

Dear Healthcare Providers,

Many of you are aware that the Centers for Disease Control and Prevention (CDC) and state and local public health officials are investigating the shigellosis outbreak in Saginaw and Genesee counties. Health officials have been meeting regularly with community leaders and medical professionals to listen to community concerns and ask for input on different aspects of the investigation. We would like to update you on our approach to investigating the outbreak and share some preliminary findings.

Health officials are using **three distinct approaches** to investigate the outbreak.

### **Components of the Investigation:**

- 1. Case series investigation to identify possible risk factors for acquiring shigellosis in this outbreak.**
  - a. All households with a confirmed, suspected, or probable case of shigellosis reported to the state between March 1, 2016, and October 29, 2016, were included in the case series.
  - b. Investigators collected demographic information on all household members and illness information on all household members who had been ill with shigellosis during the outbreak.
  - c. The first person ill, or “index case,” in each household was identified.
  - d. Investigators asked questions about how the index case might have acquired shigellosis and about household sources and uses of water.
- 2. Laboratory testing of bacterial samples collected from shigellosis patients in Genesee and Saginaw counties and from across Michigan to examine the degree of genetic relatedness among bacterial isolates from different locations in the state.**
  - a. *Shigella* isolates are being tested using pulsed-field gel electrophoresis and whole genome sequencing to identify genetic similarities.
  - b. Testing includes isolates from patients affected by this outbreak and from other patients across the state since 2015.
- 3. Spatial-temporal mapping analysis of cases in Flint to determine if there is a correlation between illnesses and water quality issues.** The map includes the following information for analysis:
  - a. Disinfectant levels and testing for contamination
  - b. Water main breaks and water quality complaints
  - c. Households in Flint with incident enteric disease, including shigellosis

Health officials have completed the interviews that comprise the case series investigation. Data from 70 households with case-patients are currently available for analysis.

**Table 1. Eligible households that were contacted, interviewed, and for which analysis was completed, stratified by county – Genesee and Saginaw counties, Michigan, March – October 2016**

	Total	Genesee	Saginaw
Households with ≥1 case in the outbreak*	126	83 (66%)	43 (34%)
Households with working contact information	115 (91%)	75 (65%)	40 (35%)
Households reached	90 (71%)	59 (66%)	31 (34%)
Households with completed interview	83 (66%)	54 (65%)	29 (35%)
Household data available for analysis (as of 11/17)**	70 (56%)	47 (67%)	23 (33%)

\*includes confirmed, suspected, and probable cases reported to Michigan Department of Health and Human Services

\*\*final analysis to include 83 households pending additional merging of data

We would like to share **three preliminary conclusions with you.**

**1. Shigella bacteria do not appear to be spreading through a drinking water system.**

- 90% of case-patients in Flint consumed only bottled water, making it unlikely that the drinking water system in Flint was the source of exposure. In addition, the majority (65%) of people from Flint used only bottled water to brush their teeth.
- Case-patients in Flint, in other areas of Genesee County, and in Saginaw County were all exposed to different drinking water sources, suggesting water exposure is NOT the common link in the outbreak.

**Table 2. Sources of water used in case-households on City of Flint water and other water systems in Genesee and Saginaw counties, Michigan, March – October 2016**

	All (n=70)	City of Flint Water (n=20)	Genesee County, not on Flint water (n=27)	Saginaw County (n=23)
<b>Drinking</b>				
Unfiltered tap	24 (34.3%)	1 (5.0%)	7 (25.9%)	16 (69.6%)
Filtered tap	13 (18.6%)	2 (10.0%)	6 (22.2%)	5 (21.7%)
Bottled water	45 (64.3%)	18 (90.0%)	17 (63.0%)	10 (43.5%)
<b>Preparing ice, cold and hot drinks</b>				
Unfiltered tap	33 (47.1%)	2 (10.0%)	11 (40.7%)	20 (87.0%)
Filtered tap	14 (20.0%)	3 (15.0%)	7 (25.9%)	4 (17.4%)
Bottled water	30 (42.9%)	14 (70.0%)	13 (48.15%)	3 (13.0%)

*Note: Respondents could select more than one source for each activity; for some households no source indicated*

**2. Shigella bacteria appear to be spreading in the community from person to person.**

- 59% of index cases wore diapers, changed diapers, or came in contact with a person wearing diapers in the week before they became ill, either inside or outside of their homes.
- 39% of index cases lived in households where another person became ill.
- The median age of index cases in Genesee and Saginaw counties was 9 years, and 26% of these cases were younger than 5 years, suggesting person-to-person transmission between children who are still learning to use the toilet and wash their hands thoroughly.
- Households in the outbreak were on average larger than households in the general population (Table 3). This is consistent with findings in prior person-to-person outbreaks of shigellosis (Boveé et al, BMC Infectious Diseases 2012 12:347).
- Epidemiologic data did not indicate a common exposure source, such as a restaurant, event or recreational water venue, that could account for this outbreak.

