IOWA SURVEILLANCE OF NOTIFIABLE AND OTHER DISEASES

Division of Acute Disease Prevention and Emergency Response & Environmental Health

Annual Report 2016

IOWA DEPARTMENT OF PUBLIC HEALTH

Promoting and Improving the Health of Iowans

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Introduction

This report provides a snapshot of notifiable and other diseases that occur in Iowa. When possible, details of each disease is provided, including information on serotypes, strains, and groups, and outbreaks. Comparisons to national rates are also provided whenever possible. Aggregated county-level data are in a table at the end of the report.

At the Iowa Department of Public Health (IDPH), the Center for Acute Disease Epidemiology (CADE) conducts surveillance for common and emerging infectious diseases, agents of bioterrorism, disease outbreaks, and occurrence of rare and unusual acute diseases.

Although, this report provides an overview of disease investigations, it represents only a fraction of work accomplished by IDPH staff each year. The time invested in each disease varies greatly by specific disease and nature of the reports received. Some reports require a quick database query and update of an electronic file. Others require hours of staff time in contact tracing, assisting other health investigators, and communication, education, and implementation of interventions.

Support for the initiatives of the Division of Acute Disease Prevention, Emergency Response & Environmental Health (ADPER & EH) comes from a variety of federal and state allocations and grants.

Methods

Disease reports are submitted to IDPH via phone, fax, mail, or a secure electronic reporting system. Reporters include health care providers, hospitals, local public health agencies, laboratories, and the public. Reports of diseases or exposures occurring outside of Iowa are reported by other states and the CDC to IDPH via the *Epi-X* system. CADE tracks diseases in Iowa residents; however, acquisition/exposure to these disease causing pathogens may have occurred in Iowa, another state, or outside of the United States.

Reports received by CADE are tracked in the secure web-based Iowa Disease Surveillance System (IDSS). De-identified data (data with personal identifying information taken out) is electronically exchanged between IDSS and CDC.

The Iowa Department of Public Health is nearing full implementation of statewide electronic laboratory reporting (ELR). ELR from the State Hygienic Laboratory (SHL) has been in place since March 2010. The large national/regional reference labs (ARUP, Center for Disease Detection, LabCorp, MAYO, PAML, Planned Parenthood Laboratory Services Corporation, QUEST-via AIMS Platform, and Tamarac) are all sending laboratory results by ELR. In total, 68 ELR connections have been established, all of which represent over 215 different laboratory or hospital locations in Iowa, Minnesota, Montana, Nebraska, South Dakota, Wisconsin and many other states. There remain a handful of connections that still need to transition to production representing about 20 Iowa facilities. In addition, IDPH efforts to implement ELR with other state public health jurisdictions are ongoing; Iowa has live connections with Michigan, Nebraska, South Dakota and Wisconsin. There are open projects with Illinois, Kansas, and Michigan. ELR dramatically improves public health response time by slicing 3 to 9 days off of the lag time that occurs with mail, fax and manual web entry reporting methods.

Reports of acute infectious diseases are typically referred to local public health agencies for patient investigations and interviews. These local agencies typically use IDSS to report information back to IDPH. Local public health agencies are also critical in conducting outbreak investigations. at the city and county level.

A few diseases require a unique reporting system used by IDPH for transmitting de-identified data to program-specific staff at CDC. These diseases include influenza and West Nile virus. The National Outbreak Reporting System (NORS) is a CDC-sponsored system used by IDPH to report outbreaks.

Rates of specific diseases were calculated using the 2010 census population for the State of Iowa or the appropriate estimated census year. The enteric disease five-year averages were calculated by taking the average of the number of cases in the previous five years for each disease. Race and ethnicity data is self-reported and a large percentage of that information is missing from our data sets, thus caution must be used when drawing conclusions from reported race and ethnicity. Calculations were performed with EPI INFO® 7.2.0.1, and Microsoft® Excel. Maps were generated using ARC GIS ® 10.0.

CADE uses the most recent Council of State and Territorial Epidemiologists (CSTE)/CDC case definitions found at wwwn.cdc.gov/nndss/conditions/notifiable/2015/. CSTE/CDC definitions are used to classify each case as confirmed, probable, suspect, not a case, or awaiting more information. Only confirmed and probable cases of disease meeting the CSTE/CDC definitions are included in this report.

Disease case counts and Iowa-specific case demographics were retrieved from IDSS, which is maintained within CADE. The specific file used for this report was created in April 2016. Case reports and additional information received after this date were not included in this report. In addition, the data file was generated using CDC's MMWR (Morbidity Mortality Weekly Report) year 2016. Therefore, case counts in this report may vary slightly from counts generated using the calendar year of 2016.

Influenza surveillance data was collected from multiple sources, including sentinel outpatient health care providers, sentinel hospitals, public health departments, clinical laboratories, and schools. Laboratory-confirmed influenza cases were based on real-time polymerase chain reaction (RT-PCR) test results sent from SHL. SHL also surveyed clinical and reference labs throughout the state for the weekly number of rapid influenza tests performed and number of positives. Influenza-associated hospitalizations were reported from the sentinel hospitals that participated in the Iowa Influenza Surveillance Network (IISN).

Respiratory syncytial virus (RSV) rapid antigen test data are used to determine the weekly positive predictive value of the rapid antigen tests in Iowa. SHL surveyed clinical and reference labs throughout the state for the number of rapid-antigen RSV tests performed and number positive weekly, and sent the survey results to IDPH.

Most disease-specific data are transmitted to CDC electronically on a routine basis after being de-identified. Some other disease information is communicated at the special request of CDC. The statistics reported by ADPER & EH programs to CDC are used to develop a composite picture of disease burden in the US.

Iowa 2010 Population by Age Group, Gender, Race and Ethnicity

	Number	Percent
Total Population	3,046,355	100.0
Under 5 years	202,123	6.6
5 to 9 years	200,646	6.6
10 to 14 years	200,904	6.6
15 to 19 years	216,837	7.1
20 to 24 years	213,350	7.0
25 to 29 years	197,843	6.5
30 to 34 years	184,740	6.1
35 to 39 years	177,148	5.8
40 to 44 years	187,400	6.2
45 to 49 years	216,482	7.1
50 to 54 years	223,244	7.3
55 to 59 years	204,393	6.7
60 to 64 years	168,357	5.5
65 to 69 years	124,365	4.1
70 to 74 years	100,291	3.3
75 to 79 years	83,387	2.7
80 to 84 years	70,187	2.3
85 years and over	74,658	2.5

Gender	
Female	1,538,036
Male	1,508,319
Race	
White	2,781,561
Black	89,148
Asian	53,094
Other	122,552
Ethnicity	
Non-Hispanic	2,894,811
Hispanic	151,544

Iowa County Boundaries

Section 1

TABLES OF SELECT REPORTABLE DISEASES AND CONDITIONS

Table 1. Common reportable diseases by county – Iowa 2016

	Babesiosis	Brucellosis	Campylobacteriosis	Chikungunya	Cholera	CRE Escherichia coli	Cryptosporidiosis	Cyclosporioasis	Dengue fever	*E. coli* (STEC)	*Anaplasmosis / Ehrlichioses*	Giardiasis	Hansen's disease (Leprosy)	Hantavirus	Hemolytic Uremic Syndrome (HUS)	Hepatitis A	Hepatitis B (acute)	Hepatitis B (chronic)	Hepatitis D	Hepatitis E	Legionellosis	Listeriosis	Lyme disease	Malaria	Meningococcal invasive disease	Mumps	Pertussis	Q fever (acute)	Q fever (chronic)	Rocky Mountain spotted fever	Salmonellosis	Shigellosis	Vancomycin-intermediate *S. aureus* (VISA)	Tetanus	Tularemia	Typhoid fever	West Nile virus	Total
Adair			4				1			1		1														1											**8**
Adams			1																											3							**4**
Allamakee			6				4			1		2						2					7								3	1						**26**
Appanoose			2				2					1									1									2						1	**9**
Audubon			4																							1				1							**6**
Benton			12				4			3								2			1		3			1					8							**34**
Black Hawk			22				5			2		9			1		1	14	1		1		3	2		212	5			3	37	3						**321**
Boone			8				2			1		1														9	1				5						1	**28**
Bremer			3				1			2		1														8					7	4						**26**
Buchanan			9							5	1	1											4			7	1				9	1						**38**
Buena Vista			10				2											5													3							**20**
Butler			6				1			3		1						1								2	1				5							**20**
Calhoun			10				2			2		1														1					1							**17**
Carroll	1		11				9		1	7		4														4	2				12							**51**
Cass			4				3																				7				1							**15**
Cedar			9				3																5			2	1				3	3						**26**
Cerro Gordo			15				101			1		4						3			1					6					5							**136**
Cherokee			3				1			1																					1							**6**
Chickasaw			3				1			2		2											2			2					18	1		1				**32**
Clarke			6				5					1																			4	4						**20**
Clay			1							2		2																			4	1						**10**
Clayton			13				13			4	2	5											12			5	3				3	2						**62**
Clinton			8				1			3								3			1		4			1	3				12	4					2	**42**
Crawford			6				3			11								2						1							6	5						**34**
Dallas			30				12	4	1	10		7			1	1		5			2		2			1	8			1	17	9						**111**
Davis			5				2			1												1								1								**10**
Decatur			4							2					1			1								1					1							**10**
Delaware			20				5			4		2				1							5			18	1				3							**59**
Des Moines			9				8					3											1								9						1	**31**
Dickinson			7				5					3						1								1					3	2						**22**
Dubuque			65				59			26	7	22						5			1	1	22			98		1		1	35	205						**548**
Emmet			4				1					1				1							1								1	3						**12**

	Babesiosis	Brucellosis	Campylobacteriosis	Chikungunya	Cholera	CRE Escherichia coli	Cryptosporidiosis	Cyclosporioasis	Dengue fever	*E. coli* (STEC)	*Anaplasmosis / Ehrlichioses*	Giardiasis	Hansen's disease (Leprosy)	Hantavirus	Hemolytic Uremic Syndrome (HUS)	Hepatitis A	Hepatitis B (acute)	Hepatitis B (chronic)	Hepatitis D	Hepatitis E	Legionellosis	Listeriosis	Lyme disease	Malaria	Meningococcal invasive disease	Mumps	Pertussis	Q fever (acute)	Q fever (chronic)	Rocky Mountain spotted fever	Salmonellosis	Shigellosis	Vancomycin-intermediate *S. aureus* (VISA)	Tetanus	Tularemia	Typhoid fever	West Nile virus	Total
Fayette			10				7				1	1									1		4			5					3							**32**
Floyd			8				4			2																2					12							**28**
Franklin			7				1			3																1					1							**13**
Fremont			4																												2	1					1	**8**
Greene			7							1		1						1													3	1						**14**
Grundy			4							3																6					4							**17**
Guthrie			9				1			2		3																			3							**18**
Hamilton			5				4		1	1						1										1					5	1						**19**
Hancock			7				2											1								2					2							**14**
Hardin			10				3		1	1		1	1				1					1	1			10					8							**38**
Harrison			8				2			2															1	1					5	3						**22**
Henry			3				7			2		1																			5	1					1	**20**
Howard			6				1			1																1					3							**12**
Humboldt			9				3			3																					2	1					1	**19**
Ida			3																												1				1			**5**
Iowa			8				2			1		5						1					3			1					32							**53**
Jackson			15				5			5		1						2					6								5	5						**44**
Jasper			10				8			3		4						1					1							1	10							**38**
Jefferson							5			2	1	1				1		2					2								2					1		**17**
Johnson			35				8			14	1	12						33			1		38	3		119	10			1	49	21				1	2	**348**
Jones			11				11			7								1			1		1								3	2						**37**
Keokuk			8				2			1													1			1					2							**15**
Kossuth			9				3			1		3						1					1			2					1							**21**
Lee			3				1				1	1				1		1													10							**18**
Linn			62	1			37	4		22		13				4		28	1		2		42	3		22	1			1	56	5					1	**305**
Louisa			5				1																								1							**7**
Lucas			5				4			3								1								1	10				1							**25**
Lyon			17			1	19			2		3																			3	1					3	**49**
Madison			5				9			1		4														4	1	1			6							**31**
Mahaska			8				7			2		1					1										1	1			5							**26**
Marion			9				6			1		3											3			3					8	1						**34**
Marshall			8				1			7		1						9					2	1		1	1				5	1						**37**

	Babesiosis	Brucellosis	Campylobacteriosis	Chikungunya	Cholera	CRE Escherichia coli	Cryptosporidiosis	Cyclosporioasis	Dengue fever	*E. coli* (STEC)	*Anaplasmosis / Ehrlichioses*	Giardiasis	Hansen's disease (Leprosy)	Hantavirus	Hemolytic Uremic Syndrome (HUS)	Hepatitis A	Hepatitis B (acute)	Hepatitis B (chronic)	Hepatitis D	Hepatitis E	Legionellosis	Listeriosis	Lyme disease	Malaria	Meningococcal invasive disease	Mumps	Pertussis	Q fever (acute)	Q fever (chronic)	Rocky Mountain spotted fever	Salmonellosis	Shigellosis	Vancomycin-intermediate *S. aureus* (VISA)	Tetanus	Tularemia	Typhoid fever	West Nile virus	Total
Mills			7															1												4	17						**29**
Mitchell			6				14			5		4													5					4							**38**
Monona			8				5					1			1																				1	**16**
Monroe			3				5			2		3														7			3			1				**24**
Montgomery										1																1											**2**
Muscatine			5				4			2		1						3			1		7			11	5				16	2					**57**
O'Brien			8				3			4		2														2				2						2	**23**
Osceola			2									2											1							3							**8**
Page			4				4			4		3																		1							**16**
Palo Alto			4				2			1															1						2						**10**
Plymouth			11				24			2		2													5					12						2	**58**
Pocahontas			6				1			1		1															1			2							**12**
Polk			124				127	6		30		47			1	2	5	133		2	5		14	7		20	40	1			101	44			1			**710**
Pottawattamie			20				7			8		1			1		1	6			1					1	3			2	10	10				2	**73**
Poweshiek			3				1					1											1							2							**8**
Ringgold							2																				3			1							**6**
Sac			12				2			1		4						1												5							**25**
Scott			24	1			7		1	5		9		1			1	24		1	11		8	3	1	11	21				30	28	1				1	**189**
Shelby			8				3			1																8					2						1	**23**
Sioux			25				27		6	3		13						1			1					1					19	1					11	**108**
Story		1	13				10			15		8				3		14			1		5			73		1			11	1			1			**157**
Tama			6				2			3		2						1								2	3				8	1					1	**29**
Taylor			2																												5							**7**
Union			5				2			3		1						1													2	1						**15**
Van Buren			3				2					1																										**6**
Wapello			21				13			1								7					2		1						2							**47**
Warren			14		1		9			4		5						3					4			17	16		1		18	6						**98**
Washington			13				1			2													5			1					3	3						**28**
Wayne			1															1					1				1			1								**5**
Webster			11				4					4				1		1					1								6	7						**35**
Winnebago			5				1																			2					1							**9**
Winneshiek			14				10			3		5											7	2		8					3							**52**
Woodbury			17				35			8		4						17								1	2				15	10					2	**111**
Worth			5				6			1																1					2							**15**
Wright			5							1		3																			2							**11**
Total	**1**	**1**	**1053**	**2**	**1**	**1**	**753**	**14**	**11**	**298**	**14**	**260**	**1**	**1**	**6**	**16**	**10**	**340**	**2**	**3**	**33**	**3**	**232**	**22**	**3**	**732**	**161**	**6**	**1**	**11**	**776**	**425**	**1**	**2**	**3**	**2**	**37**	**5238**

