INFECTIOUS DISEASE OUTBREAK SUMMARY REPORT

2014

Arizona Department of Health Services
Office of Infectious Disease Services

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OVERVIEW

Outbreak detection and response are key components of a state's public health capacity and are essential for prevention and control of illness in a population. To monitor Arizona's burden of infectious disease outbreaks and progress in detecting and responding to reported outbreaks, the Arizona Department of Health Services (ADHS) collects data on infectious disease outbreak investigations conducted throughout the state. Variables collected include date of outbreak report, number of ill cases, outbreak etiology, infectious disease category, outbreak location/setting, mode of transmission, and number of clinical specimens collected. This data is collected in order to provide a profile of the infectious disease outbreaks that occur in Arizona and of the timeliness and completeness of outbreak response, in order to better implement appropriate outbreak control measures to mitigate the spread of disease and prevent future outbreaks from occurring.

The MEDSIS Outbreak Module (OBM) was introduced in 2014 to help users report, manage, and share outbreak information. OBM's integration into MEDSIS, Arizona's statewide disease surveillance system, allows users to easily link existing MEDSIS cases to an outbreak, create new cases to link to an outbreak, and retrieve outbreak data for analysis. Notable features of the OBM include the Outbreak Summary Forms page, which can automatically calculate fields within the form using case information that has been entered, and the Outbreak Long Form Creation page, which allows users to create outbreak specific investigation forms. Furthermore, public health partners can share outbreak information within OBM to better coordinate outbreak investigations across jurisdictions.

In addition, ADHS utilizes a standardized outbreak summary form based on the Centers for Disease Control and Prevention (CDC) performance indicators. These indicators are meant to be used by state and local health agencies to evaluate the performance of their outbreak response and control programs and identify specific needs for improvement.

The performance goals for outbreak tracking and response in Arizona are as follows:

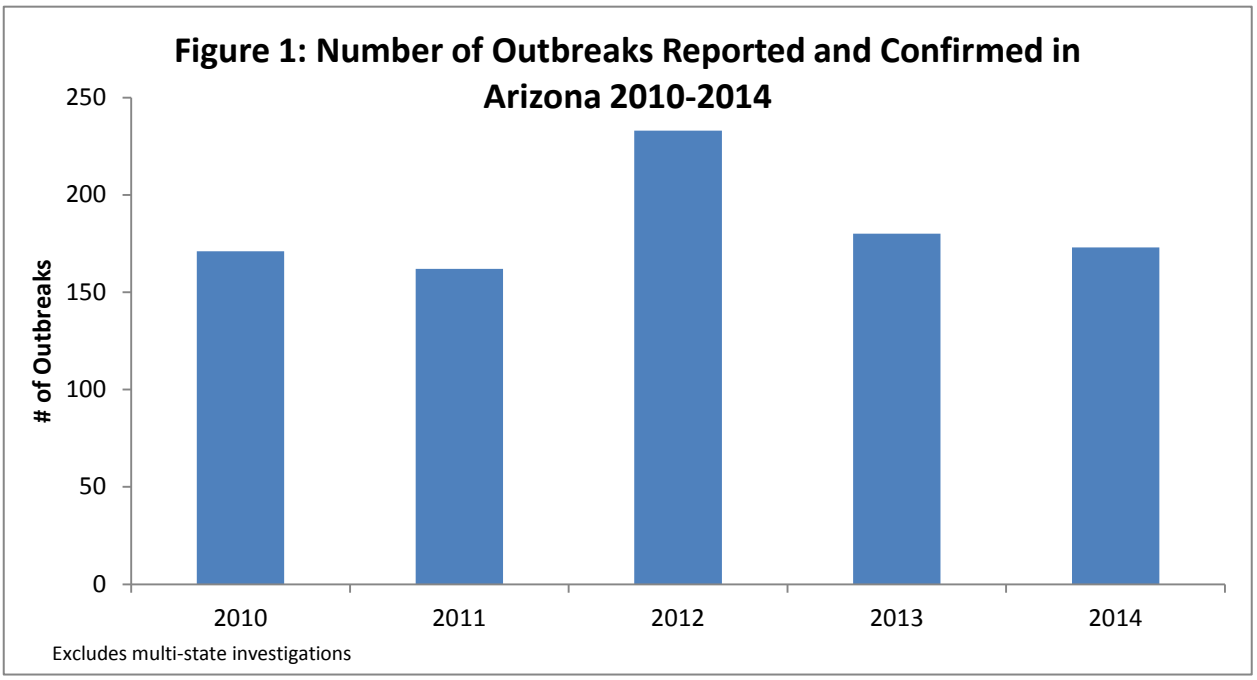
1. ≥90% of reported outbreaks will have an investigation initiated within 24 hours of receipt of report.
2. ≥95% of outbreaks will be reported to ADHS by the local health department within 24 hours of receipt of report.
3. Summary reports of 100% of investigations will be submitted to ADHS within 30 days after completion of the investigation.

In Arizona, healthcare providers (HCP), healthcare institutions, correctional facilities, and administrators of schools and shelters are required to report outbreaks of infectious diseases to their county health department under Arizona Administrative Code (A.A.C.) R9-6-202 and R9-6-203 and Arizona Revised Statutes (A.R.S.) Title 36. Hotels, motels, and resorts are also required to report contagious or epidemic diseases occurring in their establishments within 24 hours under A.R.S. 36-622. Outbreaks are reportable to ADHS within 24 hours after a county health department receives a report (A.A.C. R9-6-206F). The information provided at the time of report includes location/setting of outbreak, number of cases and suspect cases, the date reported, the disease suspected, and important contact information.

The descriptive epidemiology included in this report is based on data from OBM for outbreaks reported in 2014, and was analyzed in Statistical Analysis System (SAS) 9.3. Graphs and figures presented in this report were created in Microsoft Excel.

RESULTS

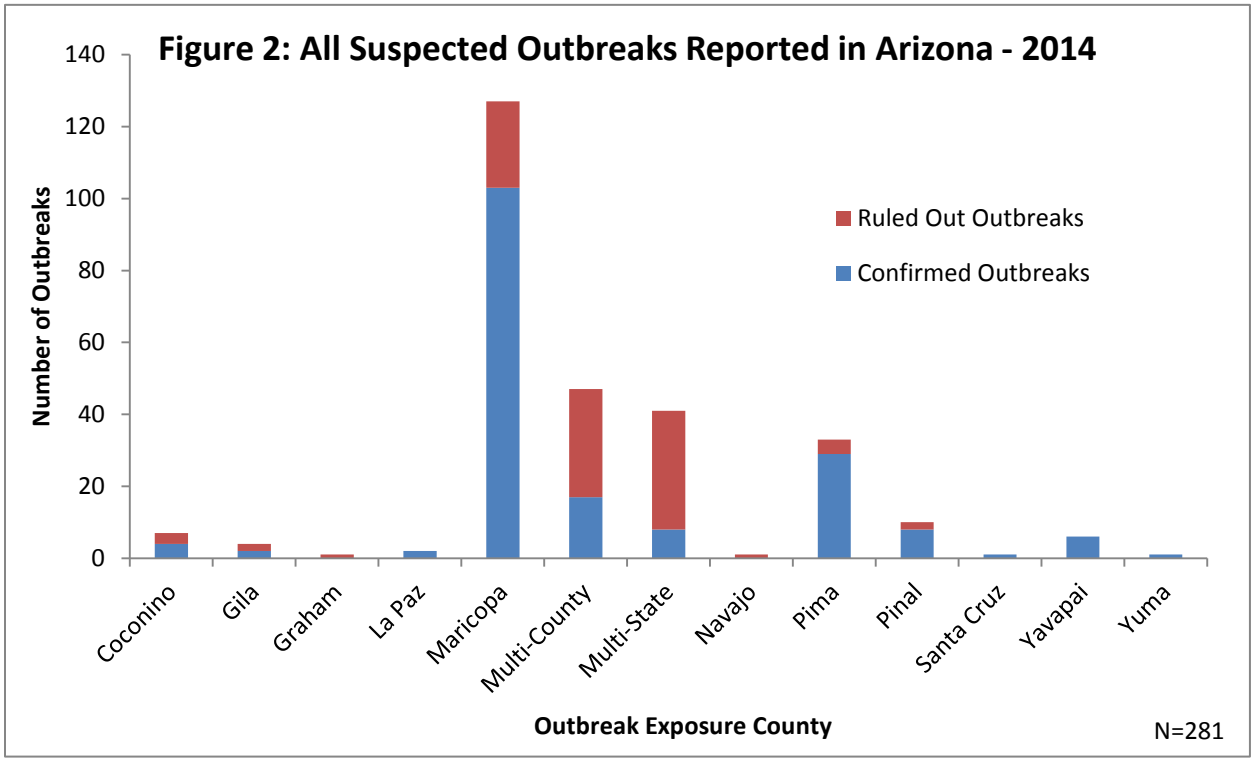
Figure 1 shows the total number of outbreaks reported in Arizona from 2010 through 2014. There was a peak in the number of outbreaks reported in 2012, with a slight decrease in 2013 and 2014. This may be due to increased surveillance and reporting of outbreaks in 2012, statistical variance, or an actual increase in outbreaks during this time period. In 2014, there were 173 infectious disease outbreaks in Arizona, excluding outbreaks involving other states (multi-state outbreaks).



