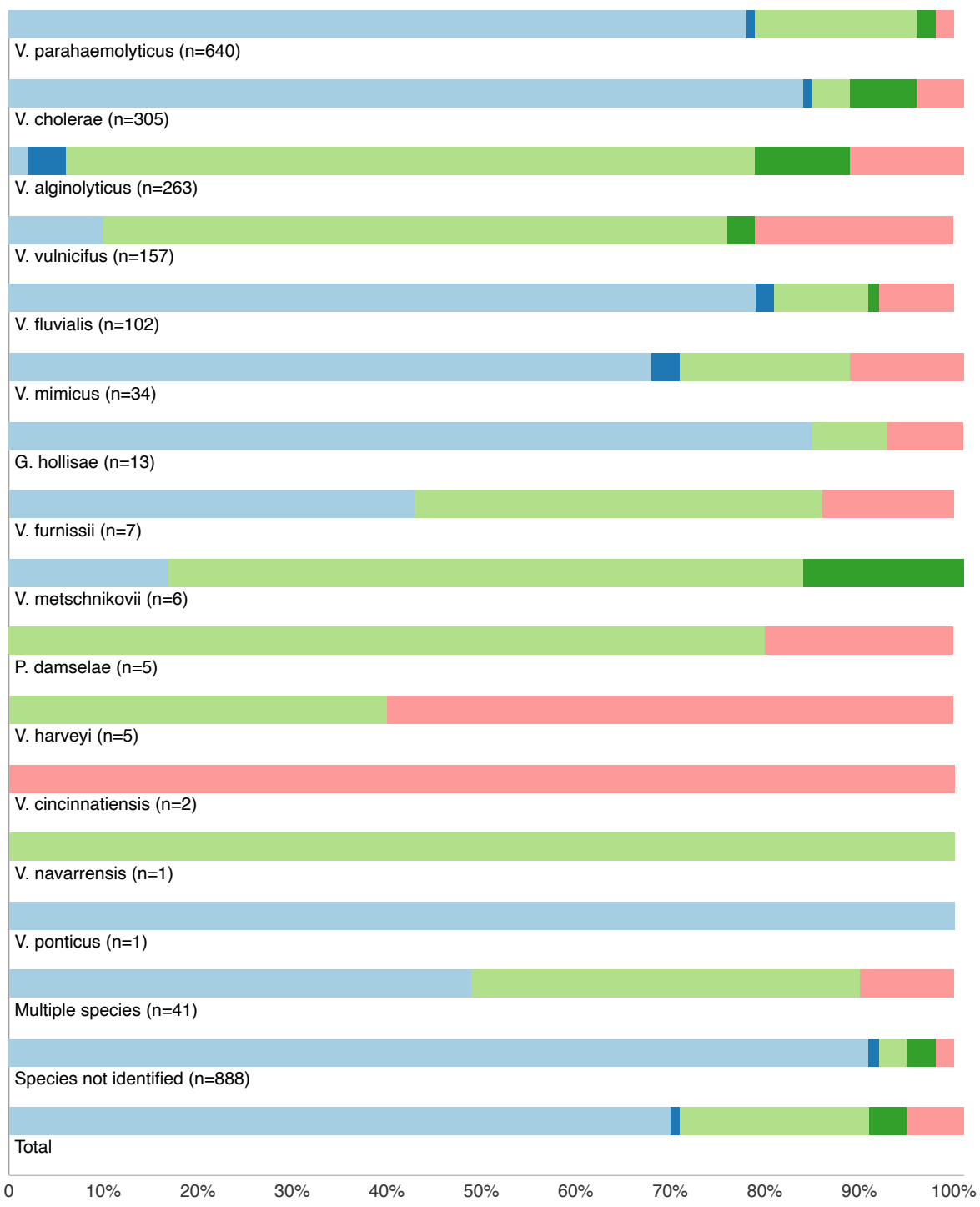
## Routes of Transmission

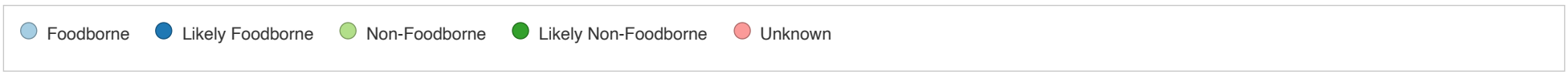
Transmission routes are classified based on exposure categories (seafood consumption and marine/estuarine contact) and the type(s) of clinical specimen from which the *Vibrio* bacteria was isolated. More information can be found in the appendix: Method for Classification of Transmission Routes in COVIS. The proportion of domestically acquired cases with each transmission route and species are shown in Figures 2a–c. The frequency of domestically acquired cases by transmission route and month are shown in Figures 3a–c.