Table 2. Confirmed and probable cases and incidence rate (Per 100,000 Population) of reportable diseases/conditions, Iowa 2011-2016

Reportable Disease/Conditions	2011		2012		2013		2014		2015		2016	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Botulism - Infant	0	-	0	-	3	-	0	-	2	-	0	-
Brucellosis	1	-	0	-	2	-	0	-	1	-	1	-
Campylobacteriosis	747	24.5	534	17.5	610	20.0	571	18.7	769	25.2	1053	34.6
Cholera	0	-	0	-	1	-	0	-	0	-	1	-
Cryptosporidiosis	364	11.9	328	10.8	1505	49.4	264	8.7	373	12.2	753	24.7
Cyclosporiasis	1	-	0	-	148	4.9	0	-	4	-	14	-
Dengue fever	5	-	2	-	3	-	4	-	4	-	11	-
E. coli (shiga toxin producing)	189	6.2	181	5.9	171	5.6	224	7.4	164	5.4	298	9.8
Ehrlichiosis /Anaplasmosis	8	-	6	-	8	-	17	-	11	-	14	-
Giardiasis	271	8.9	251	8.2	275	9.0	205	6.7	213	7.0	260	8.5
Haemophilis influenzae type b	3	-	0	-	1	-	4	-	2	-	0	-
Hansen's disease (leprosy)	0	-	0	-	1	-	0	-	0	-	1	-
Hantavirus	1	-	1	-	0	-	2	-	0	-	1	-
Hemolytic Uremic Syndrome (HUS)	13	-	10	-	6	-	6	-	5	-	6	-
Hepatitis A	8	-	7	-	17	-	12	-	16	-	16	-
Hepatitis B (acute)	15	-	13	-	11	-	9	-	16	-	10	-
Hepatitis B (chronic)	182	6.0	226	7.4	276	9.1	283	9.3	266	8.7	340	11.2
Hepatitis D	0	-	0	-	1	-	0	-	0	-	2	-
Hepatits E	0	-	0	-	0	-	0	-	0	-	3	-
Legionellosis	11	-	13	-	11	-	33	1.1	36	1.2	33	1.1
Listeriosis	5	-	3	-	2	-	7	-	3	-	3	-
Lyme disease	100	3.3	165	5.4	247	8.1	194	6.4	318	10.4	232	7.6
Malaria	22	0.7	6	-	12	-	17	-	17	-	22	0.7
Measles	1	-	0	-	0	-	0	-	0	-	0	-
Meningococcal invasive disease	14	-	2	-	1	-	2	-	5	-	3	-
Mumps	8	-	6	-	3	-	10	-	411	13.5	732	24.0
Pertussis	232	7.6	1736	57.0	308	10.1	222	7.3	173	5.7	161	5.3
Q Fever (acute)	2	-	2	-	4	-	7	-	1	-	6	-
Rocky Mountain spotted fever	7	-	8	-	8	-	10	-	8	-	11	-
Salmonellosis	448	14.7	622	20.4	575	18.9	527	17.3	618	20.3	776	25.5
Shigellosis	18	-	91	3.0	342	11.2	208	6.8	683	22.4	425	14.0
Tetanus	0	-	0	-	1	-	0	-	0	-	2	-
Tularemia	3	-	1	-	4	-	1	-	0	-	3	-
Typhoid fever	4	-	3	-	1	-	1	-	7	-	2	-
West Nile virus	9	-	31	1.0	44	1.4	15	-	14	-	37	1.2

Table 3. Reportable diseases by year – Iowa, 1995-2016

Notifiable Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Anthrax																						
Babesiosis																						1
Botulism					1					1		1	1	1							2	
Brucellosis	2	4	4	1	6		2	1			1	2		2	2		1		2		1	1
Campylobacteriosis	274	339	425	455	467	499	467	427	458	559	537	449	524	591	552	751	747	534	610	571	769	1053
Chikungunya																						2
Cholera					1														1			1
CRE																						1
Cryptosporidiosis	21	75	71	66	56	77	82	49	122	90	122	230	610	284	232	397	364	328	1505	264	373	753
Cyclosporiasis		3	1	3			1								1		1		148		4	14
Dengue Fever											1	1	6	5	2	2	5	2	3	4	4	11
Ehrlichioses / Anaplasmosis								1	1		4	7	7	7	8	2	8	6	8	17	11	14
Encephalitis (arboviral, except WNV)	13	19	3	3	3	4	3	3		2		1	1									
E. coli	64	123	114	93	114	180	81	122	103	124	108	161	185	208	163	173	189	181	171	224	164	298
Hemolytic uremic syndrome																	13	10	6	6	5	6
Giardiasis	391	410	358	429	377	420	345	315	277	301	280	302	301	326	291	284	270	251	275	205	213	260
Haemophilus influenzae Type b	3	4	6	5	2					1		2	1	2	1	1	3		1	4	2	
Hansen's disease (Leprosy)				1		2	1				1	1		1		1			1			1
Hantavirus			2	1	2				1					1			1	1				1
Hepatitis A	106	346	490	400	161	67	41	72	40	50	22	13	48	109	38	11	8	7	17	12	16	16
Hepatitis B acute /chronic	46/X	74/X	44/X	54/X	44/X	38/X	24/X	20/X	27/X	17/X	32/X	21/ 35	26/ 269	24/ 226	37/ 293	15/ 183	15/ 182	13/ 227	11/ 276	9/ 283	16/ 266	10/ 340
Hepatitis D																						2
Hepatitis E																						3
Legionellosis	21	11	12	11	17	15	8	13	12	8	8	13	12	21	24	16	11	13	11	33	36	33
Listeriosis		1		2	6	2	3	5		3	7	6	8	1	4	3	5	3	2	7	3	3
Lyme disease	16	19	8	27	24	34	36	42	58	56	91	97	124	109	108	87	100	165	247	194	318	232

Notifiable Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Malaria	3	3	10	8	11	2	9	4	6	5	9	2	3	12	10	14	22	6	12	17	17	22
Measles (Rubeola)		1								3					1		1					
Meningococcal invasive disease	31	56	47	46	42	37	32	29	28	17	19	20	15	19	16	10	14	2	1	2	5	3
Mumps	11	3	10	11	8	8	1	1	2	2	6	1.963	27	24	15	38	8	6	3	10	411	732
Pertussis	11	32	207	78	111	67	167	230	182	1066	1106	342	150	257	235	705	232	1736	308	222	173	161
Plague																						
Poliomyelitis																						
Psittacosis							3				1											
Q fever Acute/Chronic																						6/1
Rabies, animal	141	237	160	153	159	81	83	74	105	100	108	57	31	29	35	27	25	31	12	15		
Rabies, human									1													
Rocky Mountain Spotted Fever		1	2	2	1	2	5	7	3	2	7	5	17	8	5	5	7	8	8	10	8	11
Rubella (German Measles)					30		1															
Salmonellosis	433	335	296	375	260	373	339	509	413	435	410	475	477	425	408	530	448	622	575	527	618	776
Shigellosis	351	151	90	69	74	569	367	122	93	64	103	134	109	214	53	57	18	91	342	208	683	425
Tetanus			1	1		1		1			1					1			1			2
Toxic Shock Syndrome	5	4	3	4	4	4	1	3	5	5	5			1	2	1	1	1	1			
Trichinosis	6						3				1											
Tularemia															1		3	1	4			3
Typhoid fever		1	1		1				2				1	6		3	4	3	1	1	7	2
West Nile virus								52	147	23	37	37	30	5	5	9	9	31	44	15	14	37
VISA																						1
Yellow Fever															2							

Table 4: Confirmed and probable cases and incidence rate (Per 100,000 Population) of reportable diseases/conditions by gender, Iowa 2016

	Female		Male		Unk	Total	
	Cases	Rate	Cases	Rate	Unk	Cases	Rate
Babesiosis	0	-	1	-	0	1	-
Brucellosis	0	-	0	-	1	1	-
Campylobacteriosis	449	29.2	576	38.2	28	1053	34.6
Chikungunya	1	-	1	-	0	2	-
Cholera	0	-	1	-	0	1	-
CRE	1	-	0	-	0	1	-
Crytpospridiosis	388	25.2	319	21.1	46	753	24.7
Cyclosporiasis	7	-	7	-	0	14	-
Dengue fever	5	-	6	-	0	11	-
E. coli and other shiga-toxin producing	161	10.5	136	9.0	1	298	9.8
Ehrlichiosis/Anaplasmosis	9	-	5	-	0	14	-
Giardiasis	121	7.9	139	9.2	0	260	8.5
Hemolytic uremic syndrome	4	-	2	-	0	6	-
Hepatitis A	5	-	11	-	0	16	-
Hepaitis B, acute	4	-	6	-	0	10	-
Hepatitis B, chronic	158	10.3	181	12.0	0	340	11.1
Hepatitis D	0	-	2	-	0	2	-
Hepatitis E	1	-	2	-	0	3	-
Legionellosis	12	-	21	0.7	0	33	1.1
Listeriosis	1	-	2	-	0	3	-
Lyme disease	71	4.6	161	10.7	0	232	7.6
Malaria	12	-	10	-	0	22	-
Meningococcal invasive disease	1	-	2	-	0	3	-
Mumps	357	23.2	369	24.5	6	732	24.0
Perussis (whooping cough)	80	5.2	80	5.3	1	161	5.3
Q fever (Acute and Chronic)	1	-	6	-	0	7	-
Rocky Mountain spotted fever	1	-	10	-	0	11	-
Salmonellosis	395	25.7	372	24.7	9	776	25.5
Shigellosis	230	15.0	168	11.1	27	425	14.0
Tetanus	0	-	2	-	0	2	-
Tularemia	1	-	2	-	0	3	-
Typhoid fever	1	-	1	-	0	2	-
VISA	0	-	1	-	0	1	-
West Nile virus	14	-	22	1.5	1	37	1.2

(-) Not applicable. Rates calculated for less than 20 cases are unreliable and therefore are not included in this table.

Table 5. Reportable disease cases and rates per 100,000 population by age group – Iowa, 2016

	0-4		5 to 19		20 to 29		30 to 39		40 to 64		>64		Total	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Babesiosis	0	-	0	-	0	-	0	-	0	-	1	-	1	-
Brucellosis	0	-	0	-	0	-	0	-	1	-	0	-	1	-
Campylobacter	114	56.4	166	26.8	167	40.6	128	35.4	302	30.2	176	38.9	1053	34.6
Chikungunya	0	-	0	-	1	-	0	-	1	-	0	-	2	-
Cholera	0	-	0	-	1	-	0	-	0	-	0	-	1	-
CRE	0	-	0	-	0	-	0	-	0	-	1	-	1	-
Cryptosporidiosis	129	63.8	186	30.1	127	30.9	132	36.5	116	11.6	63	13.9	753	24.7
Cyclospora	0	-	1	-	2	-	4	-	7	-	0	-	14	-
Dengue fever	0	-	4	-	2	-	0	-	4	-	1	-	11	-
E. coli (shiga-toxin producing)	77	38.1	77	12.5	55	13.4	33	9.1	36	3.6	20	4.4	298	9.8
Ehrlichiosis / Anaplasmosis	0	-	3	-	1	-	1	-	6	-	3	-	14	-
Giardiasis	46	22.8	36	5.8	37	9.0	33	9.1	84	8.4	24	5.3	260	8.5
Hansen's disease (leprosy)	0	-	0	-	0	-	0	-	1	-	0	-	1	-
Hantavirus	0	-	0	-	0	-	1	-	0	-	0	-	1	-
Hemolytic Uremic Syndrome (HUS)	4	-	1	-	0	-	0	-	1	-	0	-	6	-
Hepatitis A	0	-	1	-	5	-	1	-	5	-	4	-	16	-
Hepatitis B (acute)	0	-	0	-	1	-	1	-	7	-	0	-	10	-
Hepatitis B (chronic)	1	-	29	4.7	80	19.5	101	27.9	108	10.7	21	4.6	340	11.2
Hepatitis D	0	-	0	-	1	-	1	-	0	-	0	-	2	-
Hepatitis E	1	-	1	-	0	-	0	-	1	-	0	-	3	-
Legionellosis	0	-	0	-	0	-	3	-	20	2.0	10	-	33	1.1
Listeriosis	0	-	0	-	0	-	0	-	1	-	2	-	3	-
Lyme disease	6	-	70	11.3	21	5.1	24	6.6	78	7.8	33	7.3	232	7.6
Malaria	2	-	3	-	2	-	6	-	6	-	3	-	22	0.7
Meningococcal invasive disease	0	-	1	-	0	-	0	-	1	-	1	-	3	-
Mumps	15	-	221	35.7	351	85.4	62	17.1	71	7.1	12	-	732	24.0
Pertussis	38	18.8	96	15.5	4	-	4	-	13	-	6	-	161	5.3
Q fever (acute and chronic)	0	-	0	-	1	-	0	-	6	-	0	-	7	-
Rocky Mountain spotted fever	0	-	2	-	3	-	2	-	3	-	1	-	11	-

	0-4		5 to 19		20 to 29		30 to 39		40 to 64		>64		Total	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases
Salmonellosis	96	47.5	95	15.4	121	29.4	98	27.1	243	24.3	123	27.2	776	24.5
Shigellosis	119	58.9	116	18.8	51	12.4	60	16.6	59	5.9	20	4.4	425	14.0
Tetanus	0	-	0	-	1	-	0	-	1	-	0	-	2	-
Tularemia	0	-	0	-	0	-	0	-	2	-	1	-	3	-
Typhoid fever	0	-	1	-	0	-	0	-	1	-	0	-	2	-
VISA	0	-	0	-	0	-	0	-	0	-	1	-	1	-
West Nile virus	1	-	3	-	0	-	4	-	14	-	15	-	37	1.2

(-) Not applicable. Rates calculated for less than 20 cases are unreliable and therefore are not included in this table.