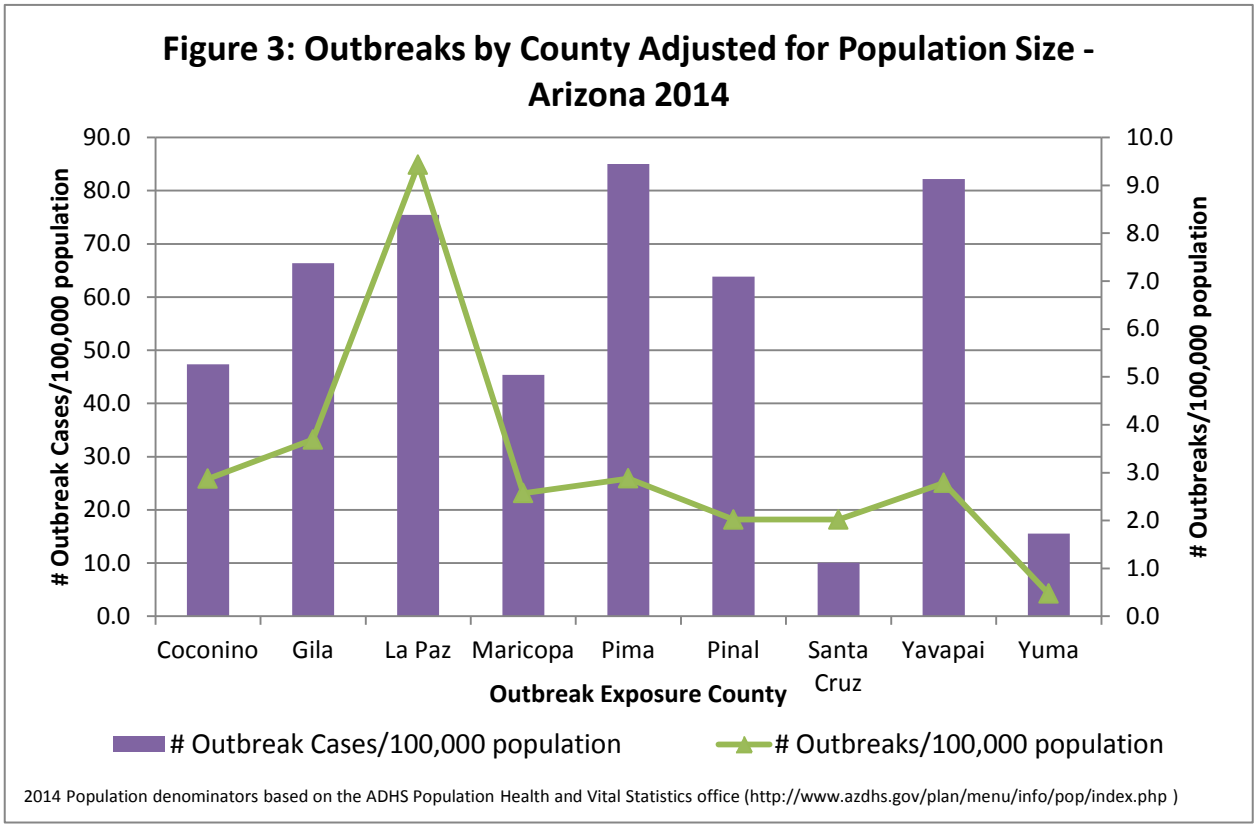
In 2014, 281 suspected communicable disease outbreaks were reported and investigated in Arizona (Figure 2). These 281 investigations included 41 multi-state cluster investigations in which Arizona participated. This is a higher number of suspected outbreaks than recorded in previous years, likely due to the fact that ADHS began tracking both in-state outbreak investigations and multi-state cluster investigations in OBM in 2014. In this way, we have a record of all of the investigation work conducted in Arizona for suspected outbreaks; the outbreak line lists for previous years may not have contained the same extent of information.

Of the 281 investigations conducted, 100 were "ruled out" as outbreaks, and 181 were finalized as confirmed, communicable disease outbreaks (i.e., they were deemed to be true increases in the rates of disease over what we normally expect to see in our population).

Outbreaks were reported predominantly in Maricopa County (103, 57%), likely due to the larger population size and increased routine processes for outbreak reporting and detection (Figure 2). 173 of these outbreaks were local, Arizona outbreaks, and eight outbreaks were multi-state outbreaks with at least one case from Arizona. Outbreaks are attributed to the county in which it is believe the exposure likely occurred. There were no outbreaks reported in 2014 from Apache, Cochise, Greenlee, or La Paz.



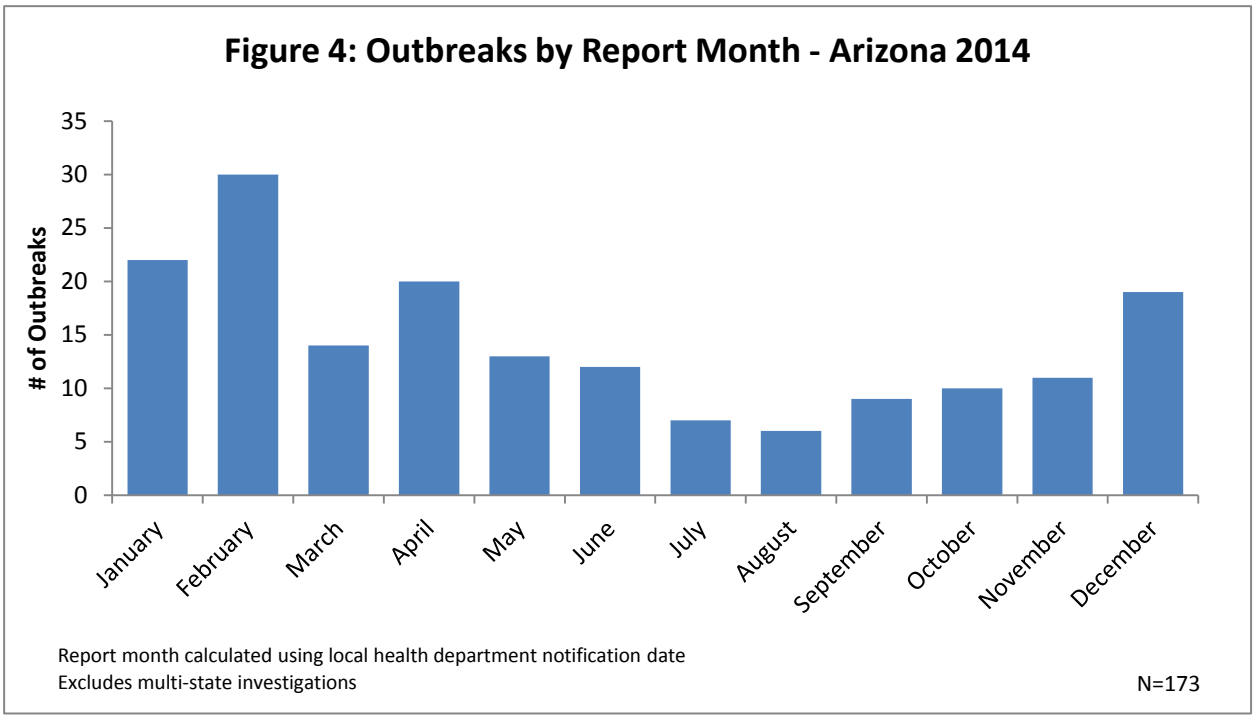
Outbreaks vary greatly in size; one outbreak could involve only a few cases or may involve hundreds of cases. When taking population size into account for Arizona outbreaks, La Paz County had the greatest number of reported outbreaks per 100,000 population in 2014 (9.9/100,000, Figure 3), and Pima County had the greatest number of outbreak cases reported per 100,000 population in 2014 (85.2/100,000, Figure 3).



The rest of the summary statistics described in the report exclude “ruled out” outbreaks and all multi-state outbreaks; they include data only for the 173 localized, confirmed Arizona outbreaks. A summary of the 41 multi-state outbreaks with Arizona participation in 2014 is included at the end of this report.

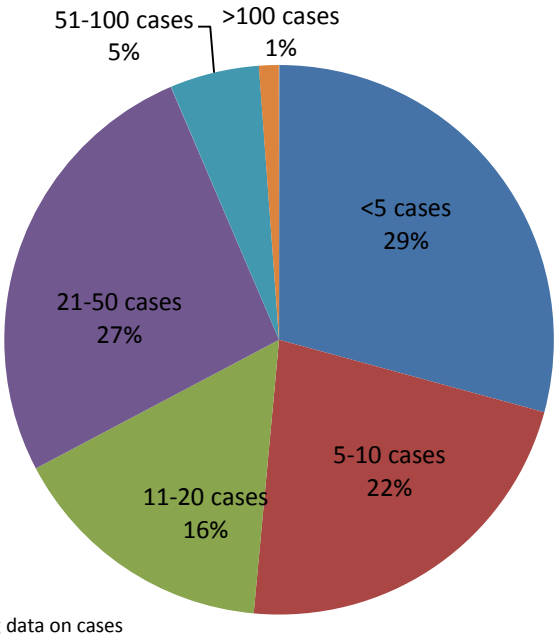
Section Header

More outbreaks were reported during the month of February than in any other month in 2014 (30, 17%) (Figure 4). Overall, a higher number of outbreaks were reported from January through May, and a lower number of outbreaks were reported from June through December. The median and mean number of outbreaks reported each month was 12.5 and 14, respectively.