- Among 2,214 cases of vibriosis with known travel information, 215 (10%) reported international travel in the 7 days before illness began.
- Of 2,470 domestically acquired vibriosis cases:
  - 1,754 (71%) were classified as foodborne or likely foodborne transmission.
  - 575 (23%) were classified as non-foodborne or likely non-foodborne transmission.
  - 141 (6%) were classified as unknown transmission.

Figure 2a | Figure 2b | Figure 2c

Transmission routes of domestically acquired vibriosis cases,* by species, United States, 2019 (N=2,470)






*Includes all vibriosis cases, culture-confirmed and CIDT-positive only, reported to COVIS.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| V. parahaemolyticus (n=640) | 78% | 1% | 17% | 2% | 2% |
| V. cholerae (n=305) | 84% | 1% | 4% | 7% | 5% |
| V. alginolyticus (n=263) | 2% | 4% | 73% | 10% | 12% |
| V. vulnicifus (n=157) | 10% | 0% | 66% | 3% | 21% |
| V. fluvialis (n=102) | 79% | 2% | 10% | 1% | 8% |
| V. mimicus (n=34) | 68% | 3% | 18% | 0% | 12% |
| G. hollisae (n=13) | 85% | 0% | 8% | 0% | 8% |
| V. furnissii (n=7) | 43% | 0% | 43% | 0% | 14% |
| V. metschnikovii (n=6) | 17% | 0% | 67% | 17% | 0% |
| P. damselae (n=5) | 0% | 0% | 80% | 0% | 20% |
| V. harveyi (n=5) | 0% | 0% | 40% | 0% | 60% |
| V. cincinnatiensis (n=2) | 0% | 0% | 0% | 0% | 100% |
| V. navarrensis (n=1) | 0% | 0% | 100% | 0% | 0% |
| V. ponticus (n=1) | 100% | 0% | 0% | 0% | 0% |
| Multiple species (n=41) | 49% | 0% | 41% | 0% | 10% |
| Species not identified (n=888) | 91% | 1% | 3% | 3% | 2% |
| Total | 70% | 1% | 20% | 4% | 6% |

Transmission routes of domestically acquired, confirmed vibriosis cases,* by species, United States, 2019 (N=1,475)


*Includes vibriosis cases reported to COVIS that were culture-confirmed.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| V. parahaemolyticus (n=627) | 78% | 1% | 17% | 2% | 2% |
| V. alginolyticus (n=263) | 2% | 4% | 73% | 10% | 12% |
| V. vulnicifus (n=156) | 9% | 0% | 67% | 3% | 21% |
| V. cholerae (n=132) | 72% | 2% | 8% | 6% | 12% |
| V. fluvialis (n=102) | 79% | 2% | 10% | 1% | 8% |
| V. mimicus (n=34) | 68% | 3% | 18% | 0% | 12% |
| G. hollisae (n=13) | 85% | 0% | 8% | 0% | 8% |
| V. furnissii (n=7) | 43% | 0% | 43% | 0% | 14% |
| V. metschnikovii (n=6) | 17% | 0% | 67% | 17% | 0% |
| P. damselae (n=5) | 0% | 0% | 80% | 0% | 20% |
| V. harveyi (n=5) | 0% | 0% | 40% | 0% | 60% |
| V. cincinnatiensis (n=2) | 0% | 0% | 0% | 0% | 100% |
| V. navarrensis (n=1) | 0% | 0% | 100% | 0% | 0% |
| V. ponticus (n=1) | 100% | 0% | 0% | 0% | 0% |
| Multiple species (n=41) | 49% | 0% | 41% | 0% | 10% |
| Species not identified (n=80) | 51% | 4% | 29% | 4% | 12% |
| Total | 53% | 2% | 33% | 4% | 9% |

Transmission routes of domestically acquired probable vibriosis cases,* by species, United States, 2019 (N=995)