Section 2

TABLES OF REPORTED OUTBREAK INVESTIGATIONS

Table 6. Foodborne outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Food Vehicle of Transmission	Agent Involved
1	Foodborne	Gastrointestinal	Family Gathering	Muscatine	January	7	35	Eggs	*Salmonella infantis*
2	Foodborne	Gastrointestinal	Resort - Out of County	Scott	May	22	41	Unknown	*Salmonella enteritidis*
3	Foodborne	Gastrointestinal	Private Residence	Chickasaw	May	30	32	Turkey	*Salmonella enteritidis*
4	Foodborne	Gastrointestinal	Fundraising Event	Carroll	June	10	Unknown	Unknown	*E.coli* 0111
5	Foodborne	Gastrointestinal	Hospital	Dubuque	June	11	Unknown	Chicken casserole	*Clostridium perfringens*
6	Foodborne	Gastrointestinal	Grocery Store	Iowa	June	51	Unknown	Potato salad	*Salmonella braenderup*
7	Foodborne	Gastrointestinal	Restaurant	Johnson	August	17	Unknown	Unknown	*Salmonella javiana*
8	Foodborne	Gastrointestinal	Restaurant	Plymouth	September	2	2	Chicken	*Salmonella infantis*
9	Foodborne	Gastrointestinal	Wedding	Hardin	October	19	300	Unknown	Clostridum *perfringens* enterotoxin
10	Foodborne	Gastrointestinal	Family Gathering	Appanoose	November	4	17	Quail	*Salmonella typhimurium*

Table 7. Animal-related outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Animal	Gastrointestinal	College	Hardin	September	18	55	*Salmonella enterica* Hartford

Table 8. Water-borne outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Water	Gastrointestinal	Pool/Daycare	Cerro Gordo	August	16	Unknown	*Cryptosporidium*

Table 9. Vector-borne outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Mosquito	Fever, fatigue, headache	Mission trip- out of country	Sioux	July	9	9	Dengue Presumptive/Equivocal zika

Table 10. Environmental outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Environmental	Fatigue, body aches, diarrhea, chills, fever	Construction site	Sioux	June	4	4	Histoplasmosis

Table 11. Non-foodborne person-to-person outbreaks

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Person-to-Person	Gastrointestinal	Restaurant	Linn	December	31	Unknown	Norovirus GII_4_Syndey_AU12
2	Person-to-Person	Gastrointestinal	Long-term Care	Black Hawk	January	13	48	Norovirus GII
3	Person-to-Person	Gastrointestinal	Hospital	Story	January	10	Unknown	Norovirus GI_5A_Musgrove_GB89
4	Person-to-Person	Gastrointestinal	Restaurant	Polk	January	2	Unknown	Norovirus GII_4_Sydney_AU12
5	Person-to-Person	Gastrointestinal	Sports Team	Linn	February	13	29	Norovirus GII
6	Person-to-Person	Respiratory	Hospital	Boone	February	8	Unknown	Influenza A Rapid Test
7	Person-to-Person	Respiratory	Long-term Care	Story	February	3	53	Influenza A Rapid Test
8	Person-to-Person	Gastrointestinal	Restaurant	Polk	March	6	10	Norovirus GII
9	Person-to-Person	Gastrointestinal	Elementary School	Bremer	March	11	30	Norovirus GI_5A_Musgrove_GB89
10	Person-to-Person	Respiratory	Long-term Care	Pottawattamie	March	5	45	Influenza A
11	Person-to-Person	Gastrointestinal	Restaurant	Dallas	March	2	2	Suspect Norovirus
12	Person-to-Person	Respiratory	Long-term Care	Story	March	3	180	Influenza A
13	Person-to-Person	Gastrointestinal	Long-term Care	Palo Alto	April	26	70	Norovirus GII_4_Sydney_AU12
14	Person-to-Person	Respiratory	Senior Center	Lee	April	8	124	Influenza A
15	Person-to-Person	Gastrointestinal	Rehab Facility	Johnson	April	19	62	Norovirus GII
16	Person-to-Person	Gastrointestinal	Hospital	Johnson	April	12	Unknown	Norovirus (Negative at SHL)
17	Person-to-Person	Respiratory	Long-term Care	Black Hawk	April	13	17	Influenza B (Yamagata)
18	Person-to-Person	Gastrointestinal	Restaurant	Sioux	April	4	Unknown	Norovirus GII_4_untypeable
19	Person-to-Person	Respiratory	Rehab Facility	Adair	April	6	40	Influenza A(Rapid Test)
20	Person-to-Person	Gastrointestinal	Long-term Care	Lyon	April	34	61	Negative for Enteric Pathogens and Noro
21	Person-to-Person	Gastrointestinal	Long-term Care	Des Moines	April	13	50	Norovirus GII_4_untypeable
22	Person-to-Person	Gastrointestinal	lndependent Living	Johnson	April	27	148	Suspect Norovirus
23	Person-to-Person	Gastrointestinal	Long-term Care	Polk	April	7	20	Norovirus G1_5A_Musgrove_GB89
24	Person-to-Person	Gastrointestinal	Long-term Care	Des Moines	April	3	30	Suspect Norovirus
25	Person-to-Person	Gastrointestinal	Grocery Store	Woodbury	April	4	5	Norovirus
26	Person-to-Person	Gastrointestinal	Restaurant	Webster	April	4	7	Norovirus
27	Person-to-Person	Gastrointestinal	Restaurant	Polk	March	2	2	Suspect Norovirus

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
28	Person-to-Person	Gastrointestinal	Birthday Party	Linn	May	8	10	Norovirus G1_5A_Musgrove_GB89
29	Person-to-Person	Gastrointestinal	Restaurant	Linn	May	7	12	Norovirus GII_4_untypeable
30	Person-to-Person	Parotitis	College Campus	Black Hawk	March	Unknown	Unknown	Mumps
31	Person-to-Person	Gastrointestinal	Restaurant	Story	May	7	16	Norovirus GII
32	Person-to-Person	Gastrointestinal	Gas Station	Delaware	May	3	3	Norovirus GII
33	Person-to-Person	Rash	Daycare	Palo Alto	May	6	40	Rash Illness (negative for varicella both by IgM and IgG)
34	Person-to-Person	Gastrointestinal	Long term Care	Dubuque	May	31	424	Norovirus GII_17B_Kawasaki323_JP 14
35	Person-to-Person	Gastrointestinal	Sports Camp	Winnebago	June	18	Unknown	Norovirus GI_3BPotsdam_DE00
36	Person-to-Person	Gastrointestinal	Long-term Care	Marion	june	7	Unknown	Suspect Norovirus
37	Person-to-Person	Gastrointestinal	Restaurant	Scott	July	5	Unknown	Norovirus GI
38	Person-to-Person	Gastrointestinal	Wedding	Dickinson	July	15	160	Suspect Norovirus
39	Person-to-Person	Gastrointestinal	Restaurant	Linn	August	12	15	Norovirus GI_3B_Potsdam_DE00
40	Person-to-Person	Respiratory	Long-term Care	Poweshiek	August	6	Unknown	Parainfluenza III
41	Person-to-Person	Gastrointestinal	Long-term Care	Poweshiek	August	8	Unknown	Norovirus GI_3BPotsdam_DE00
42	Person-to-Person	Gastrointestinal	Hospital	Linn	August	16	16	Norovirus GII_4_unsubtypable
43	Person-to-Person	Gastrointestinal	Jail	Pottawattamie	August	19	Unknown	Norovirus
44	Person-to-Person	Gastrointestinal	Restaurant	Dubuque	August	3	6	Norovirus
45	Person-to-Person	Respiratory	Wedding	Humboldt	August	10	Unknown	Influenza A (H3)
46	Person-to-Person	Gastrointestinal	Fraternity	Johnson	September	7	Unknown	Norovirus GI
47	Person-to-Person	Gastrointestinal	Restaurant	Linn	September	2	2	Norovirus GII
48	Person-to-Person	Gastrointestinal	Unknown	Story	September	8	9	Norovirus GII_7_Gwynedd_US94
49	Person-to-Person	Rash	Sports Team	Clayton	September	8	12	Suspect Impetigo
50	Person-to-Person	Rash	Sports Team	Allamakee	September	13	28	Suspect Impetigo
51	Person-to-Person	Gastrointestinal	Restaurant	Cerro Gordo	October	3	3	Norovirus
52	Person-to-Person	Gastrointestinal	K-12 School	Union	November	66	542	Norovirus GI
53	Person-to-Person	Gastrointestinal	Elementary School	Cherokee	December	31	279	Norovirus GII_6B_Miami292_US94
54	Person-to-Person	Respiratory	Long-term Care	Grundy	November	19	100	Rapid Influenza A

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
55	Person-to-Person	Gastrointestinal	Birthday Party	Calhoun	December	29	130	Norovirus GII_4_Untypeable
56	Person-to-Person	Gastrointestinal	Nursing home	Woodbury	December	20	39	Norovirus GII_4_Untypeable
57	Person-to-Person	Gastrointestinal	Hospital	Black Hawk	December	13	33	Norovirus equivocal, Negative for all enteric pathogens
58	Person-to-Person	Gastrointestinal	Long-term Care	Appanoose	December	2	35	Norovirus GII
59	Person-to-Person	Gastrointestinal	Long-term care	Linn	December	27	57	Norovirus GII_4_untypeable
60	Person-to-Person	Respiratory	Poultry Plant	Floyd	December	5	300	Rhinovirus
61	Person-to-Person	Gastrointestinal	Hospital	Monroe	December	9	20	Norovirus GII_4_untypeable
62	Person-to-Person	Respiratory	Long-term Care	Ringgold	December	36	179	Influenza A (H3)
63	Person-to-Person	Gastrointestinal	Long-term Care	Kossuth	December	24	83	Norovirus GII_4_untypeable
64	Person-to-Person	Respiratory	Long-term Care	Washington	December	12	52	Influenza A (H3)
65	Person-to-Person	Respiratory	long-term Care	Dubuque	December	13	115	Influenza A (H3)
66	Person-to-Person	Gastrointestinal	Long-term Care	Buchanan	December	38	124	Norovirus GII
67	Person-to-Person	Rash	Daycare	Dubuque	November	9	15	*Varicella zoster* PCR

Table 12. Outbreaks with unknown modes of transmission

#	Mode of Transmission	Nature of Episode	Event/Place	County	Month	Number Affected	Number Exposed (if known)	Agent Involved
1	Unknown	Gastrointestinal	Restaurant	Linn	January	2	2	Negative for Enteric Pathogens
2	Unknown	Respiratory	Long-term Care	Marion	March	3	118	Influenza A H1N1
3	Unknown	Gastrointestinal	Restaurant	Johnson	May	2	4	Enteric
4	Unknown	Gastrointestinal	Restaurant	Polk	May	3	3	Norovirus Negative
5	Unknown	Gastrointestinal	Restaurant	Black Hawk	June	2	12	Enteric
6	Unknown	Gastrointestinal	Food Processing Plant	Louisa	June	12	Unknown	Negative for Enteric Pathogens and Noro
7	Unknown	Gastrointestinal	Monastery	Woodbury	June	7	Unknown	*E.coli* 0157:H7
8	Unknown	Gastrointestinal	Daycare	Sioux	July	20	22	Cryptosporidium
9	Unknown	Gastrointestinal	Elementary School	Story	September	50	Unknown	Suspect Norovirus
10	Unknown	Gastrointestinal	Elementary School	Black Hawk	September	15	Unknown	Norovirus GII
11	Unknown	Gastrointestinal	Multiple Settings	Linn	August	9	9	Cryptosporidium
12	Unknown	Gastrointestinal	Restaurant	Linn	October	3	3	Negative for Enteric Pathogens and Noro
13	Unknown	Gastrointestinal	Restaurant	Muscatine	October	2	2	Negative for Enteric Pathogens and Noro
14	Unknown	Gastrointestinal	Restaurant	Polk	October	6	-	Negative for Enteric Pathogens and Noro
15	Unknown	Gastrointestinal	Restaurant	Dallas	November	2	2	Enteric
16	Unknown	Gastrointestinal	Restaurant	Polk	November	5	16	Negative for Enteric Pathogens and Noro
17	Unknown	Gastrointestinal	Hospital	Kossuth	December	7	80	Negative for Enteric Pathogens and Noro
18	Unknown	Gastrointestinal	Assisted Living	Black Hawk	November	1	4	Enteric
19	Unknown	Gastrointestinal	Trip out of Country	Webster	December	6	18	*Shigella sonnei*
20	Unknown	Gastrointestinal	Restaurant	Dallas	December	2	2	GI
21	Unknown	Gastrointestinal	Restaurant	Story	December	3	3	GI
22	Unknown	Gastrointestinal	Restaurant	Polk	December	8	17	Enteric

Section 3

DISEASE-SPECIFIC SUMMARIES OF SELECT REPORTABLE DISEASES

Campylobacteriosis

Cause: *Campylobacter* bacteria

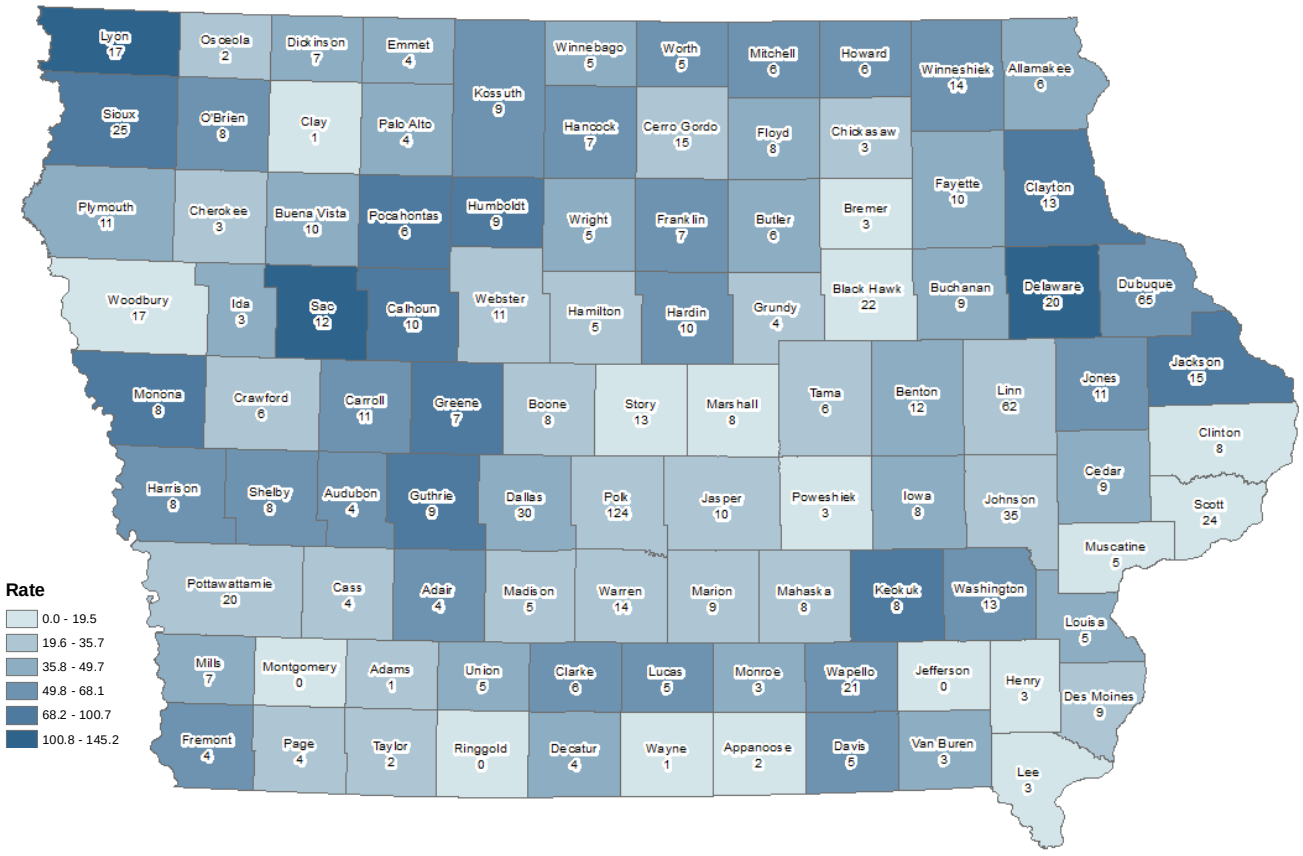
Clinical Features: Diarrhea, abdominal pain, fever, malaise, and nausea

Transmission: Transmitted through ingestion of organisms in under-cooked meat, unpasteurized dairy products, or other contaminated food or water, or from direct contact with infected animals. *Campylobacter* can be found in fecally contaminated water. As few as 500 organisms can cause illness.