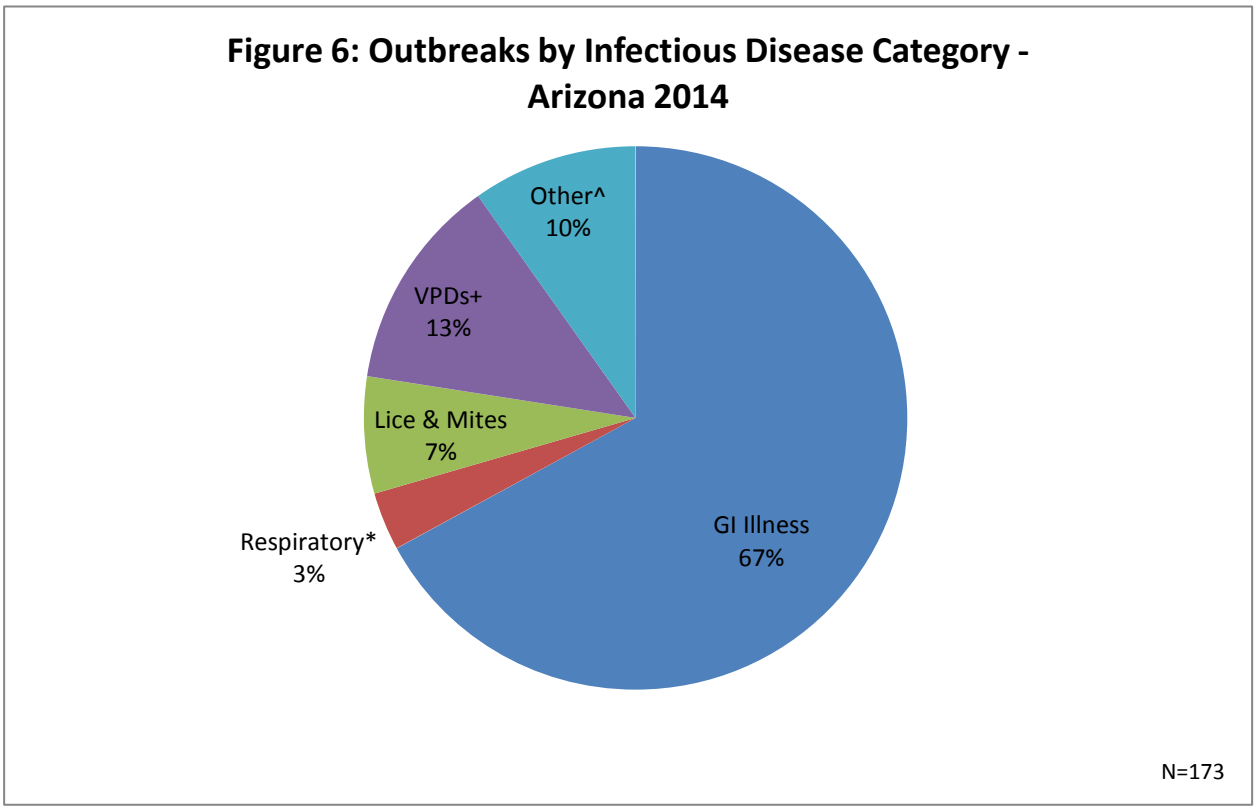
Reported outbreaks were further characterized by outbreak location, mode of transmission, size, and infectious disease category. In 2014, 88 (51%) of the outbreaks contained 10 or fewer cases of illness and 160 (94%) outbreaks contained 50 or fewer cases (Figure 5). Only 2 (1%) outbreaks had more than 100 cases of illness reported. Both were Norovirus outbreaks at elementary schools with 324 cases and 102 cases, respectively.

Figure 5: Percentage of Reported Outbreaks by Outbreak Size - Arizona 2014

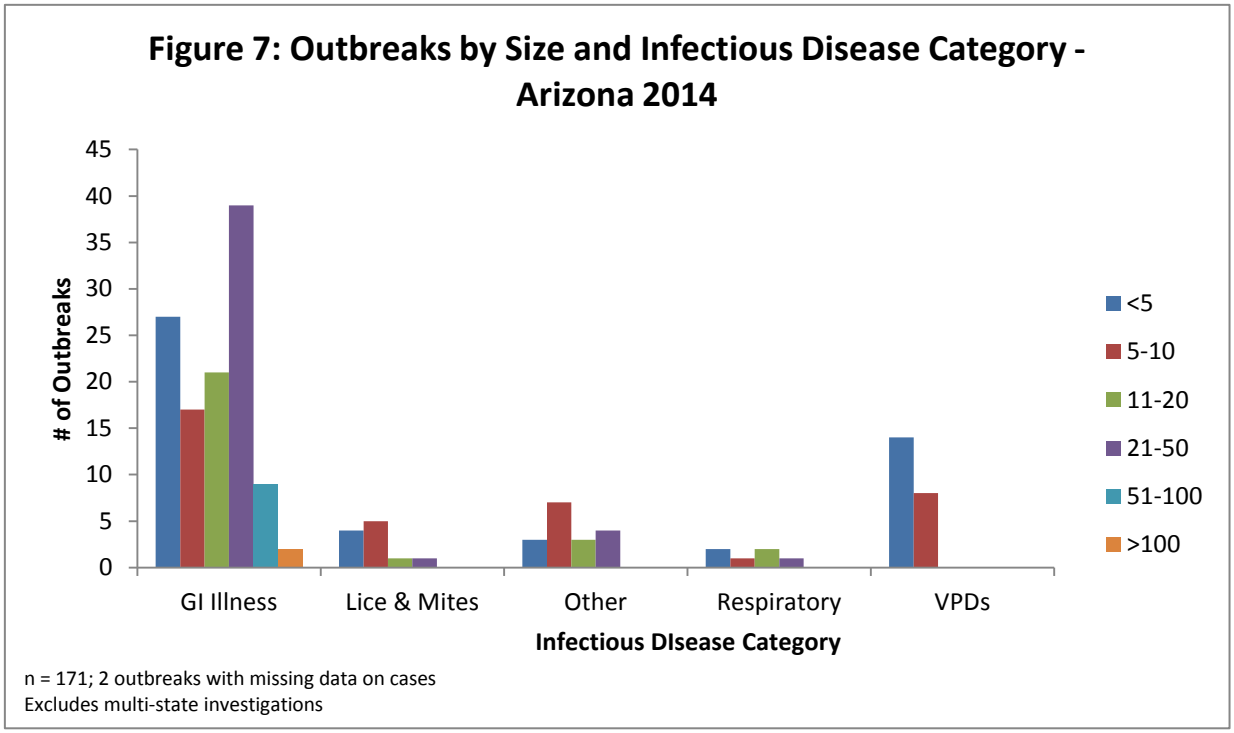


n = 171; 2 outbreaks with missing data on cases
Excludes multi-state investigations

Gastrointestinal illness (GI) outbreaks were reported most frequently (116, 67%). Other categories of reported outbreaks included: respiratory diseases (6, 3%), vaccine-preventable diseases (VPD) (22, 13%), and lice and mites (12, 7%), with 17 (10%) not fitting into those categories (Figure 6).

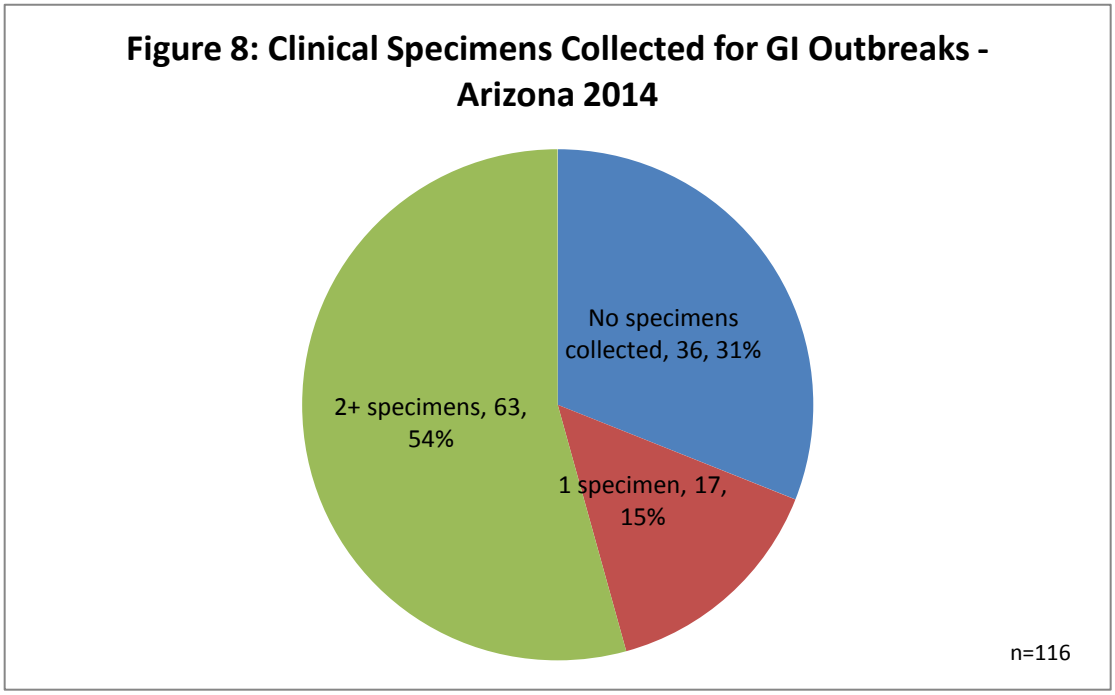


Smaller sized outbreaks were common for most types of outbreaks, with very few large outbreaks reported in 2014 (Figure 7). Gastrointestinal illness outbreaks of many different sizes were reported, though most outbreaks had 50 or fewer cases (104, 90%).