Foodborne Likely Foodborne Non-Foodborne Likely Non-Foodborne Unknown

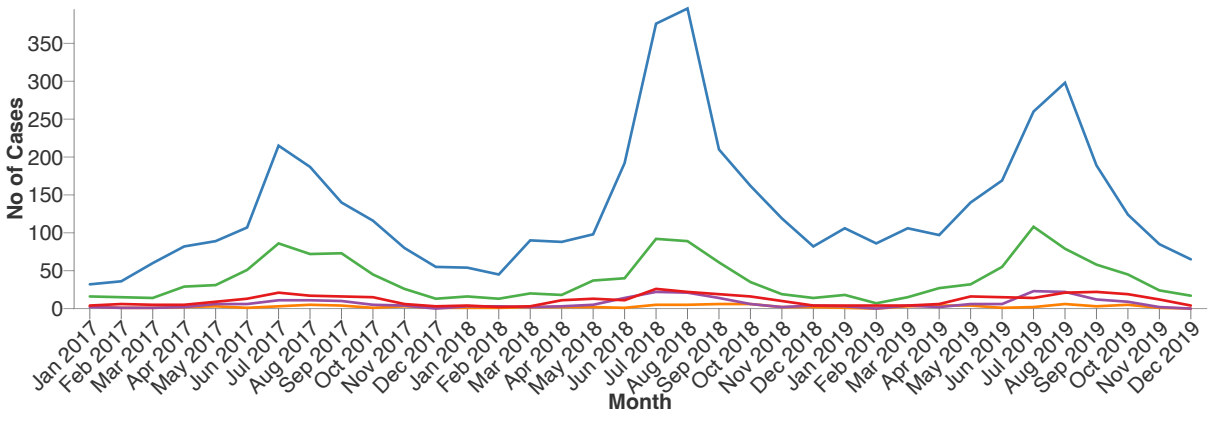
*Includes vibriosis cases reported to COVIS that were CIDT-positive but not culture-confirmed.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| V. cholerae (n=173) | 92% | 0% | 1% | 7% | 0% |
| V. parahaemolyticus (n=13) | 100% | 0% | 0% | 0% | 0% |
| V. vulnificus (n=1) | 100% | 0% | 0% | 0% | 0% |
| Species not identified (n=808) | 95% | 1% | 0% | 3% | 1% |
| Total | 95% | 1% | 0% | 3% | 1% |

Figure 3a Figure 3b Figure 3c

Frequency of domestically acquired vibriosis cases,* by month† and transmission route, United States, 2017–2019 (N=7,004)



*Includes all vibriosis cases, culture-confirmed and CIDT-positive only, reported to COVIS.
†Month is based on the date of earliest specimen collection. When unavailable, date of illness onset is used. During 2017–2019, 16 vibriosis cases were missing specimen collection and illness onset dates.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| Jan 2017 | 32 | 3 | 16 | 2 | 4 |
| Feb 2017 | 36 | 1 | 15 | 1 | 6 |
| Mar 2017 | 60 | 1 | 14 | 1 | 5 |
| Apr 2017 | 82 | 2 | 29 | 2 | 5 |
| May 2017 | 89 | 3 | 31 | 6 | 9 |
| Jun 2017 | 107 | 1 | 51 | 6 | 13 |
| Jul 2017 | 215 | 3 | 86 | 11 | 21 |
| Aug 2017 | 187 | 5 | 72 | 11 | 17 |
| Sep 2017 | 140 | 4 | 73 | 10 | 16 |
| Oct 2017 | 116 | 1 | 45 | 5 | 15 |
| Nov 2017 | 80 | 3 | 26 | 4 | 6 |
| Dec 2017 | 55 | 1 | 13 | 0 | 3 |
| Jan 2018 | 54 | 1 | 16 | 3 | 4 |
| Feb 2018 | 45 | 1 | 13 | 3 | 2 |
| Mar 2018 | 90 | 2 | 20 | 2 | 3 |
| Apr 2018 | 88 | 2 | 18 | 3 | 11 |
| May 2018 | 98 | 2 | 37 | 5 | 13 |
| Jun 2018 | 192 | 1 | 40 | 14 | 11 |
| Jul 2018 | 376 | 5 | 92 | 22 | 26 |
| Aug 2018 | 396 | 5 | 89 | 21 | 22 |
| Sep 2018 | 210 | 6 | 61 | 14 | 19 |
| Oct 2018 | 162 | 6 | 35 | 6 | 16 |
| Nov 2018 | 119 | 2 | 19 | 2 | 10 |
| Dec 2018 | 82 | 2 | 14 | 4 | 4 |
| Jan 2019 | 106 | 1 | 18 | 3 | 4 |
| Feb 2019 | 86 | 0 | 7 | 0 | 4 |
| Mar 2019 | 106 | 3 | 15 | 4 | 4 |
| Apr 2019 | 97 | 4 | 27 | 2 | 6 |
| May 2019 | 140 | 4 | 32 | 6 | 16 |
| Jun 2019 | 169 | 1 | 55 | 6 | 15 |
| Jul 2019 | 260 | 2 | 108 | 23 | 14 |
| Aug 2019 | 298 | 6 | 79 | 22 | 21 |
| Sep 2019 | 189 | 3 | 58 | 12 | 22 |
| Oct 2019 | 124 | 5 | 45 | 9 | 19 |
| Nov 2019 | 85 | 1 | 24 | 2 | 12 |
| Dec 2019 | 65 | 0 | 17 | 0 | 4 |