Comments: The use of culture-independent diagnostic testing for *Campylobacter* has increased significantly in recent years. In 2015, CSTE changed the case definition to include culture independent diagnostic tests (CIDT) results in the probable case definition.

Summary of 2016 campylobacteriosis cases	
Number of cases	1053
Incidence rate (per 100,000 population)	34.6
Change from 5-year average incidence	63.2%

Reported campylobacteriosis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence, Iowa, 2016 (N = 1053)



Campylobacteriosis case demographics

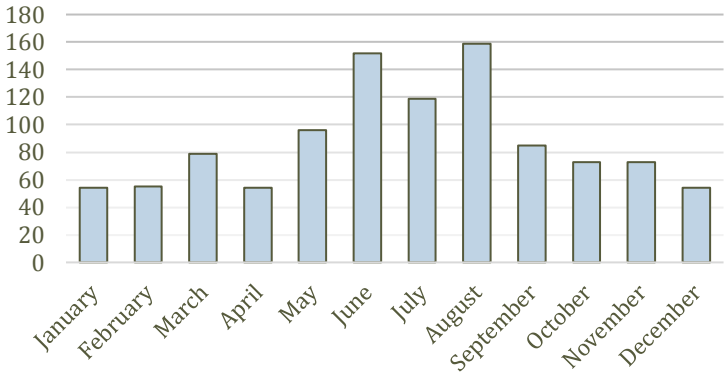
Age (years)	
Mean	38.1
Median	36.9
Min-Max	.02-95.2

Gender			
	Cases	Percent	Rate
Female	449	42.6	29.2
Male	576	54.7	38.2
Unknown	28	2.7	-

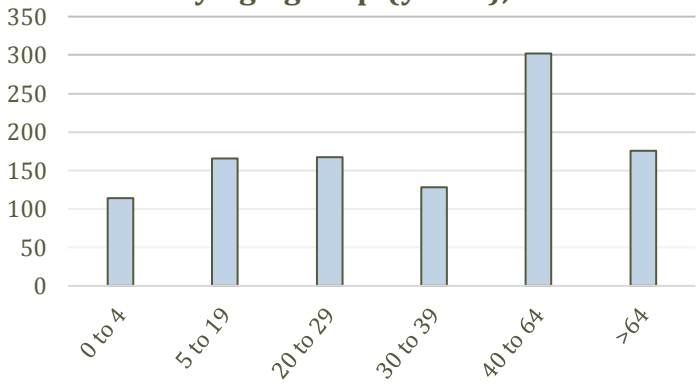
Race			
	Cases	Percent	Rate
White	568	53.9	20.4
Black	19	1.8	21.3
Other/Unknown	16/450	44.3	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	529	50.2	18.3
Hispanic	17	1.6	11.21
Unknown	507	-	-

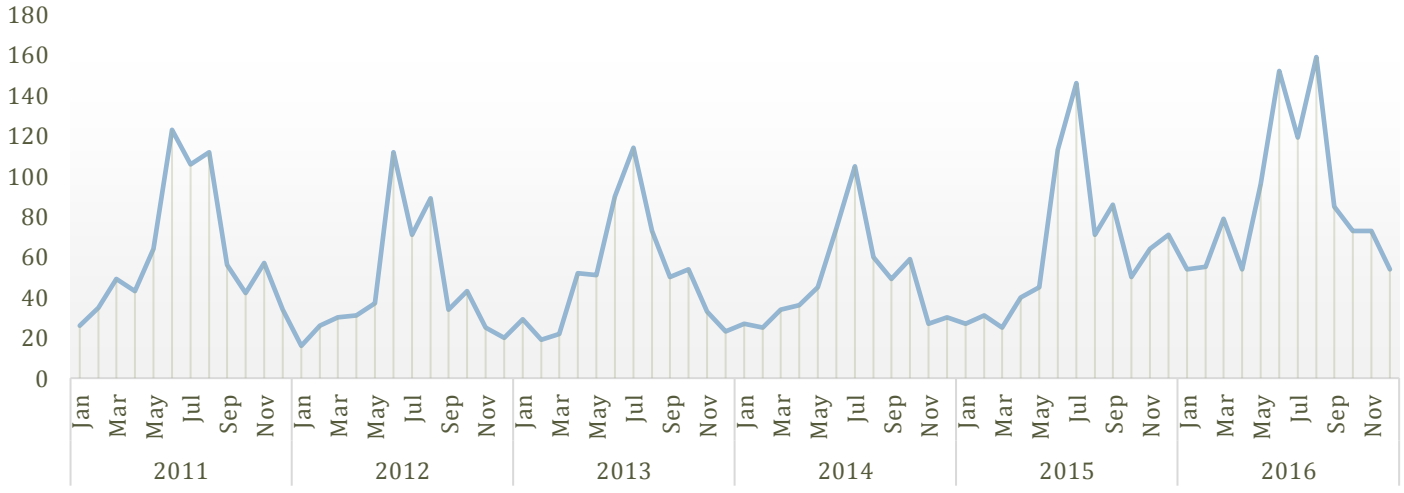
Number of campylobacteriosis cases by month, 2016



Number of campylobacteriosis cases by age group (years), 2016



Campylobacteriosis cases by month and year - Iowa, 2011-2016



Cryptosporidiosis

Cause: Cryptosporidium protazoan

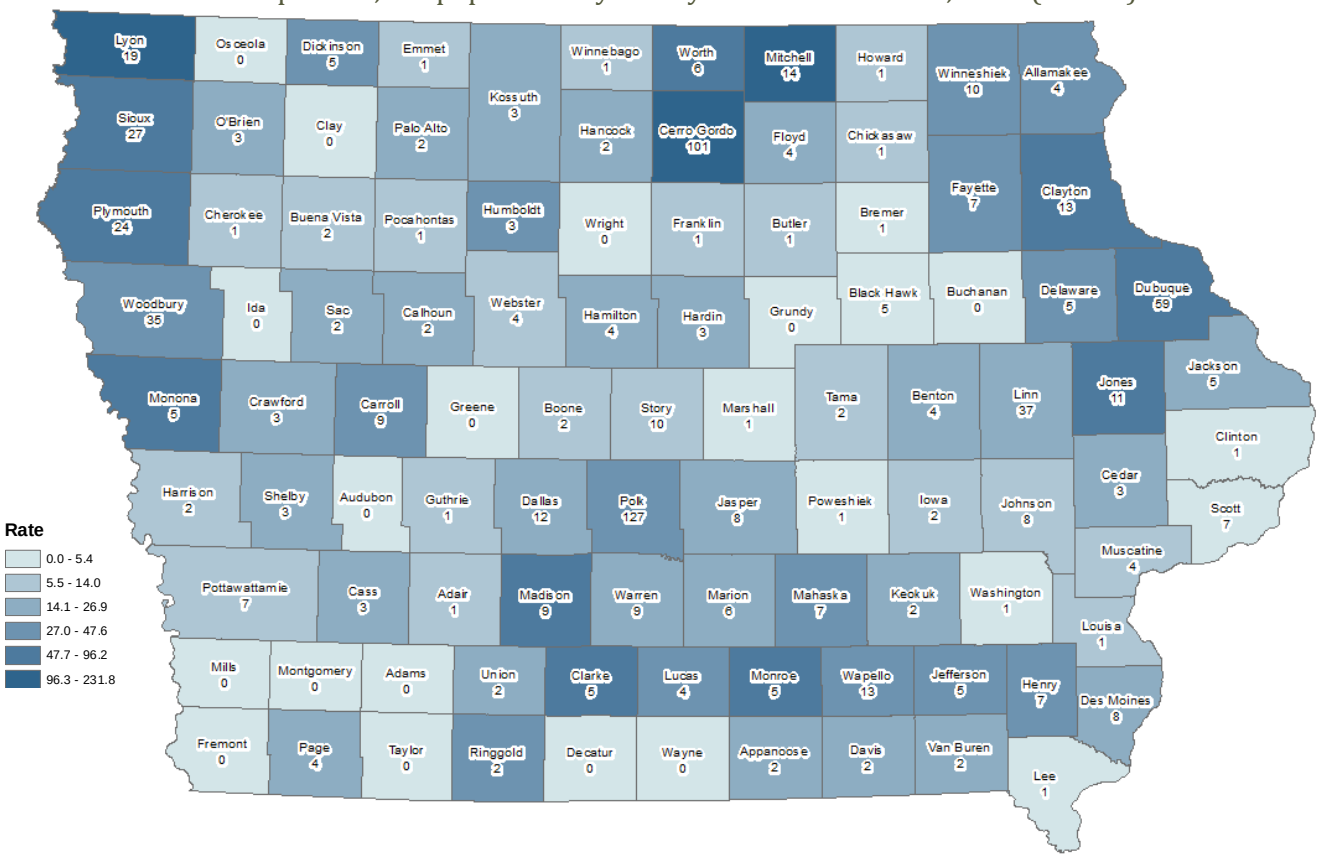
Clinical Features: Watery diarrhea, abdominal cramps, nausea, vomiting, low-grade fever

Transmission: Fecal-oral, which includes person-to-person, animal-to-person, waterborne and foodborne transmission. Localized outbreaks may occur from fecally contaminated water, such as streams, lakes and swimming pools open to contamination by human and animal feces. Outbreaks have resulted from eating food contaminated by animal feces (e.g., unpasteurized apple cider). An infected food worker can be a source of foodborne transmission.

Comments: An outbreak of cryptosporidiosis occurred in Cerro Gordo County in the summer months of 2016 that sickened over 140 individuals. Most of the cases associated with the outbreak had links to child care businesses.

Summary of 2016 cryptosporidiosis cases	
Number of cases	753
Incidence rate (per 100,000 population)	24.7
Change from 5-year average incidence	32.8%

Reported cryptosporidiosis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=753)



Cryptosporidiosis case demographics

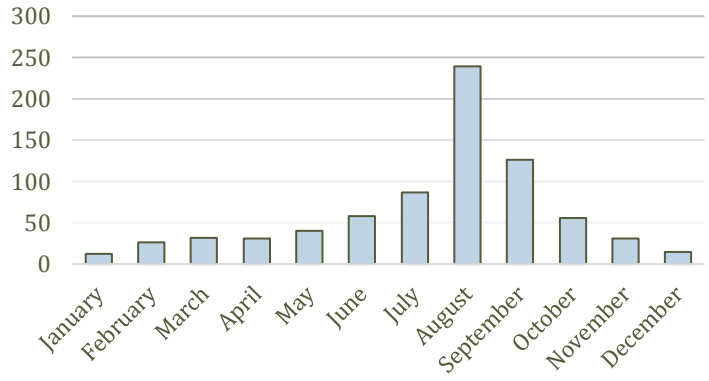
Age (years)	
Mean	27.5
Median	25.4
Min-Max	0.4 – 94.2

Gender			
	Cases	Percent	Rate
Female	388	51.5	25.2
Male	319	42.4	21.1
Unknown	46	6.1	-

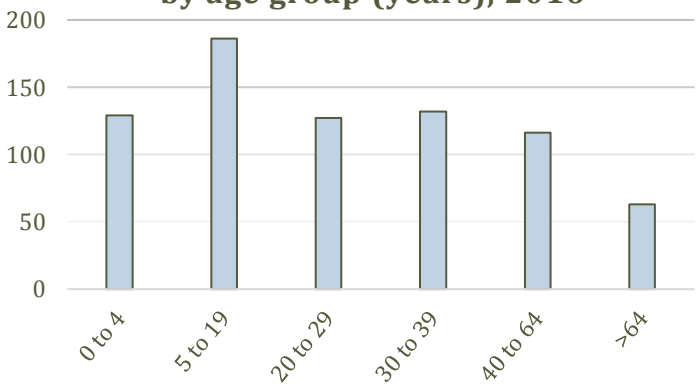
Race			
	Cases	Percent	Rate
White	470	62.4	16.9
Black	19	2.5	21.3
Other/ Unknown	17/ 247	35.1	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	441	58.6	15.2
Hispanic	29	3.9	19.1
Unknown	283	37.6	-

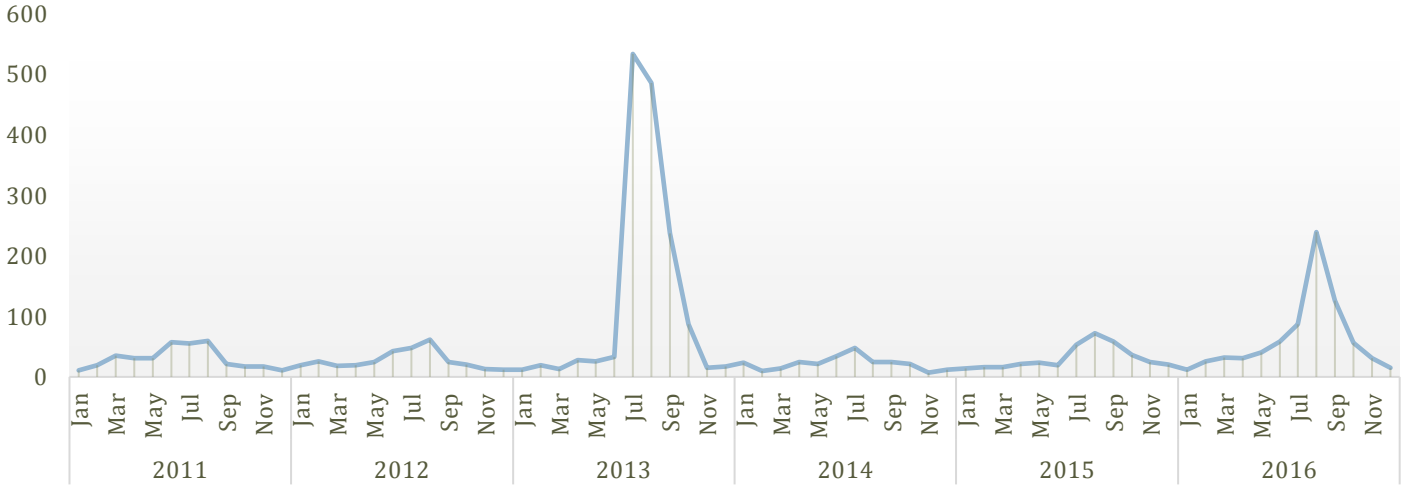
Number of cryptosporidiosis cases by month, 2016