One of the measured outcomes for outbreaks in Arizona is to determine if two or more clinical specimens were collected for laboratory testing to determine the outbreak etiology, particularly for GI illness outbreaks. All local health departments have a written outbreak protocol that details the process by which they will collect, package and ship specimens in the event of an outbreak. Facilities reporting outbreaks are encouraged to collect and submit two or more specimens to the Arizona State Public Health Laboratory to increase the opportunity for accurate laboratory detection of the agent of infection.

For the 116 GI illness outbreaks in 2014, at least one specimen was collected for 80 (69%) and two or more specimens were collected for 63 (54%) (Figure 8). Etiology could not be determined for any of the outbreaks with zero specimens collected for testing. However, etiology was determined for 10 (59%) GI outbreaks with one specimen collected and 60 (95%) of GI outbreaks with two or more specimens collected.



Outbreak investigators were able to determine a suspected or confirmed outbreak etiology for 135 (78%) of all the 173 outbreaks reported in 2014. Norovirus was the confirmed causative agent for 40 (23%) outbreaks and the suspected causative agent for 11 (6%) outbreaks reported in Arizona in 2014. Other common etiologies of outbreaks reported in 2014 were *Salmonella spp.* (23, 13%) and *Bordatella pertussis* (13, 7%) (Figure 9). A more detailed description of infectious agents identified as causing outbreaks in 2014 is shown in Table 1.

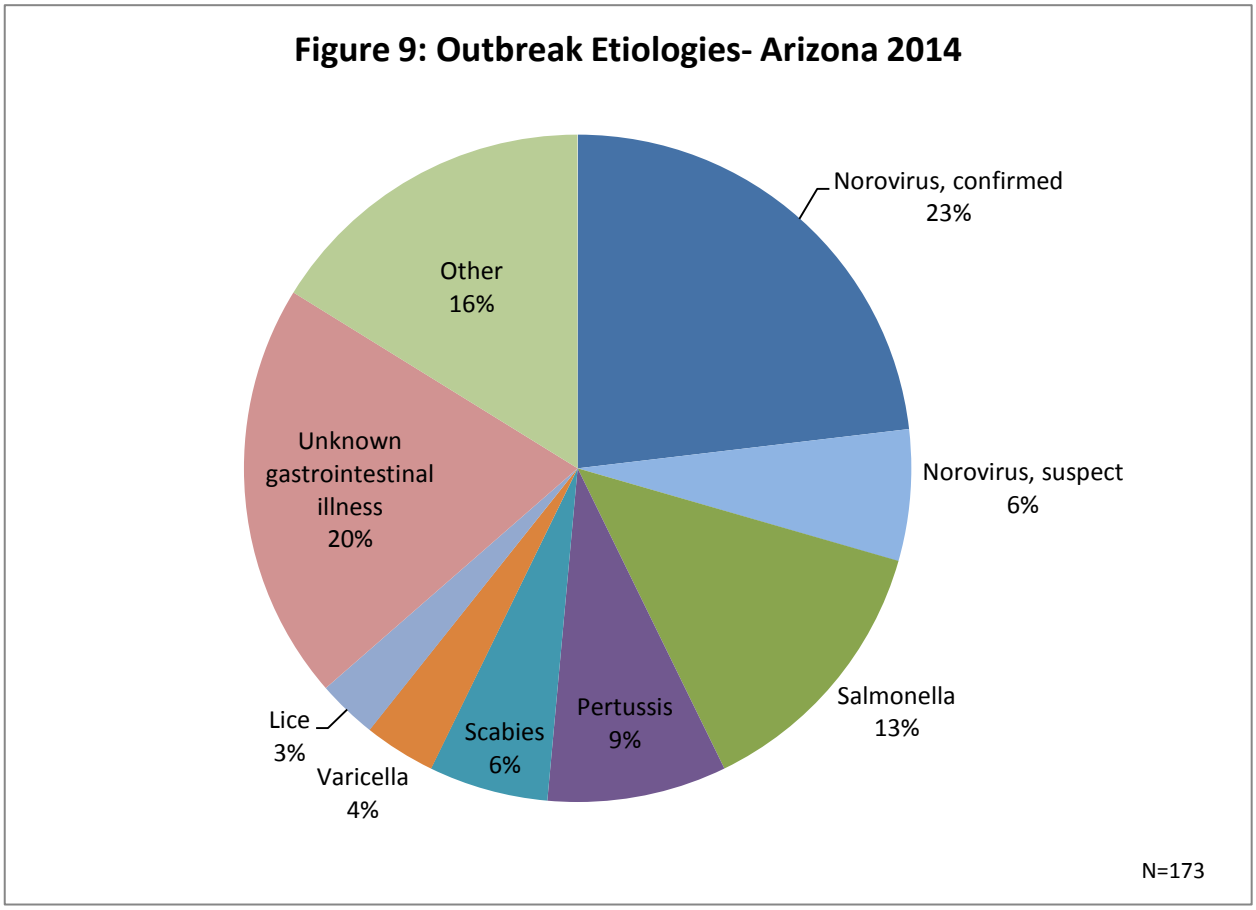
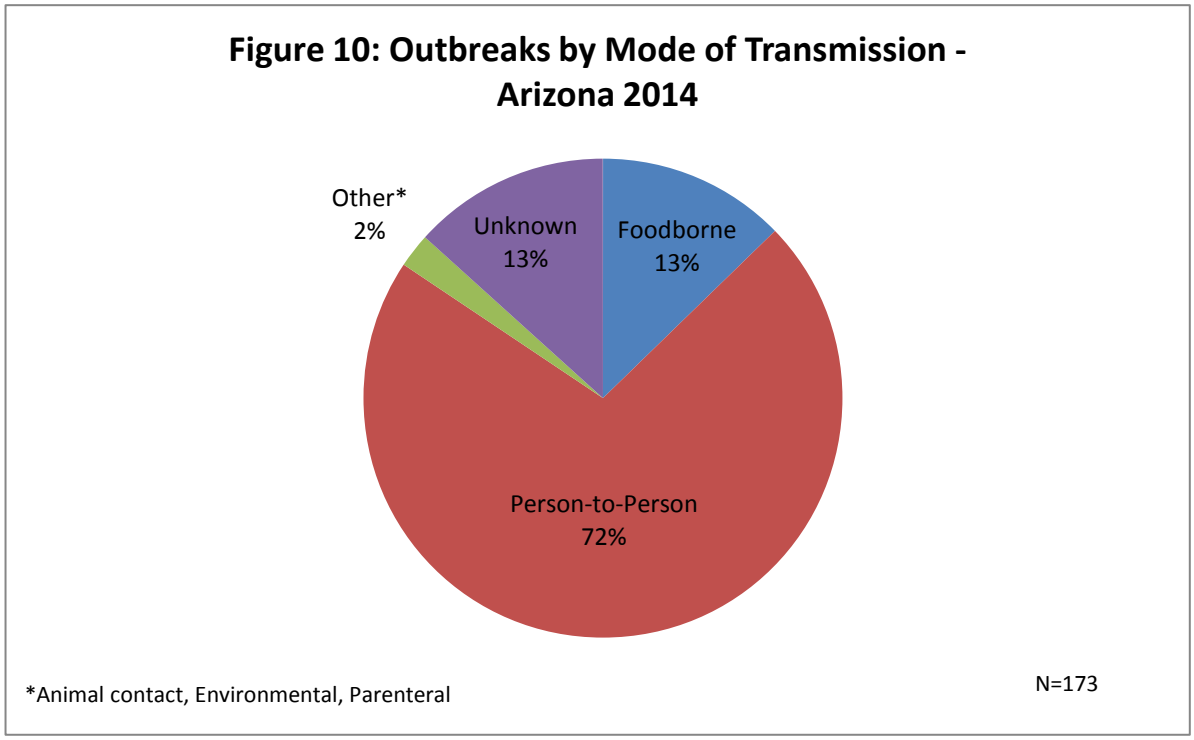