**Table 3. Composition of case-households stratified by county – Genesee and Saginaw counties, Michigan, March-October 2016**

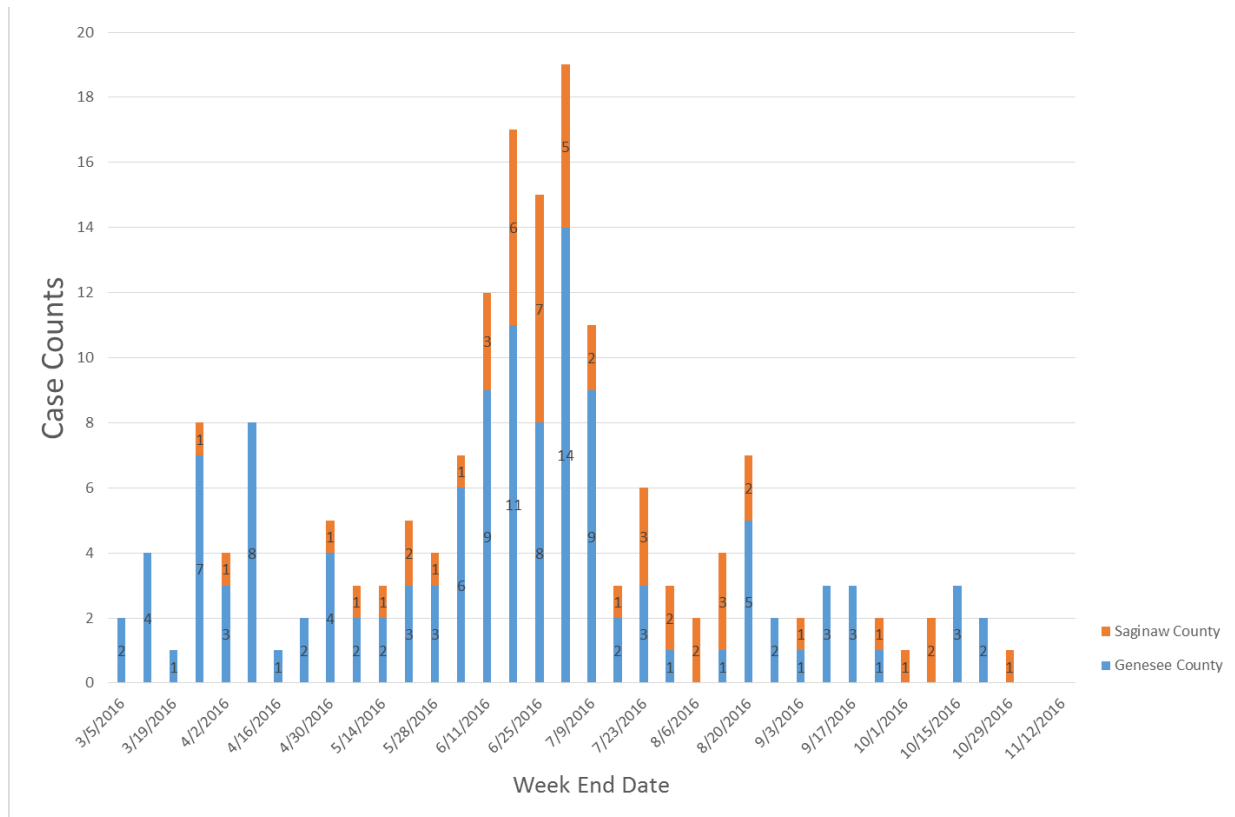
	Genesee + Saginaw Counties (N=70)	Genesee County (N=47)	Saginaw County (N=23)
Mean household size: general population*	2.5	2.4	2.5
Mean household size: case series	4.2	4.2	4.3
Mean ill people per household: case series	1.9	1.8	2

\*Source: 2015 American Community Survey, 1-year estimates

**3. The outbreak is slowing down.**

- No new cases of shigellosis have been reported in Saginaw or Genesee counties since October 31, 2016.
- Reported cases in October did not increase compared with reported cases in September and August, even with increased awareness of *Shigella* infections among community residents and physicians.
- CDC, state, and local officials will continue to monitor the outbreak until case counts have returned to baseline and the outbreak is determined to be over.

**Figure 1. Illness onset date for confirmed, suspected, and probable cases of shigellosis in Genesee and Saginaw counties, March 1 – November 12, 2016**



Analysis of data from the case series is ongoing. Intermediate next steps include completion of the analysis with the remaining 13 households that were interviewed (83 total) and stratification of additional data fields by age group and by county. Additional findings will be shared as they become available.

Data collection for the molecular testing and mapping analysis is ongoing. Preliminary results of these portions of the investigation will be shared as soon as they are available. We will continue to analyze the results as they become available to determine if anything else may be needed to identify the source of the outbreak, such as more community interviews or water testing.

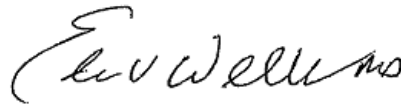
When talking with patients about *Shigella*, remind them about the importance of meticulous handwashing with soap and water to help prevent the spread of infection. If soap and water are not available, patients can use an alcohol-based hand sanitizer that contains at least 60% alcohol. This type of hand sanitizer will kill *Shigella* bacteria but does not kill all types of germs and will not work well if hands are visibly greasy or dirty.

Thank you for your ongoing support of this investigation. For clinical and public health information about shigellosis, please visit: [www.cdc.gov/shigella/resources](http://www.cdc.gov/shigella/resources). If you have any questions regarding the investigation of shigellosis in Genesee and Saginaw counties, please contact the local health department.

Sincerely,



Dr. Michael Beach  
Centers for Disease Control  
and Prevention



Dr. Eden Wells  
Michigan Department of Health  
and Human Services



Dr. Gary Johnson  
Genesee County  
Health Department