Number of cryptosporidiosis cases by age group (years), 2016



Cryptosporidiosis cases by month and year - Iowa, 2011-2016



E. coli 0157:H7 and other shiga-toxin producing strains (STEC)

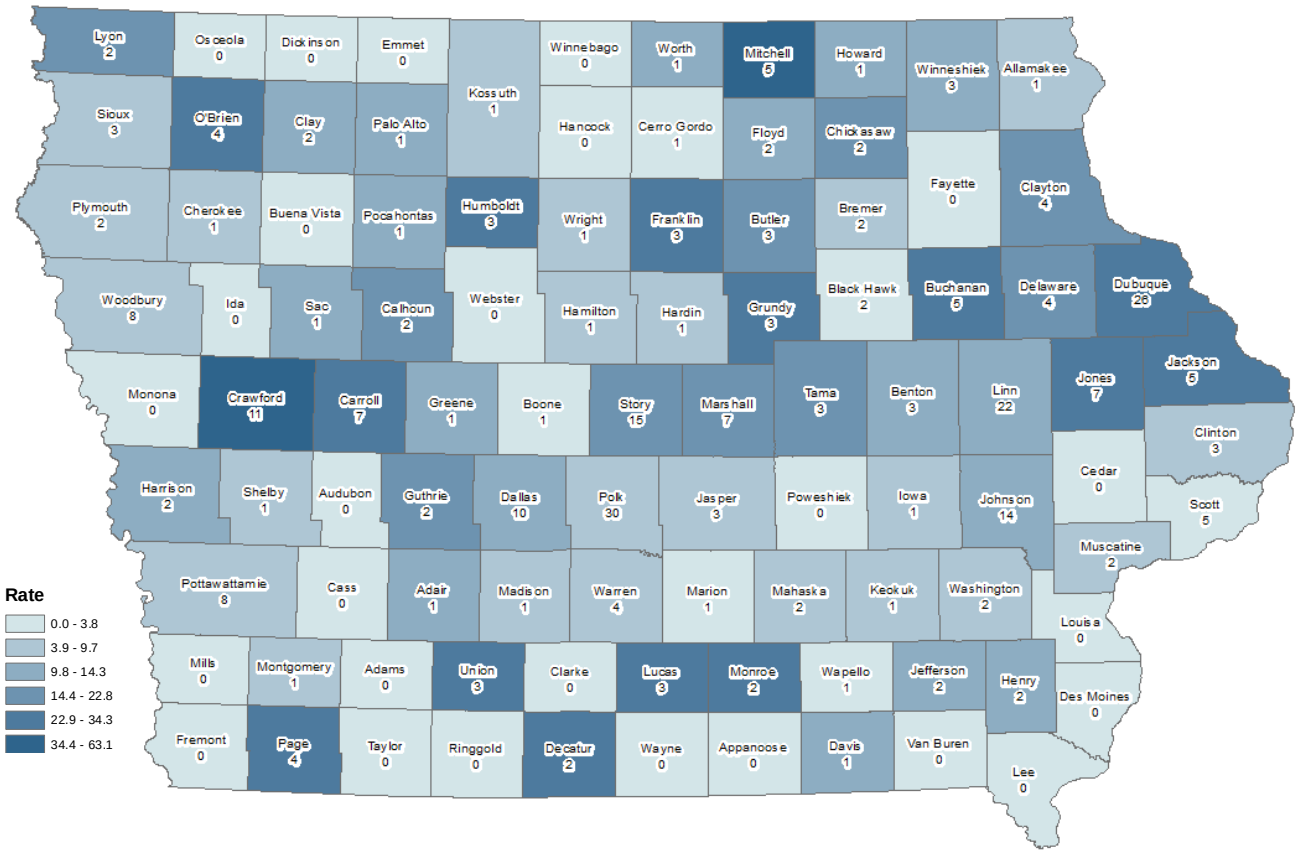
Cause: Shiga toxin-producing *Escherichia coli* bacteria (STEC) that produce cytotoxins called Shiga toxin 1 and 2.

Clinical Features: An individual may be asymptomatic, have mild non-bloody diarrhea, or have grossly bloody diarrhea. Most diagnosed cases develop bloody diarrhea 6 to 48 hours after the onset of non-bloody diarrhea. Abdominal cramps, nausea and vomiting may also be present.

Transmission: STEC transmission occurs fecal-orally via contaminated food, drinking water or recreational water. Transmission may also occur directly from person-to-person; and can include certain types of sexual contact. The infectious dose for *E. coli* O157:H7 is very low (about 100 organisms). *E. coli* O157:H7 has been associated with the consumption of undercooked contaminated ground beef, unpasteurized apple juice and cider, unpasteurized milk and other dairy products, raw fruits and vegetables, and salami.

Summary of 2016 shiga-toxin producing *E. coli* cases	
Number of cases	298
Incidence rate (per 100,000 population)	9.8
Change from 5-year average incidence	60.7%

Reported shiga-toxin producing *E. coli* cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=298)



Shiga-toxin producing *E. coli* case demographics

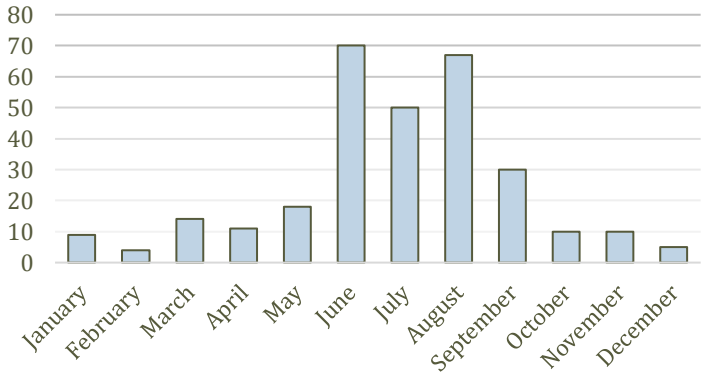
Age (years)	
Mean	23.8
Median	18.9
Min-Max	0.3 – 97.3

Gender			
	Cases	Percent	Rate
Female	161	54.0	10.5
Male	136	45.6	9.0
Unknown	1	0.4	-

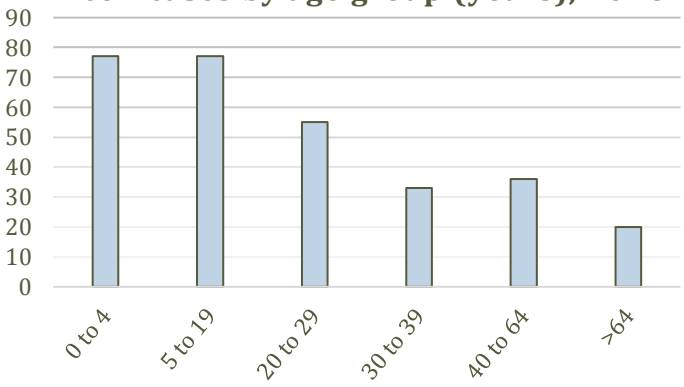
Race			
	Cases	Percent	Rate
White	194	65.1	7.0
Black	5	1.7	5.6
Other/ Unknown	2/97	33.2	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	194	65.1	6.7
Hispanic	16	5.4	10.6
Unknown	88	29.5	-

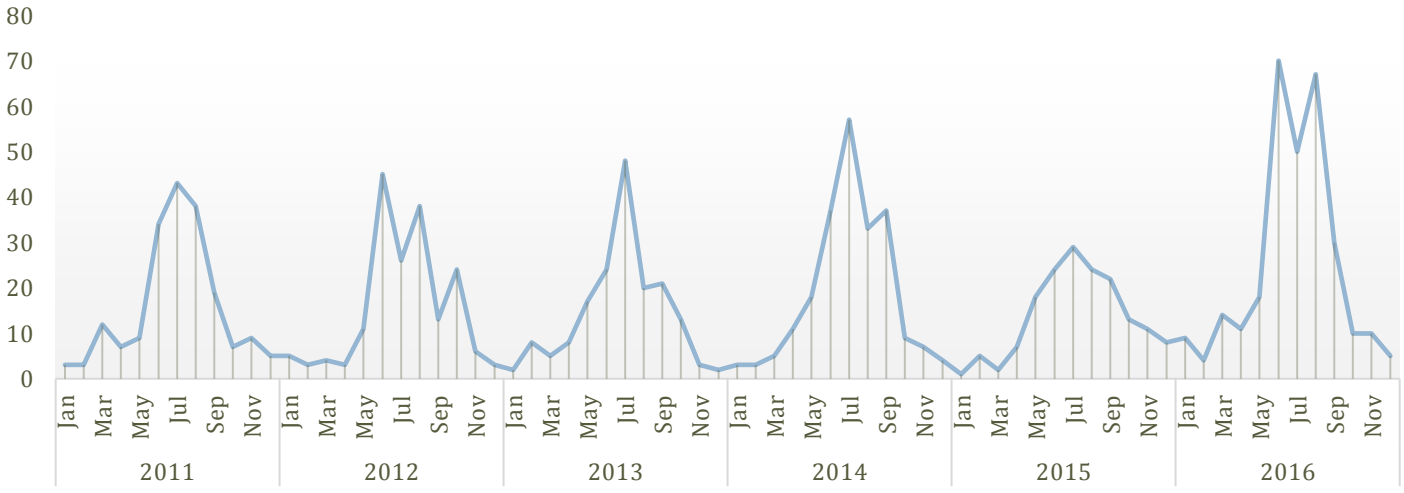
Number of shiga-toxin producing *E. coli* cases by month, 2016



Number of shiga-toxin producing *E. coli* cases by age group (years), 2016



Shiga-toxin producing *E. coli* cases by month and year - Iowa, 2011-2016



Giardiasis

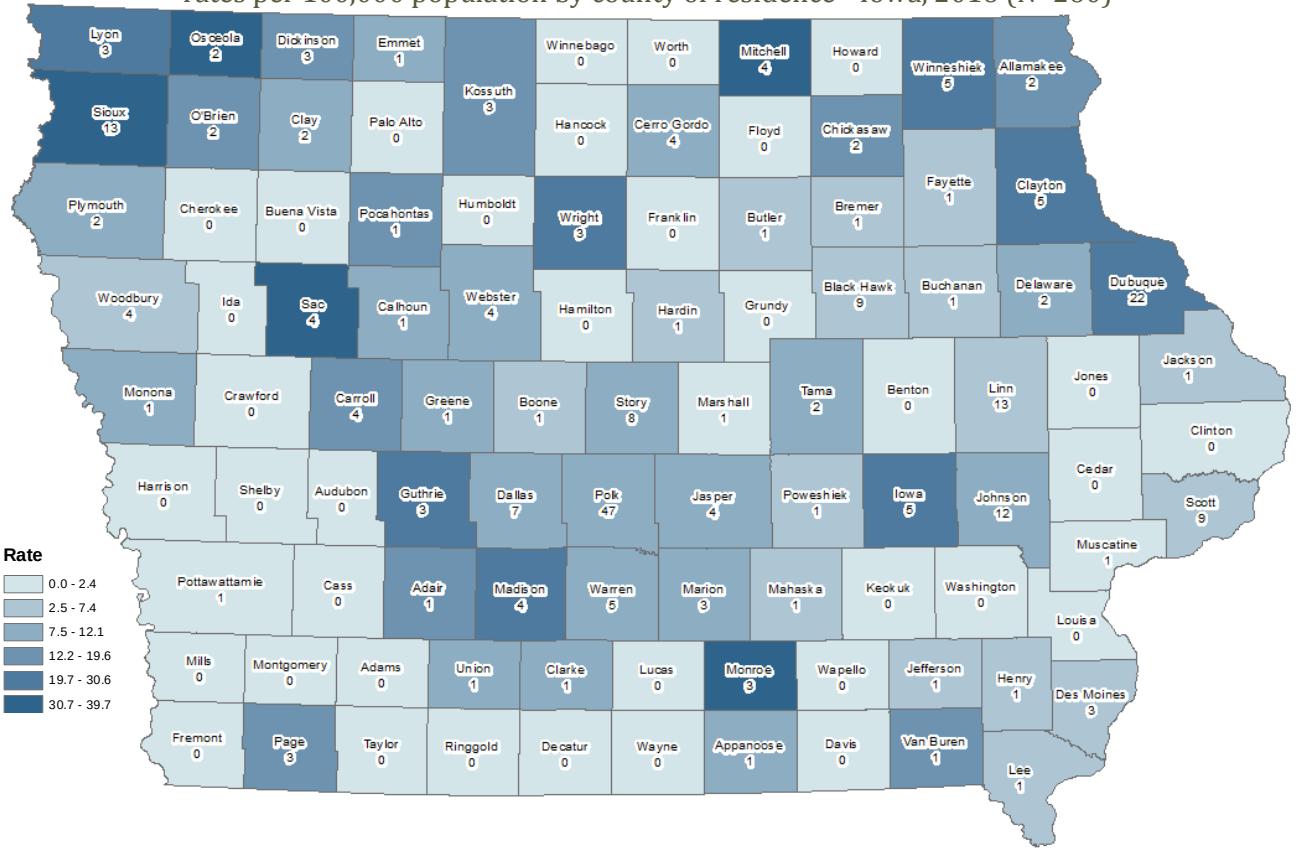
Cause: Giardia lamblia protazoan

Clinical Features: Symptoms can include soft, non-bloody, foul-smelling diarrhea. Abdominal cramps and a "bloated" feeling with excess gas often accompany the diarrhea. The diarrhea can be chronic or intermittent and it can be accompanied by fatigue and steatorrhea (fatty stools). Appetite loss combined with malabsorption can lead to significant weight loss, failure to thrive and anemia.

Transmission: Giardia is principally spread person-to-person. Persons become infected by fecal-oral transfer of cysts from the feces of an infected individual, especially in institutions and child care centers. Transmission can also occur through certain types of sexual contact (e.g. fecal-oral contact). As few as 10 cysts can cause illness. Localized outbreaks may occur from fecally contaminated water, such as stream and lake waters and swimming pools that are contaminated by human and animal feces.