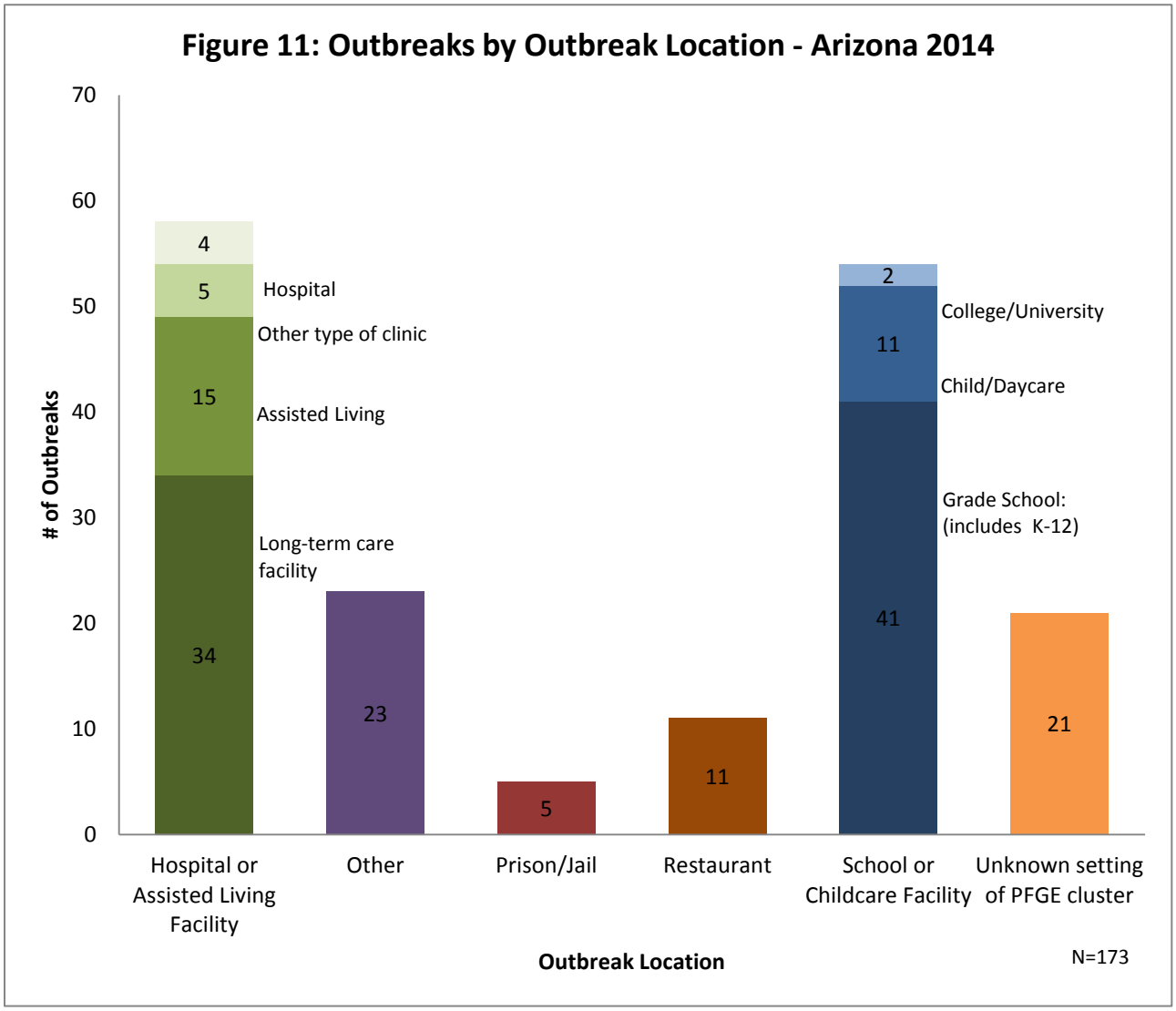
Table 1: Infectious disease agents identified as causing an outbreak in Arizona (N, %), 2014.

Outbreak Agent	Frequency (N)	Percentage (%)
Campylobacter	2	1.2%
Conjunctivitis	4	2.3%
Enterohemorrhagic *Escherichia coli*	2	1.2%
Hand, Foot, and Mouth Disease	4	2.3%
Impetigo	2	1.2%
Influenza	2	1.2%
Lice	5	2.9%
Mumps	1	0.6%
Mycobacterium chelonae	1	0.6%
Norovirus, confirmed	40	23.1%
Norovirus, suspect	11	6.4%
Pertussis	15	8.7%
Relapsing fever	1	0.6%
RSV	1	0.6%
Salmonella	23	13.3%
Scabies	10	5.8%
Shigella	2	1.2%
Streptococcus pharyngitis (strep throat)	2	1.2%
Unknown gastrointestinal illness (GI)	35	20.2%
Unknown respiratory illness	3	1.7%
Varicella	6	3.5%
Vibrio infection	1	0.6%
Total	**173**	**100.0%**

Person-to-person transmission was the most common mode of transmission identified for Arizona outbreaks in 2014 (124, 72%) (Figure 10). There were also 22 (13%) foodborne outbreaks and 27 (15%) outbreaks of other or unknown transmission reported in 2014.



Reported outbreaks were classified into six categories based on location: hospital or assisted living facility, prison or jail, restaurant, school or child care facility, unknown setting of PFGE cluster, and other. The most common outbreak location was a hospital or assisted living facility (58, 34%) (Figure 11), and within this category, the most common reported location was long-term care facility (34, 59%). Fifty-four (31%) outbreaks were reported from a school or childcare facility, and within this category, the most common report location was grade school which includes kindergarten through 12th grade (41, 76%). Awareness of reporting requirements and the number of facilities in the state may heavily influence these numbers; increased reporting from schools or healthcare facilities is expected as healthcare professionals located on-site may assist in identification of such outbreaks, and outreach regarding reporting requirements is conducted by public health agencies, whereas reporting of restaurant outbreaks relies on individual illness complaints and outreach to the public may be less effective. Reported outbreaks in prisons or jails may be lower because there are fewer facilities in the state, they have fewer infectious disease outbreaks, and/or facilities are less aware of reporting requirements.



Norovirus outbreaks (including confirmed and suspected Norovirus outbreaks) were also classified by outbreak location (Figure 12). Most Norovirus outbreaks in 2014 occurred in hospitals or assisted living facilities (36, 71%). Of these, most outbreaks occur in long-term care facilities (22, 61%).