Frequency of domestically acquired, confirmed vibriosis cases,* by month† and transmission route, United States, 2017–2019 (N=4,492)


*Includes vibriosis cases reported to COVIS that were culture-confirmed.
†Month is based on the date of earliest specimen collection when available. When unavailable, date of illness onset is used. During 2017–2019, 11 confirmed vibriosis cases were missing specimen collection and illness onset dates.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| Jan 2017 | 19 | 3 | 16 | 2 | 4 |
| Feb 2017 | 14 | 1 | 15 | 0 | 6 |
| Mar 2017 | 37 | 1 | 14 | 1 | 5 |
| Apr 2017 | 48 | 2 | 29 | 1 | 5 |
| May 2017 | 42 | 3 | 31 | 5 | 8 |
| Jun 2017 | 51 | 1 | 51 | 6 | 13 |

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| Jul 2017 | 165 | 3 | 85 | 9 | 21 |
| Aug 2017 | 123 | 5 | 72 | 4 | 16 |
| Sep 2017 | 89 | 4 | 73 | 5 | 16 |
| Oct 2017 | 57 | 1 | 45 | 4 | 15 |
| Nov 2017 | 35 | 3 | 26 | 3 | 6 |
| Dec 2017 | 17 | 1 | 13 | 0 | 3 |
| Jan 2018 | 10 | 1 | 16 | 2 | 4 |
| Feb 2018 | 11 | 1 | 13 | 3 | 1 |
| Mar 2018 | 25 | 2 | 20 | 0 | 3 |
| Apr 2018 | 26 | 2 | 18 | 0 | 9 |
| May 2018 | 50 | 2 | 37 | 2 | 13 |
| Jun 2018 | 125 | 1 | 40 | 10 | 10 |
| Jul 2018 | 249 | 5 | 92 | 11 | 24 |
| Aug 2018 | 267 | 5 | 89 | 10 | 21 |
| Sep 2018 | 97 | 6 | 61 | 10 | 18 |
| Oct 2018 | 64 | 6 | 35 | 2 | 16 |
| Nov 2018 | 37 | 1 | 19 | 0 | 9 |
| Dec 2018 | 21 | 2 | 14 | 2 | 4 |
| Jan 2019 | 12 | 0 | 18 | 2 | 4 |
| Feb 2019 | 13 | 0 | 7 | 0 | 4 |
| Mar 2019 | 30 | 3 | 15 | 1 | 2 |
| Apr 2019 | 27 | 2 | 27 | 0 | 5 |
| May 2019 | 59 | 4 | 32 | 5 | 15 |
| Jun 2019 | 94 | 1 | 55 | 5 | 14 |
| Jul 2019 | 168 | 2 | 108 | 13 | 12 |
| Aug 2019 | 183 | 5 | 78 | 14 | 20 |
| Sep 2019 | 95 | 2 | 58 | 9 | 21 |
| Oct 2019 | 50 | 4 | 45 | 5 | 18 |
| Nov 2019 | 31 | 1 | 24 | 2 | 10 |
| Dec 2019 | 19 | 0 | 17 | 0 | 4 |

Frequency of domestically acquired, probable vibriosis cases,* by month† and transmission route, United States, 2017–2019 (N=2,512)


*Includes vibriosis cases reported to COVIS that were CIDT-positive but not culture-confirmed.
†Month is based on the date of earliest specimen collection when available. When unavailable, date of illness onset is used. 5 probable vibriosis cases from 2017–2019 were missing specimen collection and illness onset dates.