Summary of 2016 giardiasis cases	
Number of cases	260
Incidence rate (per 100,000 population)	8.5
Change from 5-year average incidence	6.3%

Reported giardiasis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=260)



Giardiasis case demographics

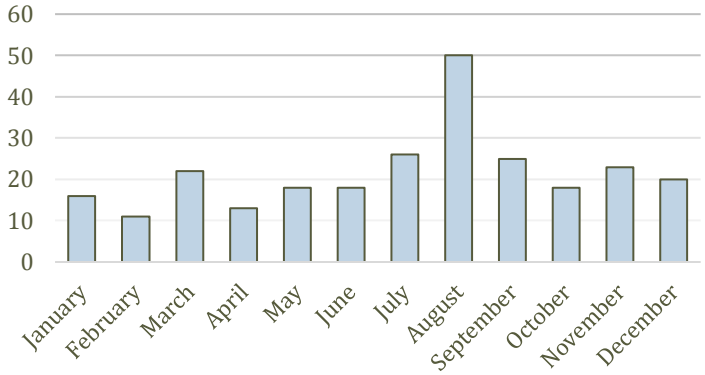
Age (years)	
Mean	34.1
Median	32.6
Min-Max	0.2 – 87.8

Gender			
	Cases	Percent	Rate
Female	121	46.5	7.9
Male	139	53.5	9.2

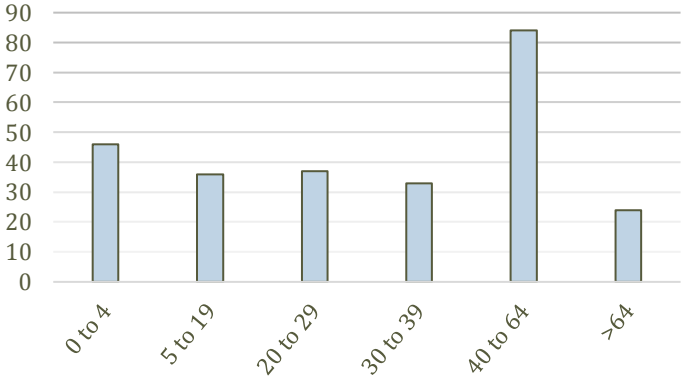
Race			
	Cases	Percent	Rate
White	204	78.5	7.3
Black	14	5.4	15.7
Other/ Unknown	5/37	16.1	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	212	81.5	7.3
Hispanic	17	6.5	11.2
Unknown	31	12.0	-

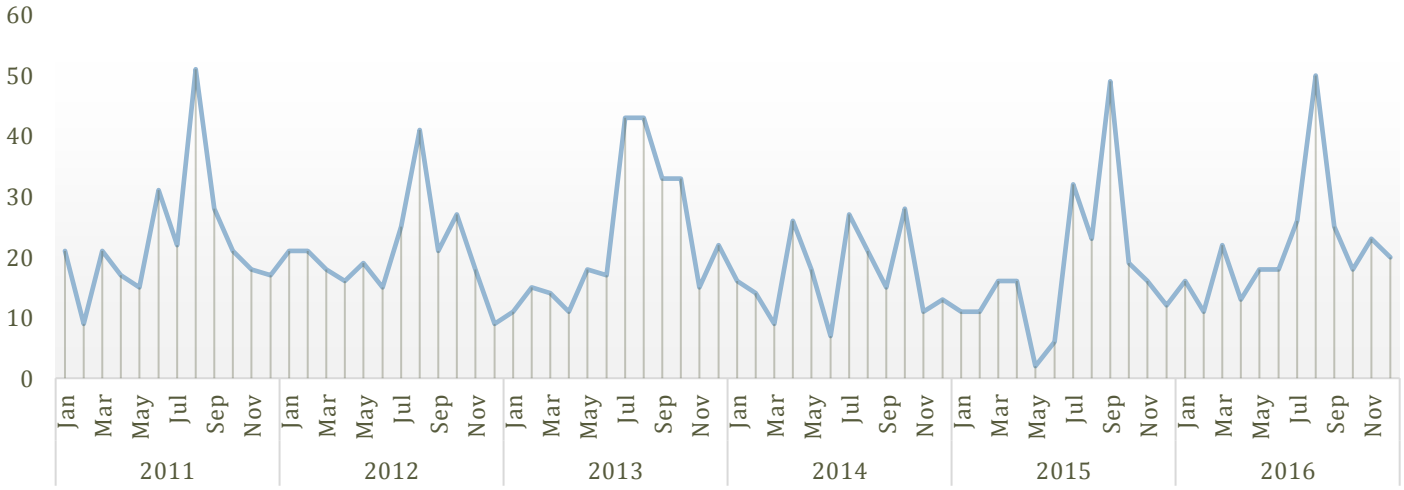
Number of giardiasis cases by month, 2016



Number of giardiasis cases by age group (years), 2016



Giardiasis cases by month and year - Iowa, 2011-2016



Lyme Disease

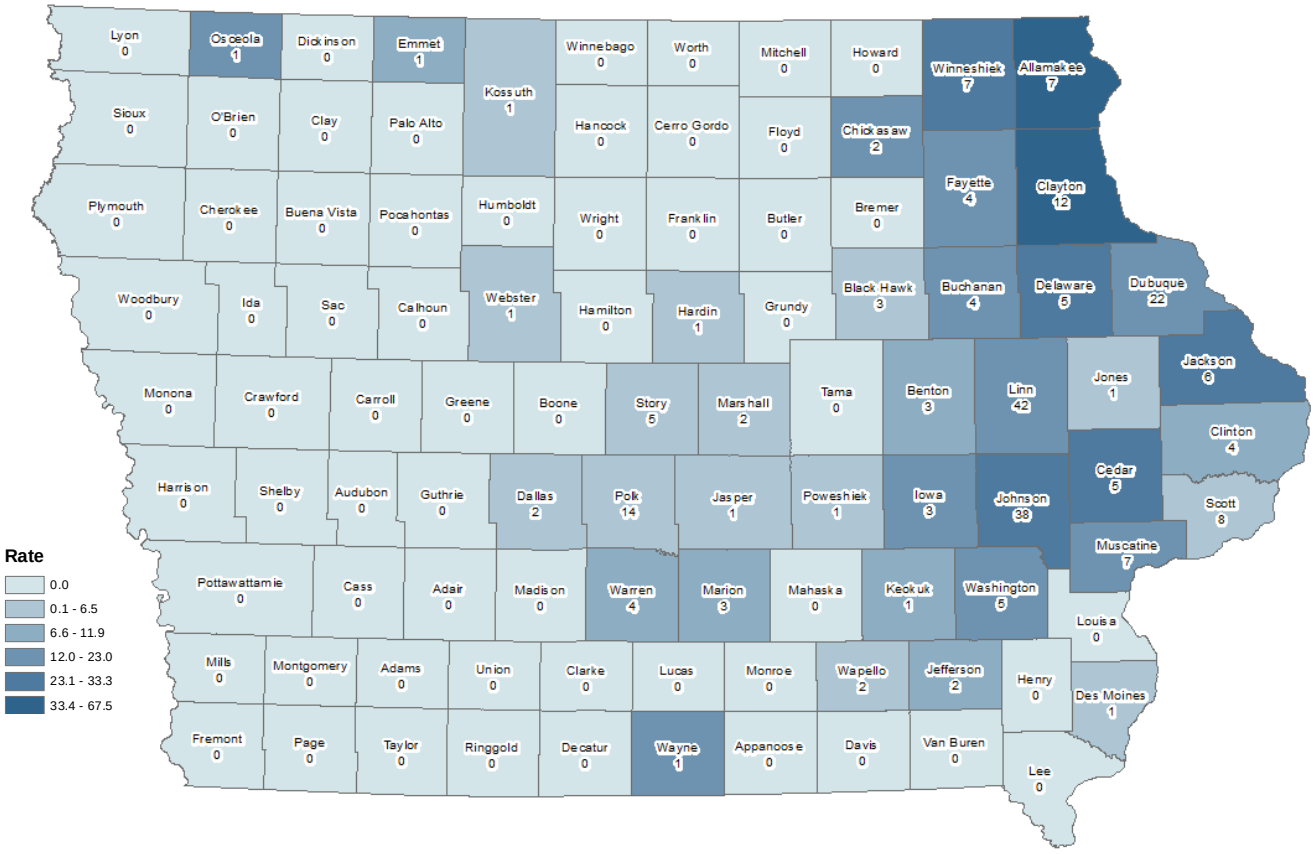
Cause: Borrelia burgdorferi bacteria

Clinical Features: Lyme disease is a systemic, tick-borne disease with a variety of manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is erythema migrans (EM), the initial skin lesion that occurs in 60%-80% of patients.

Transmission: Lyme disease is acquired from a tick bite. Laboratory data suggests that the tick must usually remain attached from 24 to 48 hours before transmission can occur.

Summary of 2016 Lyme disease cases	
Number of cases	232
Incidence rate (per 100,000 population)	7.6
Change from 5-year average incidence	13.3%

Reported Lyme disease cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=232)



Lyme disease case demographics

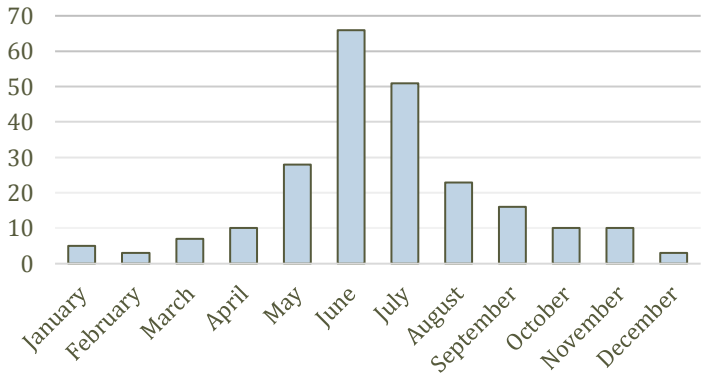
Age (years)	
Mean	37.4
Median	36.1
Min-Max	2.0 – 93.3

Gender			
	Cases	Percent	Rate
Female	71	30.6	4.6
Male	161	69.4	10.7

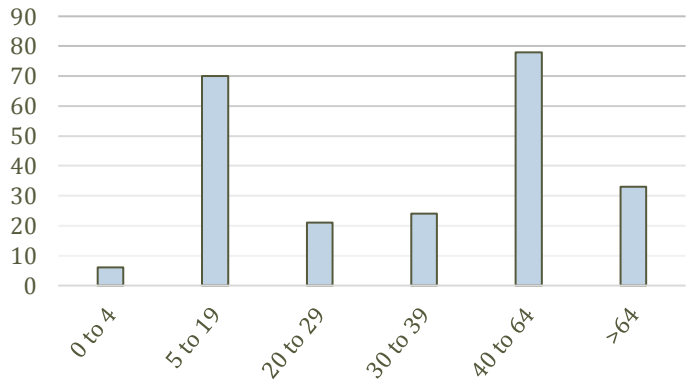
Race			
	Cases	Percent	Rate
White	198	85.3	7.1
Black	1	0.4	-
Other/ Unknown	2/31	14.3	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	190	81.9	6.6
Hispanic	1	0.4	-
Unknown	41	17.7	-

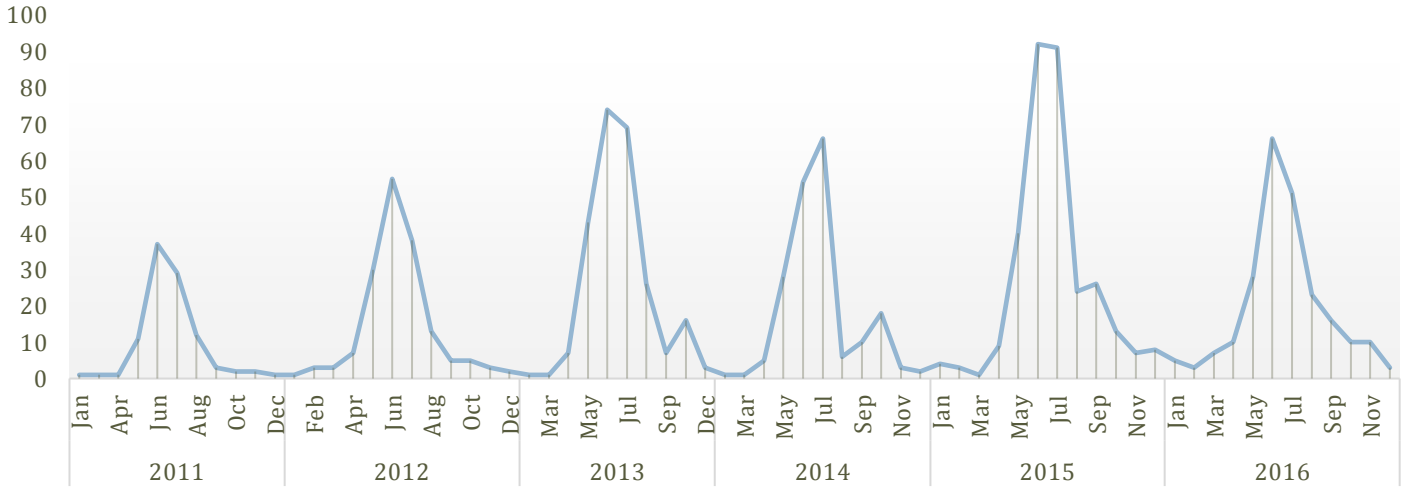
Number of lyme disease cases by month, 2016



Number of lyme disease cases by age group (years), 2016



Lyme disease cases by month and year - Iowa, 2011-2016



Mumps

Cause: Paramyxovirus

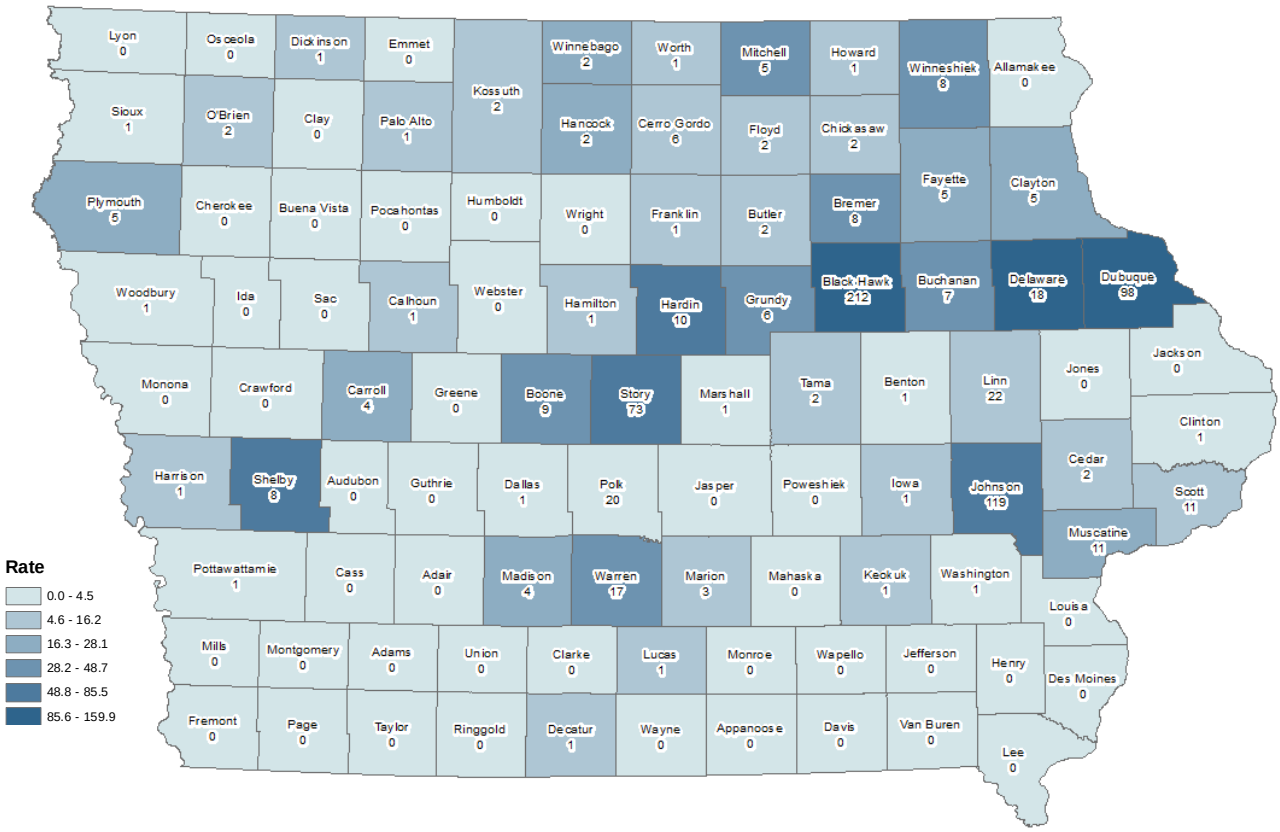
Clinical Features: Mumps is an acute viral disease characterized by fever, swelling, or tenderness of one or more of the salivary glands that lasts several days. Parotitis may be unilateral or bilateral. Respiratory symptoms are common. Infection in adulthood is likely to produce a more severe disease, including mastitis in women and orchitis in men.