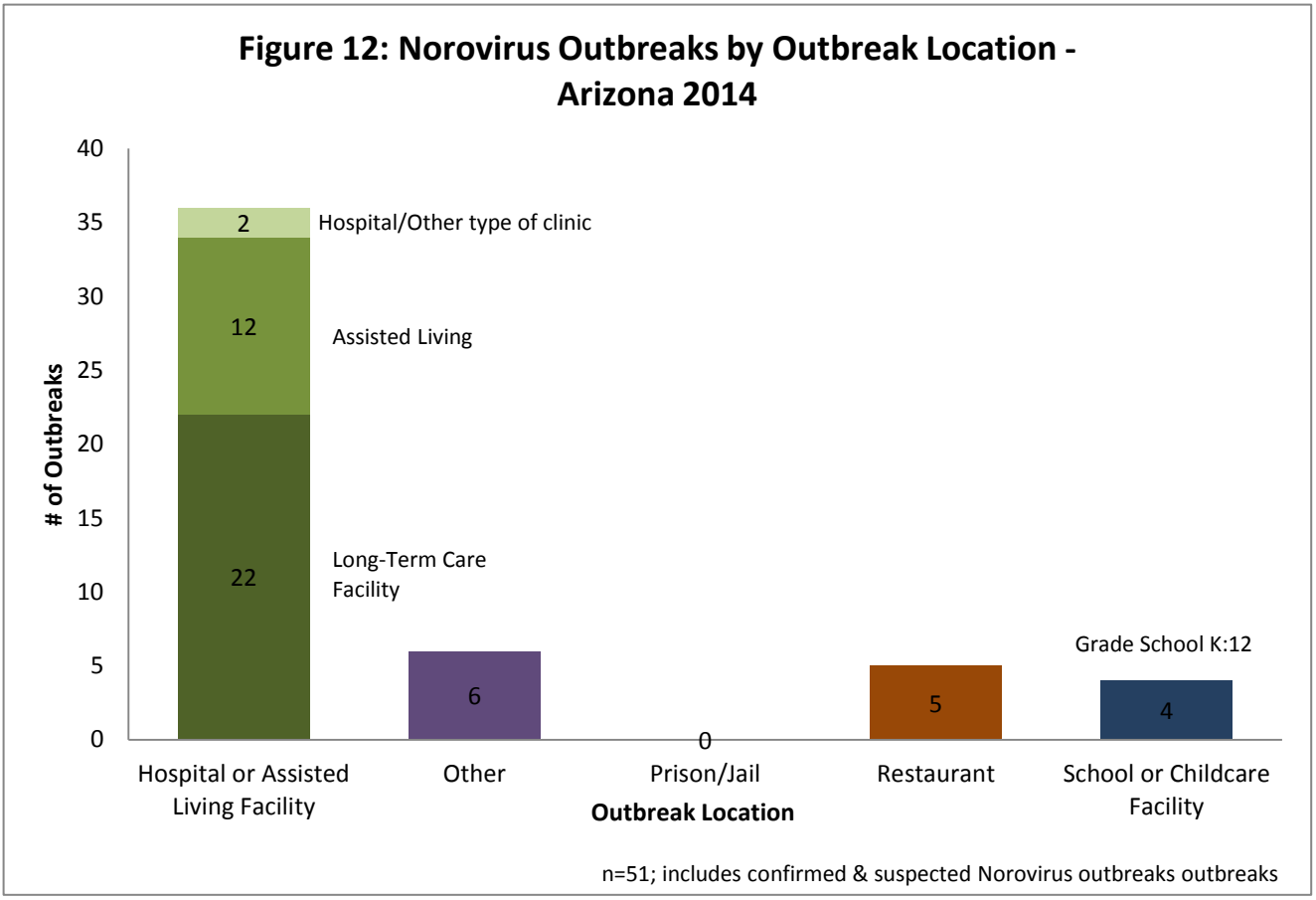
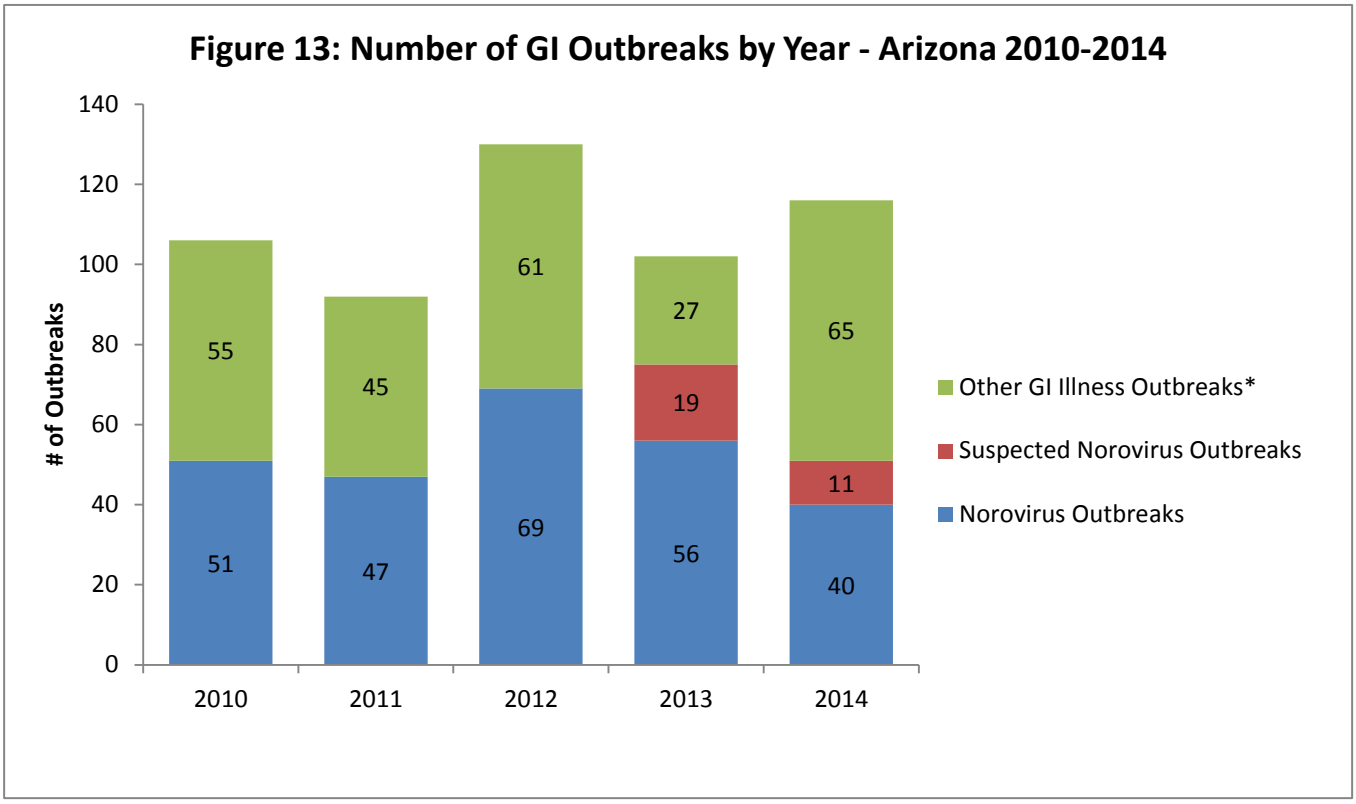
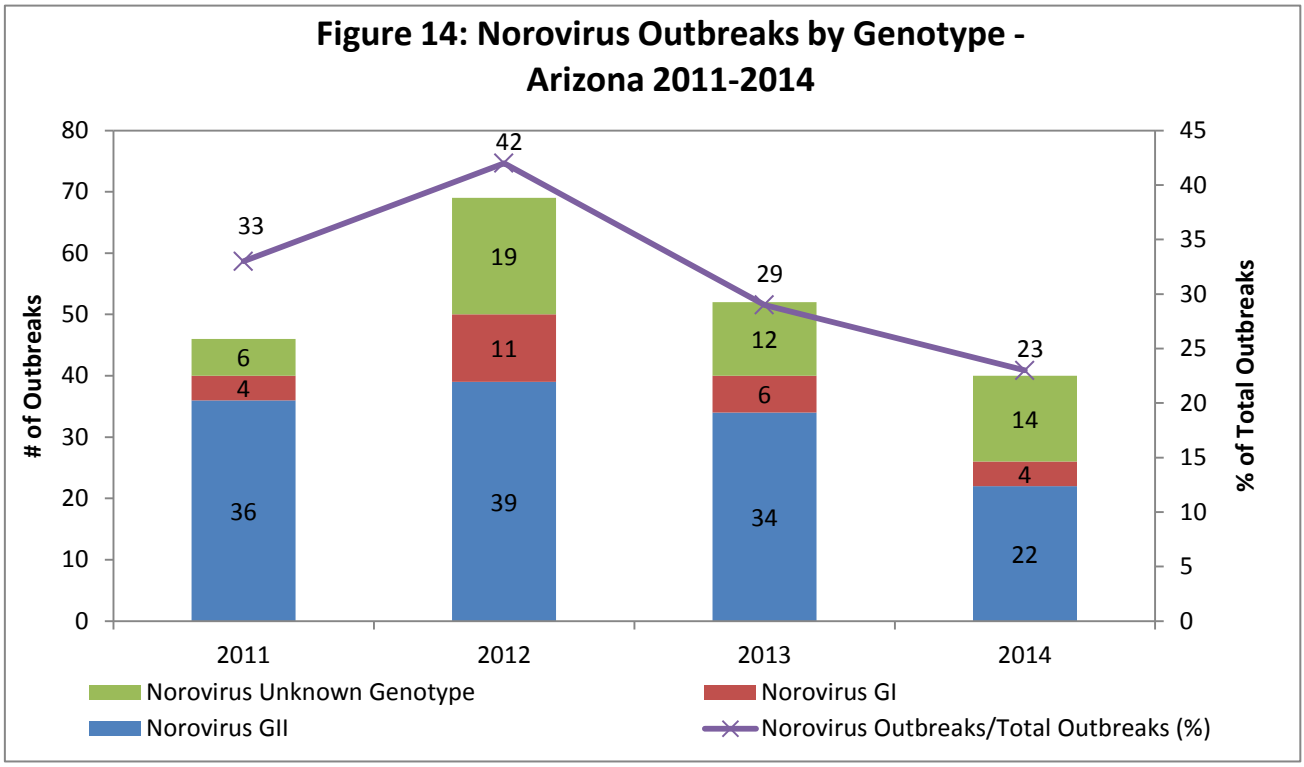


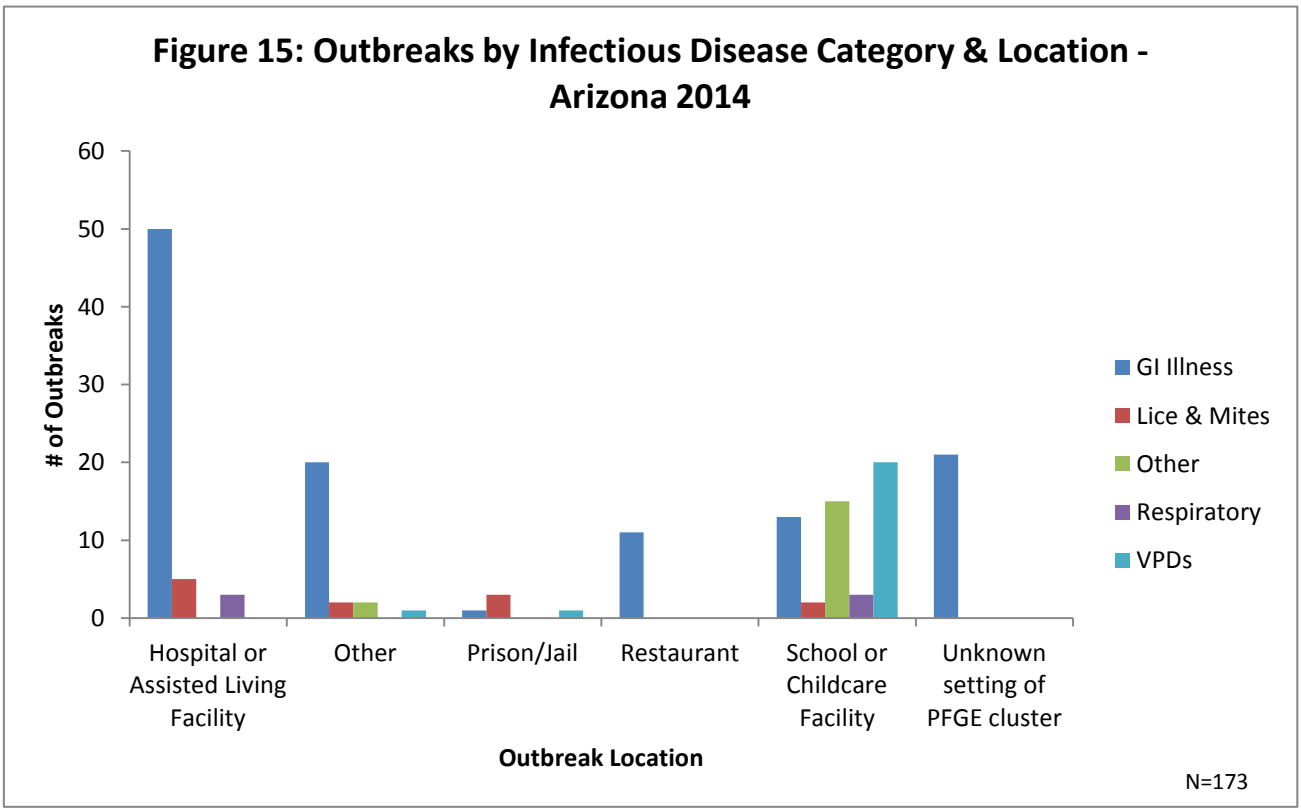
Figure 13 shows GI outbreaks reported in Arizona from 2010-2014. Approximately one-third of GI outbreaks from 2014 were attributed to Norovirus as a confirmed etiology, a decrease from previous years. This may be due to more *Salmonella* PFGE-matched outbreaks being tracked and managed in OBM which in turn decreases the proportion of other GI illness outbreaks, as well as a true decrease in the number of Norovirus outbreaks. Many of the "other GI" outbreaks are outbreaks of an unknown GI etiology, most often due to a lack of availability of clinical specimens. Outbreaks where no clinical specimens are collected and submitted for testing leads to an incomplete understanding of the burden of infectious disease outbreaks in Arizona. Continued outreach and education to facilities commonly experiencing GI illness outbreaks on the importance of collecting specimens will allow us to better understand the types of etiologies causing outbreaks in Arizona and enable public health agencies to implement appropriate and effective control measures to minimize and prevent outbreaks in the future.