Data Table

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| Jan 2017 | 13 | 0 | 0 | 0 | 0 |
| Feb 2017 | 22 | 0 | 0 | 1 | 0 |
| Mar 2017 | 23 | 0 | 0 | 0 | 0 |
| Apr 2017 | 34 | 0 | 0 | 1 | 0 |
| May 2017 | 47 | 0 | 0 | 1 | 1 |
| Jun 2017 | 56 | 0 | 0 | 0 | 0 |
| Jul 2017 | 50 | 0 | 1 | 2 | 0 |
| Aug 2017 | 64 | 0 | 0 | 7 | 1 |
| Sep 2017 | 51 | 0 | 0 | 5 | 0 |
| Oct 2017 | 59 | 0 | 0 | 1 | 0 |
| Nov 2017 | 45 | 0 | 0 | 1 | 0 |
| Dec 2017 | 38 | 0 | 0 | 0 | 0 |
| Jan 2018 | 44 | 0 | 0 | 1 | 0 |
| Feb 2018 | 34 | 0 | 0 | 0 | 1 |
| Mar 2018 | 65 | 0 | 0 | 2 | 0 |
| Apr 2018 | 62 | 0 | 0 | 3 | 2 |
| May 2018 | 48 | 0 | 0 | 3 | 0 |
| Jun 2018 | 67 | 0 | 0 | 4 | 1 |
| Jul 2018 | 127 | 0 | 0 | 11 | 2 |

| | Foodborne | Likely Foodborne | Non-Foodborne | Likely Non-Foodborne | Unknown |
|---|---|---|---|---|---|
| Aug 2018 | 129 | 0 | 0 | 11 | 1 |
| Sep 2018 | 113 | 0 | 0 | 4 | 1 |
| Oct 2018 | 98 | 0 | 0 | 4 | 0 |
| Nov 2018 | 82 | 1 | 0 | 2 | 1 |
| Dec 2018 | 61 | 0 | 0 | 2 | 0 |
| Jan 2019 | 94 | 1 | 0 | 1 | 0 |
| Feb 2019 | 73 | 0 | 0 | 0 | 0 |
| Mar 2019 | 76 | 0 | 0 | 3 | 2 |
| Apr 2019 | 70 | 2 | 0 | 2 | 1 |
| May 2019 | 81 | 0 | 0 | 1 | 1 |
| Jun 2019 | 75 | 0 | 0 | 1 | 1 |
| Jul 2019 | 92 | 0 | 0 | 10 | 2 |
| Aug 2019 | 115 | 1 | 1 | 8 | 1 |
| Sep 2019 | 94 | 1 | 0 | 3 | 1 |
| Oct 2019 | 74 | 1 | 0 | 4 | 1 |
| Nov 2019 | 54 | 0 | 0 | 0 | 2 |
| Dec 2019 | 46 | 0 | 0 | 0 | 0 |

## Seafood, Marine, and Estuarine Exposures

Seafood exposures among domestically acquired vibriosis cases are shown in Tables 2a–c.

- Among patients with domestically acquired vibriosis who reported eating seafood (N=1,233):
  - 685 (56%) consumed oysters, 490 (40%) consumed shrimp, and 468 (38%) consumed fish.
  - Among those who reported eating a single seafood item, 287 (47%) ate oysters, 85% of whom consumed them raw.
- Among patients with domestically acquired vibriosis who reported a marine or estuarine exposure (N=714):
  - 607 (85%) reported having skin exposure to a body of water within 7 days before illness onset.
  - 213 (30%) reported contact with drippings from raw or live seafood.
  - 77 (11%) reported contact with marine life.

Table 2a | Table 2b | Table 2c

### Seafood exposures among domestically acquired vibriosis cases,* United States, 2019

| | Mollusks | | | | Crustaceans | | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oysters | Clams | Scallops | Mussels | Shrimp | Crab | Crayfish | Lobster | Finfish | Other Shellfish |
| Patients who ate single seafood item, n (% of 606) | 287 (47) | 20 (3) | 6 (1) | 3 (0) | 102 (17) | 45 (7) | 12 (2) | 5 (1) | 123 (20) | 3 (0) |
| Patients who ate the single seafood item raw, n (% of n in row above) | 244 (85) | 14 (70) | 0 (0) | 1 (33) | 8 (8) | 4 (9) | 0 (0) | 1 (20) | 23 (19) | 0 (0) |

*Includes all vibriosis cases, culture-confirmed and CIDT-positive only, reported to COVIS.