Transmission: Mumps is transmitted by droplet or direct contact with nasopharyngeal secretions of an infected person, and by the airborne route.

Comments: A mumps outbreak in Iowa began in July of 2015 and persisted through 2017. By the end of 2016, public health identified 1,143 cases since the start of the outbreak.

Summary of 2016 mumps cases	
Number of cases	732
Incidence rate (per 100,000 population)	24.0
Change from 5-year average incidence	566.7%

Reported Mumps cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=732)



Mumps case demographics

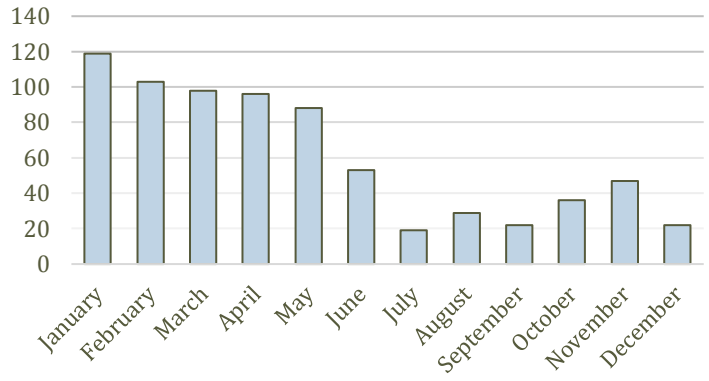
Age (years)	
Mean	24.9
Median	21.8
Min-Max	1.5 – 85.5

Gender			
	Cases	Percent	Rate
Female	357	48.8	23.2
Male	369	50.4	24.5
Unknown	6	0.8	-

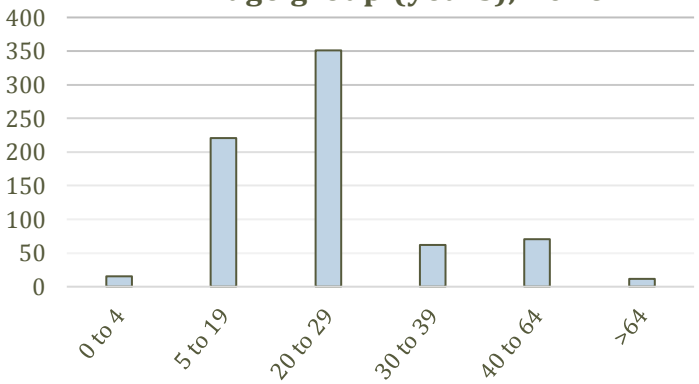
Race			
	Cases	Percent	Rate
White	434	59.3	15.6
Black	38	5.2	42.6
Other/ Unknown	76/ 184	35.5	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	453	61.9	15.6
Hispanic	15	2.0	9.9
Unknown	264	36.1	-

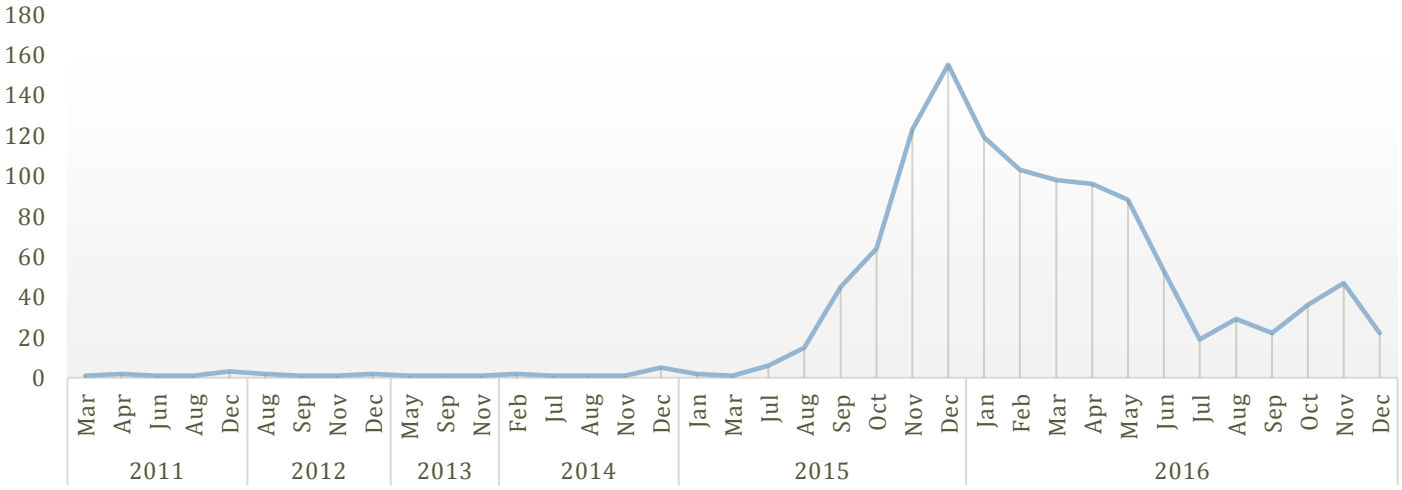
Number of mumps cases by month, 2016



Number of mumps cases by age group (years), 2016



Mumps cases by month and year - Iowa, 2011-2016



Pertussis

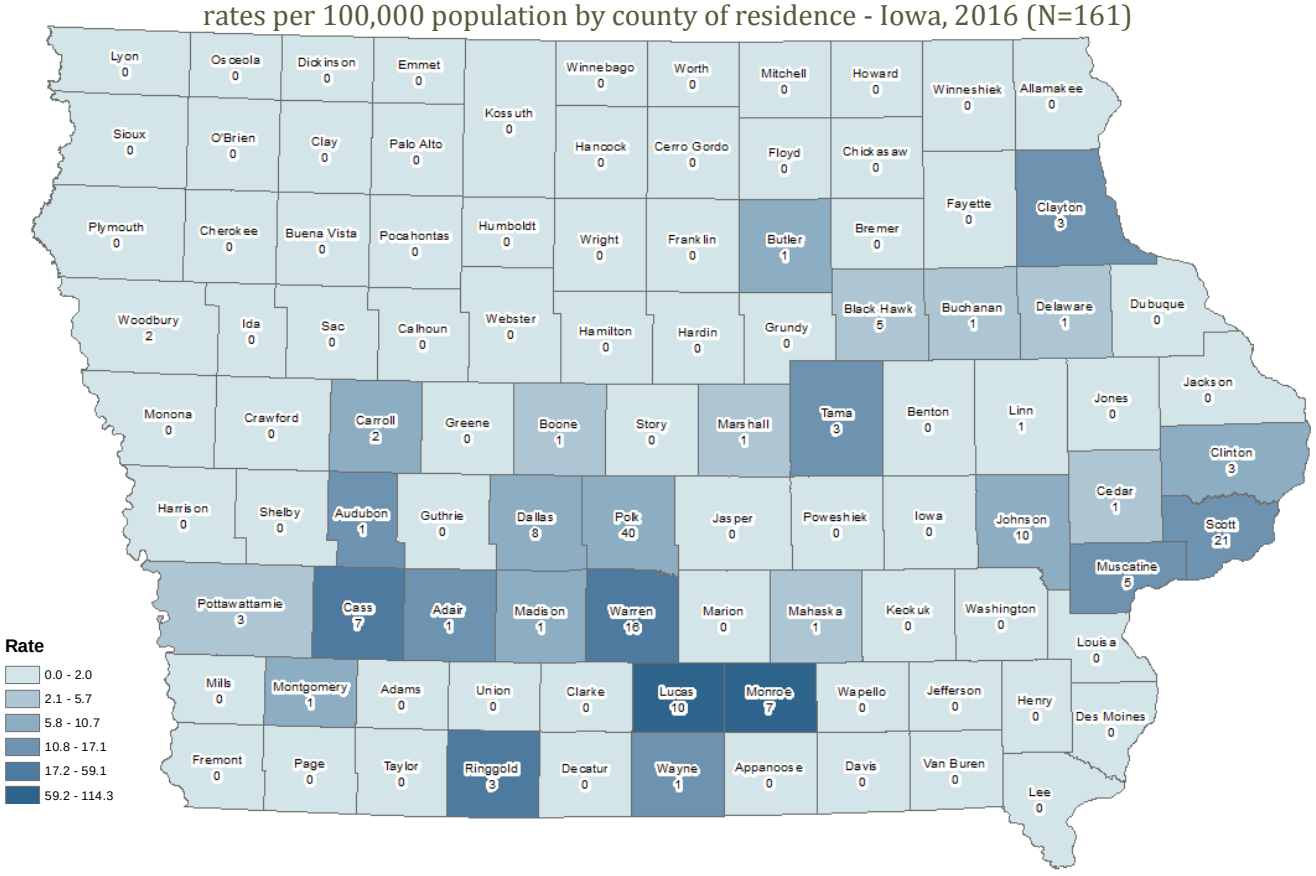
Cause: *Bordetella pertussis* bacteria

Clinical Features: An acute bacterial infection of the respiratory tract classically characterized by a paroxysmal cough and inspiratory whoop. The initial (catarrhal) stage consists of an insidious onset of upper respiratory infection with an irritating cough. Over the course of 1-2 weeks, paroxysms develop (paroxysmal phase) and increase in frequency and intensity before gradually improving after 1-2 months. Disease presentation can vary with age and history of previous exposure or vaccination. Adults and adolescents with some immunity may exhibit only mild symptoms.

Transmission: Pertussis is most commonly spread by contact with respiratory droplets or by contact with airborne droplets of respiratory secretions. It occurs rarely by contact with an infected persons contaminated objects.

Summary of 2016 pertussis cases	
Number of cases	161
Incidence rate (per 100,000 population)	5.3
Change from 5-year average incidence	-69.7%

Reported pertussis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=161)



Pertussis case demographics

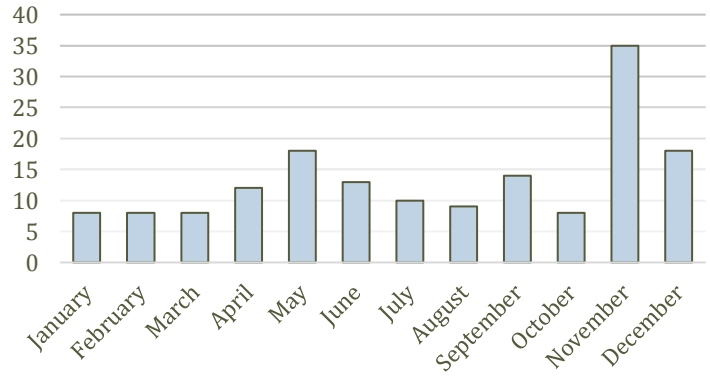
Age (years)	
Mean	15.9
Median	11.4
Min-Max	.08 – 79.8

Gender			
	Cases	Percent	Rate
Female	80	49.7	5.2
Male	80	49.7	5.3
Unknown	1	0.6	-

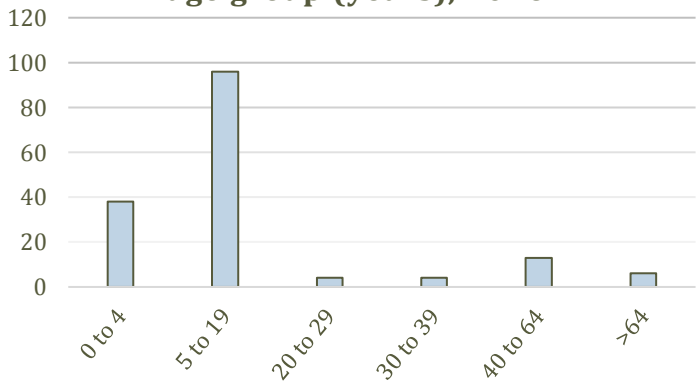
Race			
	Cases	Percent	Rate
White	118	73.3	4.2
Black	2	1.2	-
Other/ Unknown	4/37	25.5	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	107	66.5	3.7
Hispanic	5	3.1	3.3
Unknown	49	30.4	-

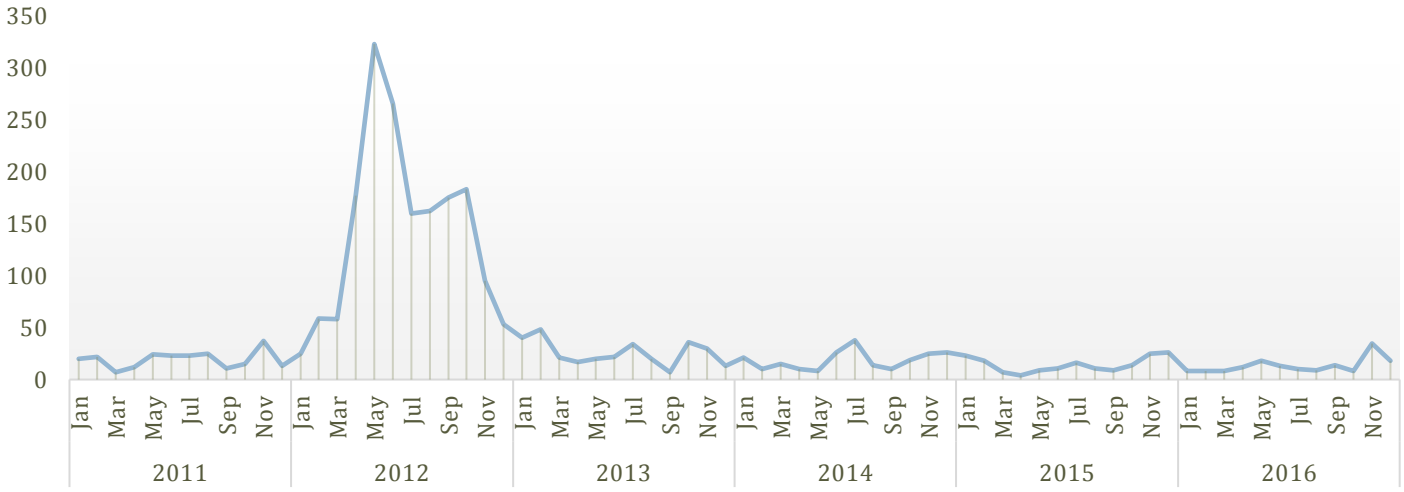
Number of pertussis cases by month, 2016