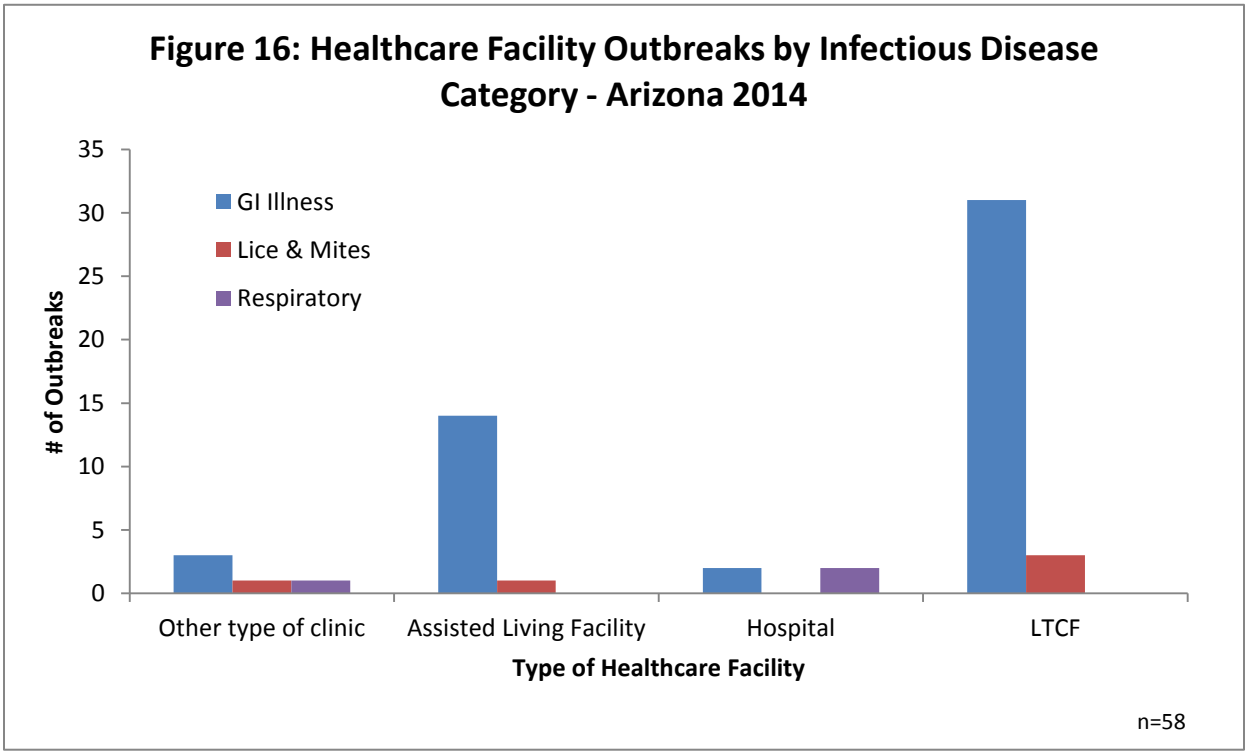
For confirmed Norovirus outbreaks with a known genotype, most outbreaks are attributed to Norovirus GII (Figure 14). In 2014, 55% (22) of confirmed Norovirus outbreaks were Norovirus GII, 10% (4) were Norovirus GI, and 35% (14) were an unknown Norovirus genotype. There were more Norovirus outbreaks reported in 2012 than in 2011, 2013, or 2014 and even though there were more total outbreaks reported in 2012, Norovirus outbreaks still represented a larger percentage of outbreak reports (42%) in 2012 than in 2011 (33%), 2013 (29%), and 2014 (23%). It is unclear if this is due to a true increase in Norovirus outbreaks or if there was increased reporting and detection of Norovirus outbreaks in 2012. From 2011-2014, the proportion of Norovirus outbreaks attributed to Norovirus GI and GII has remained relatively constant.



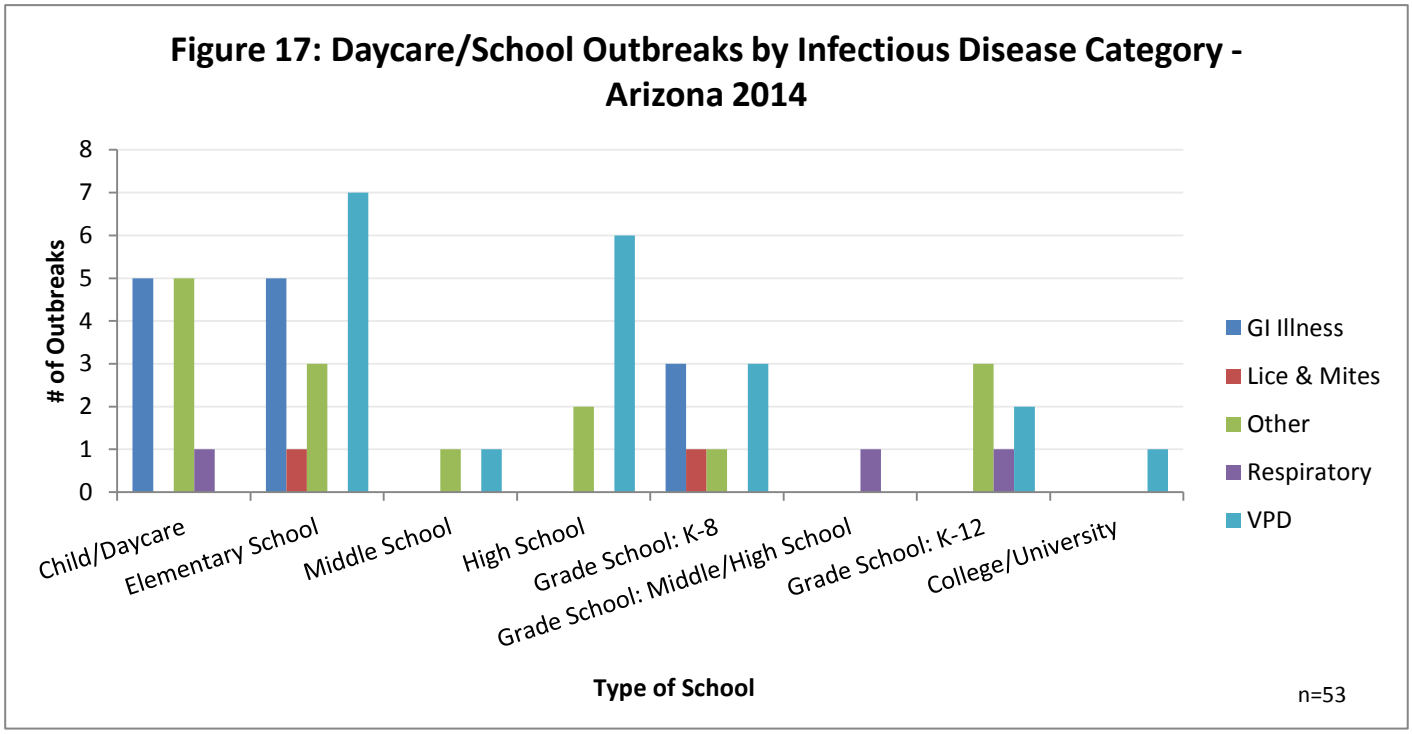
Outbreak locations were further characterized by infectious disease category. Most of the outbreaks reported from healthcare facilities were due to gastrointestinal illnesses (86%), and all of the outbreaks reported from restaurants were due to gastrointestinal illnesses (Figure 15). Schools and child care facilities reported a mix of outbreak types.