### Seafood exposures among domestically acquired, confirmed vibriosis cases,* United States, 2019

| | Mollusks | | | | Crustaceans | | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oysters | Clams | Scallops | Mussels | Shrimp | Crab | Crayfish | Lobster | Finfish | Other Shellfish |
| Patients who ate single seafood item, n (% of 387) | 226 (58) | 17 (4) | 5 (1) | 2 (1) | 42 (11) | 29 (7) | 8 (2) | 4 (1) | 53 (14) | 1 (0) |
| Patients who ate the single seafood item raw, n (% of n in row above) | 193 (85) | 12 (71) | 0 (0) | 1 (50) | 6 (14) | 4 (14) | 0 (0) | 1 (25) | 13 (25) | 0 (0) |

*Includes vibriosis cases reported to COVIS that were culture-confirmed.

### Seafood exposures among domestically acquired, probable vibriosis cases,* United States, 2019

| | Mollusks | | | | Crustaceans | | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oysters | Clams | Scallops | Mussels | Shrimp | Crab | Crayfish | Lobster | Finfish | Other Shellfish |
| Patients who ate single seafood item, n (% of 219) | 61 (28) | 3 (1) | 1 (0) | 1 (0) | 60 (27) | 16 (7) | 4 (2) | 1 (0) | 70 (32) | 2 (1) |

| | Mollusks | | | | Crustaceans | | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oysters | Clams | Scallops | Mussels | Shrimp | Crab | Crayfish | Lobster | Finfish | Other Shellfish |
| **Patients who ate the single seafood item raw, n (% of n in row above)** | 51 (84) | 2 (67) | 0 (0) | 0 (0) | 2 (3) | 0 (0) | 0 (0) | 0 (0) | 10 (14) | 0 (0) |

*Includes vibriosis cases reported to COVIS that were CIDT-positive but not culture-confirmed.

## National Cholera Surveillance

In 2019, 11 cholera cases were reported to COVIS. These cases are summarized in Table 3.

- All were toxigenic *V. cholerae* serogroup O1 infections and had a marker (found in the *tcpA* gene) identified by PCR that identified the isolate as the El Tor biotype.
- 6 (55%) patients were hospitalized, and none died.
- Among 10 cases with travel information, all were international travel-associated. Travel destinations include Kenya (3), Pakistan (2), Yemen (2), Bangladesh (1), India (1), and Kenya (1).

Table 3

Cases of toxigenic V. cholerae serogroup O1 infection, United States, 2019

| Location | Age | Sex | Month of Illness Onset | International Travel | Serogroup | Serotype |
|---|---|---|---|---|---|---|
| **Illinois** | 64 | F | February | Pakistan | O1 | Inaba |
| **Massachusetts** | 64 | F | September | Kenya | O1 | Inaba |
| **Michigan** | 67 | F | March | Yemen | O1 | Ogawa |
| **Michigan** | 38 | M | August | Kenya | O1 | Inaba |
| **Minnesota** | 68 | M | February | Pakistan | O1 | Inaba |
| **Minnesota** | 36 | M | April | Kenya | O1 | Inaba |
| **Minnesota** | 40 | M | April | Kenya | O1 | Inaba |
| **New Jersey** | 72 | F | September | India | O1 | Ogawa |
| **New York** | 44 | F | September | Bangladesh | O1 | Ogawa |
| **North Carolina** | 63 | M | September | Yemen | O1 | Ogawa |
| **Wisconsin** | 43 | F | October | Unknown | O1 | Inaba |

**V. cholerae* isolates sent to CDC undergo antimicrobial susceptibility testing through the National Antimicrobial Resistance Monitoring System (NARMS) laboratory. Among 21 toxigenic *V. cholerae* O1 isolates tested by NARMS from 2017–2019, 11 (52%) had antimicrobial resistance to both sulfisoxazole and trimethoprim-sulfamethoxazole. 7 (33%) had intermediate susceptibility to ampicillin. 1 (5%) had intermediate susceptibility to chloramphenicol. 17 (81%) had decreased susceptibility to both ciprofloxacin (MIC >=0.12 ug/mL) and nalidixic acid (MIC >32 ug/mL). None had resistance to ampicillin, azithromycin, chloramphenicol, or tetracycline.

## Appendix: Method for Classification of Transmission Routes in COVIS

### I. *Exposure categories*

To classify transmission routes, the first step is to categorize patient exposures. For a given illness episode, more than one patient exposure can be reported to COVIS; each reported exposure is categorized individually. If all exposures fall into a single category, then the case is considered to have a single exposure category. If not, the case is considered to have multiple exposure categories. For a given case, if any exposure is reported, we assume that other exposures for which information was not reported were not present. Exposures are classified using three categories:

1. **Seafood consumption:** Ingestion of any type of seafood. Does not include touching seafood.
2. **Marine/estuarine contact:** Includes direct skin contact with marine/estuarine life, bodies of water, or drippings from raw or live seafood.
3. **Unknown or no exposure:** All seafood consumption or marine/estuarine exposure history questions are reported as unknown, or no exposures are reported.

### II. *Specimen site categories*

The next step in classifying transmission routes is to categorize reported specimen sites. For a given illness episode, more than one specimen site can be reported; each reported site is categorized individually. If all specimen sites fall into a single category, then the report is considered to have a single specimen site category. If not, then the report is considered to have multiple specimen site categories. Specimen sites are classified using five categories:

1. **Gastrointestinal site (GI):** stool, bile, appendix, rectum, gall bladder, colon
2. **Blood or other normally sterile site (sterile):** blood, cerebrospinal fluid (CSF), peritoneal fluid, lumbar disc fluid, lymph node, bullae
3. **Skin or soft tissue site (SST):** wound, ear (other than otitis media and middle ear, which are included in ‘other, non-sterile site’), appendage, tissue
4. **Other, non-sterile site (ONS):** urine, sputum, aspirate, bronchial washing, effusion, catheter, endotracheal, eye, nasal, placenta, respiratory, sinus, tonsil
5. **Unknown site (unknown):** no specimen site reported or no site specified for ‘other’

**Note:** The lists of sites for each category above are not intended to be exhaustive. Rather, they reflect the sites traditionally reported to COVIS and may be updated if new sites are reported.

### III. *Transmission route*

The final step in classifying transmission involves review of exposure and specimen site categories for each reported case. Cases are classified into one of five transmission routes (foodborne, likely foodborne, non-foodborne, likely non-foodborne, and unknown) based on the criteria below:

1. **Single exposure category:** seafood consumption
    - **Foodborne:** *Vibrio* isolated only from GI or sterile site OR *Vibrio* isolated from multiple specimen site categories, with GI reported.
    - **Likely Foodborne:** *Vibrio* isolated only from SST, ONS, or unknown sites OR *Vibrio* isolated from multiple specimen site categories, not including GI.
2. **Single exposure category:** marine/estuarine contact
    - **Non-foodborne:** *Vibrio* isolated only from SST or sterile site OR *Vibrio* isolated from multiple specimen site categories, with SST reported.
    - **Likely Non-foodborne:** *Vibrio* isolated only from GI, ONS, or unknown sites OR *Vibrio* isolated from multiple specimen site categories, not including SST.
3. **Multiple exposure categories:** both seafood consumption AND marine/estuarine contact
    - **Foodborne:** *Vibrio* isolated only from a GI site OR *Vibrio* isolated from multiple specimen site categories, with GI reported and SST not reported.
    - **Non-foodborne:** *Vibrio* isolated only from a SST site OR *Vibrio* isolated from multiple specimen site categories, with SST reported and GI not reported.
    - **Unknown:** *Vibrio* isolated only from a sterile, ONS, or unknown site OR *Vibrio* isolated from multiple specimen site categories, including either 1) both GI and SST or 2) neither GI nor SST.
4. **Unknown or no reported exposure** (note that categorization is the same as for multiple exposure categories)
    - **Foodborne:** *Vibrio* isolated only from a GI site OR *Vibrio* isolated from multiple specimen site categories, with GI reported and SST not reported.
    - **Non-foodborne:** *Vibrio* isolated only from a SST site OR *Vibrio* isolated from multiple specimen site categories, with SST reported and GI not reported.
    - **Unknown:** *Vibrio* isolated only from a sterile, ONS, or unknown site OR *Vibrio* isolated from multiple specimen site categories, including either 1) both GI and SST or 2) neither GI nor SST.

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Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Foodborne, Waterborne, and Environmental Diseases