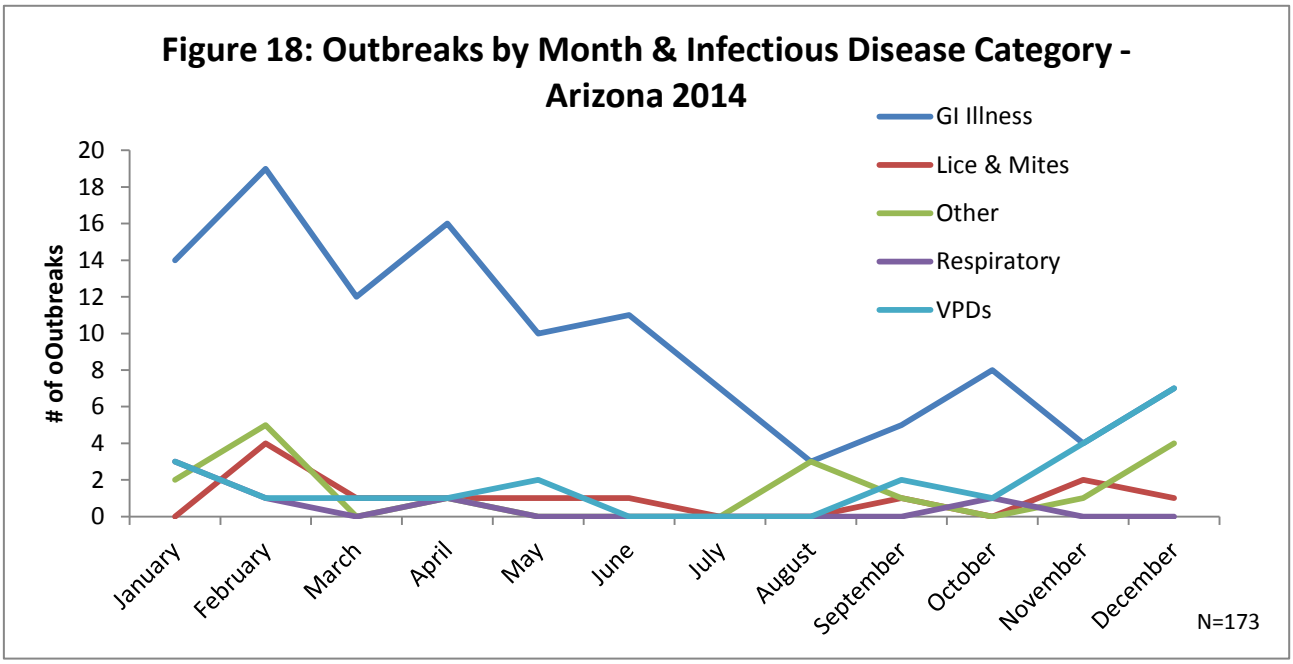
Healthcare facilities experienced GI illness, lice & mites, and respiratory illness outbreaks in 2014. Healthcare facilities were further classified as assisted living facilities, hospitals, long-term care facilities (LTCF), or other types of clinics (e.g., dental, rehab, behavioral health). GI illness outbreaks were most common among all types of facilities, but long-term care facilities reported the highest number of GI illness outbreaks (Figure 16).



Different outbreak disease profiles were seen in the different types of schools reporting outbreaks. Overall, more outbreaks were reported from facilities with younger age groups, such as daycares, and elementary schools (27, 51%) (Figure 17). GI illness outbreaks were mainly reported from childcare facilities and elementary schools, while vaccine-preventable disease (VPD) outbreaks were mainly reported from elementary schools and high schools. Fewer outbreaks were reported from schools with older aged students.



An analysis of infectious disease categories by month was conducted to look at trends of outbreak etiology types over seasons (Figure 18). As mentioned earlier, most outbreaks in 2014 were reported in February (30, 17%). Gastrointestinal illness outbreaks were most frequent from January through June (82, 71% of the GI outbreaks for 2014), but GI illness was the most common type of outbreak reported for all months in 2014. VPD outbreaks peaked in December (7, 32% of the respiratory outbreaks for 2014). Other types of outbreaks were reported at a relatively similar rate throughout the year.



MULTI-STATE CLUSTERS INVESTIGATIONS:

In 2014, Arizona participated in 41 multi-state cluster investigations; 8 of these investigations were confirmed as outbreaks because a high-suspect exposure was identified (Table 2). Among the confirmed multi-state outbreaks, one outbreak was due to listeriosis, and the remaining 7 outbreaks were due to various *Salmonella* serotypes. These multi-state investigations and outbreaks are not included in the above analyses.

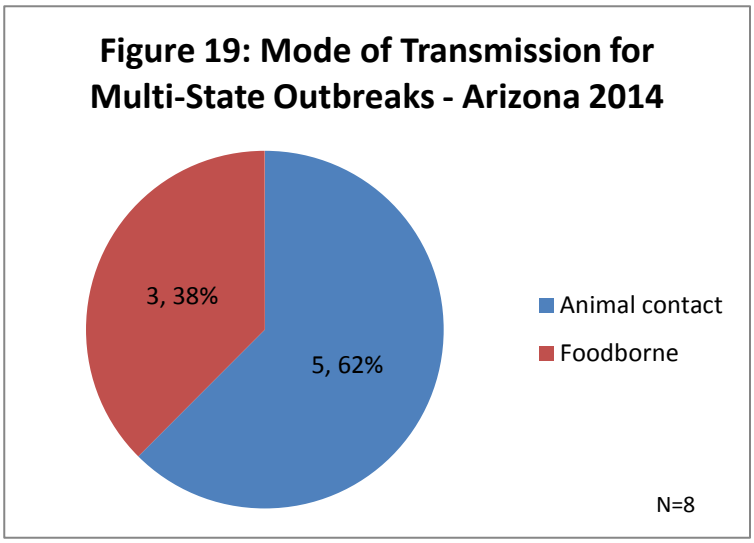
Table 2: Infectious disease agents identified as causing multi-state outbreaks with Arizona participation, by high suspect exposure identification (N, %), 2014.

Outbreak Agent	No high suspect exposure identified	High suspect exposure identified
Enterohemorrhagic *Escherichia coli*	2	0
Listeria	0	1
Salmonella	31	7
Total	**33**	**8**

Some of the following highly suspected common exposures that were identified included:

- *Listeria monocytogenes* linked to consumption of caramel apples
- *Salmonella* Newport/Hartford/Oranienburg outbreak associated with chia seed powder exposure
- *Salmonella* Infantis/Newport/Hadar outbreak associated with live poultry contact
- *Salmonella* Cotham linked to contact with pet bearded dragons

62% of multi-state outbreaks in 2014 were due to transmission from animals and 38% were due to foodborne transmission of pathogens (Figure 19).



Most of these multi-state outbreaks included only small numbers of cases from Arizona, and none of these investigations were led by Arizona. However, Arizona supported other states and CDC in all multi-state cluster investigations where Arizona had at least one case involved.

HEALTHCARE ASSOCIATED INFECTION (HAI) INVESTIGATIONS

In 2014, Arizona participated in seven HAI investigations involving potential exposures to various blood-borne pathogens, methicillin-resistant Staphylococcus aureus (MRSA), vaccine-preventable diseases and legionellosis. Exposures occurred at various healthcare settings, including correctional and outpatient facilities. None of these investigations were confirmed as communicable disease outbreaks, so they are not included in the above analysis.

OUTBREAK PERFORMANCE INDICATORS

Outbreaks were reported by the county health departments to ADHS within 24 hours for 160 (94%) outbreaks. This did not meet our state performance goal of ≥95% of outbreaks reported to ADHS within 24 hours. Investigations were begun within 24 hours of receipt of report for 171 outbreaks (99%), which exceeds the goal of ≥90%. Excluding outbreaks of lice and mites, strep throat, group A streptococcal infections, influenza or ILI, conjunctivitis or hand foot and mouth disease, there were 143 outbreaks for which an outbreak summary form should have been submitted to ADHS. For 125 (87%) of these outbreaks of selected disease agents, county health departments submitted an outbreak report to ADHS within 30 days of investigation closure. This is also below our target of 100% and is one area for improvement.

CONCLUSION

During outbreak investigations, local and state health departments work with the reporting facility to identify the causative agent as well as make recommendations for control and prevention of future cases. In 2014, 281 suspect infectious disease outbreaks were reported and investigated by Arizona public health agencies. Of these, 181 were confirmed communicable disease outbreaks, including eight multi-state outbreaks where Arizona had at least one case. Reported outbreaks were more likely to occur in Maricopa County (57%), in the month of February (17%), in a hospital or assisted living facility (34%), involve symptoms consistent with gastrointestinal illness (67%), be spread person-to-person (72%) and involve 50 or fewer people (94%). Norovirus was the most common (29%) suspected or confirmed causative agent identified in outbreaks in 2014.

For 2014, 94% of outbreaks were reported to ADHS within 24 hours, which was below our target of ≥95%, and 87% of outbreak reports were submitted to ADHS within 30 days of investigation closure, which is also below our target of 100%. In addition, 99% of all outbreaks were investigated within 24 hours of receipt of report at the local health department, which meets our target of 90%. Continued outreach and education to county health departments will hopefully improve these performance indicators even more for 2015.