Number of pertussis cases by age group (years), 2016



Pertussis cases by month and year - Iowa, 2011-2016



Salmonellosis

Cause: Salmonella bacteria

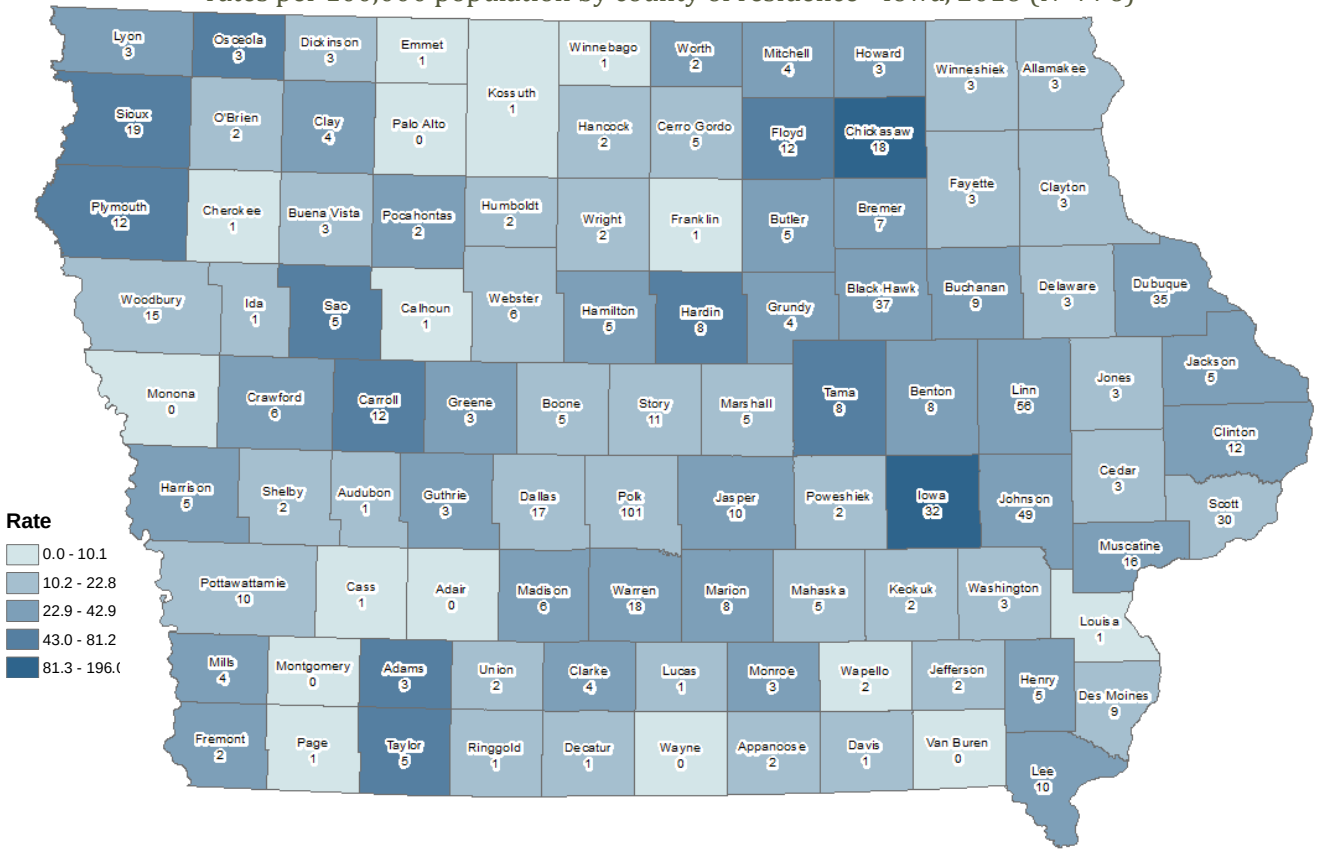
Clinical Features: Diarrhea (sometimes bloody), headache, stomach cramps, fever, nausea, and sometimes vomiting. The infection may also appear as septicemia, an abscess, arthritis or cholecystitis.

Transmission: The most common mode of transmission is ingestion of food or water that has been contaminated with animal feces. Reptiles such as iguanas, snakes and lizards are often chronic carriers of these bacteria and can also be sources of infection.

Person-to-person spread can occur when an infected food handler contaminates food. Most often, person-to-person spread occurs among household contacts, children in child care, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur person-to-person through certain types of sexual contact (e.g. fecal - oral contact).

Summary of 2016 salmonellosis cases	
Number of cases	776
Incidence rate (per 100,000 population)	25.5
Change from 5-year average incidence	39.3%

Reported salmonellosis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=776)



Salmonellosis case demographics

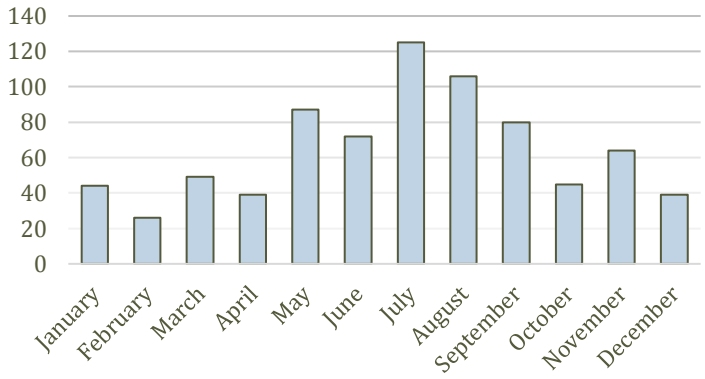
Age (years)	
Mean	38.9
Median	37.8
Min-Max	0.10 – 96.4

Gender			
	Cases	Percent	Rate
Female	395	50.9	25.7
Male	372	47.9	24.7
Unknown	9	1.2	-

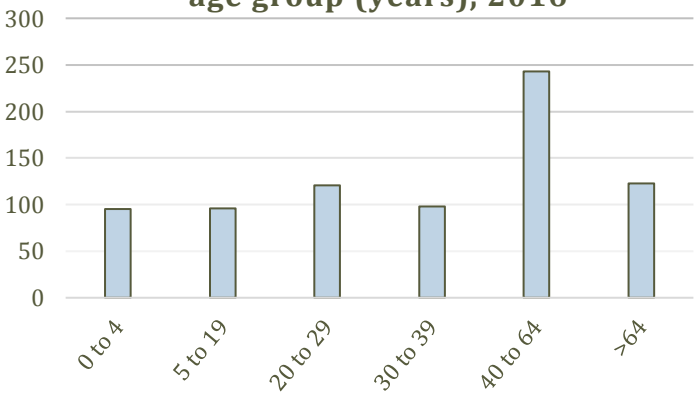
Race			
	Cases	Percent	Rate
White	506	65.2	18.2
Black	22	2.8	24.7
Other/ Unknown	28/220	32.0	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	528	68.0	18.2
Hispanic	34	4.4	22.4
Unknown	214	27.6	-

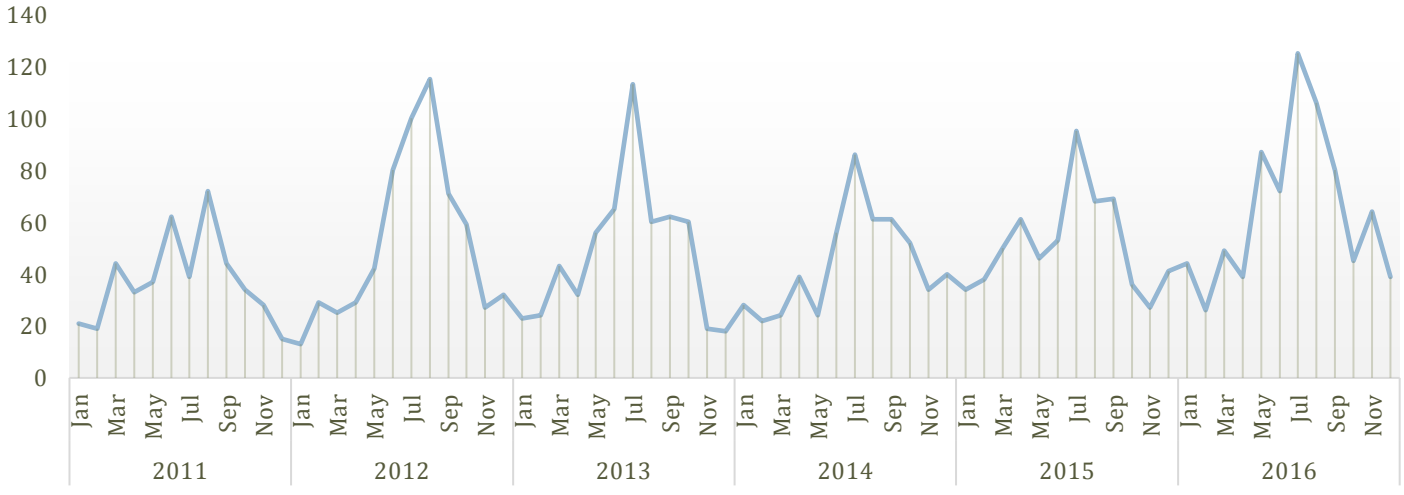
Number of salmonellosis cases by month, 2016



Number of salmonellosis cases by age group (years), 2016



Salmonellosis cases by month and year - Iowa, 2011-2016



Shigellosis

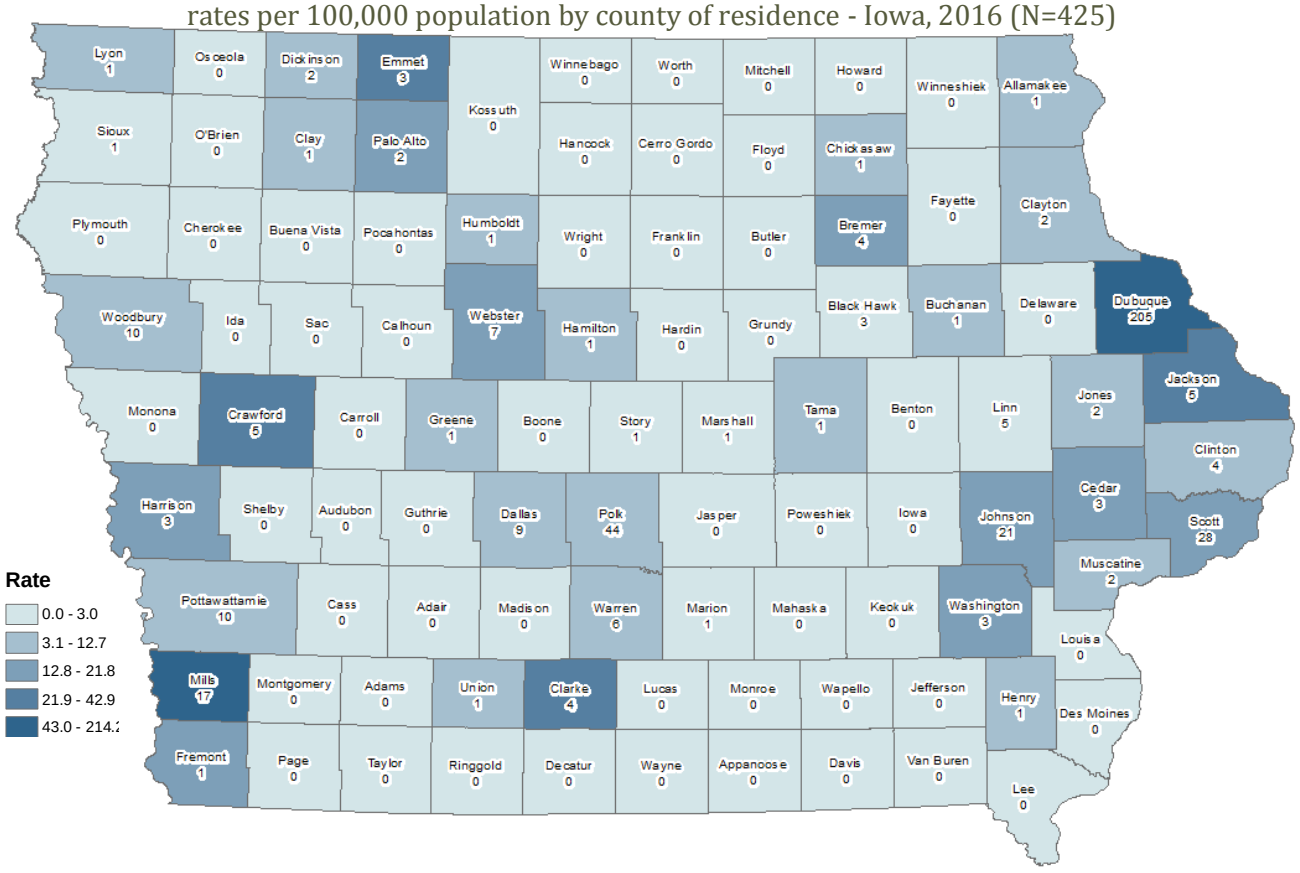
Cause: Shigella bacteria

Clinical Features: Diarrhea accompanied by fever, nausea and sometimes, vomiting, cramps and tenesmus (painful, ineffectual straining to defecate).

Transmission: Transmitted via the fecal-oral route. People shedding bacteria may contaminate food by failing to properly wash their hands before food handling, potentially causing large numbers of people to become ill. A very small dose of *Shigella* is needed to cause illness (maybe as few as 10 – 100 organisms); thus, it can be easily spread. Person-to-person spread typically occurs among household contacts, pre-school children in child care, and the elderly and developmentally disabled living in residential facilities. Secondary attack rate in households can be as high as 40%. Transmission can also occur person-to-person through certain types of sexual contact (*e.g.,* fecal-oral contact).

Summary of 2016 shigellosis cases	
Number of cases	425
Incidence rate (per 100,000 population)	14.0
Change from 5-year average incidence	59.1%

Reported shigellosis cases (confirmed and probable) and incidence rates per 100,000 population by county of residence - Iowa, 2016 (N=425)



Shigellosis case demographics

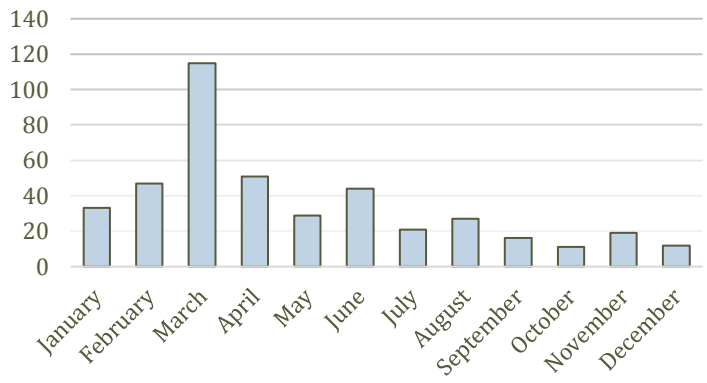
Age (years)	
Mean	21.8
Median	12.6
Min-Max	0.20 – 90.9

Gender			
	Cases	Percent	Rate
Female	230	54.1	15.0
Male	168	39.5	11.1
Unknown	27	6.4	-

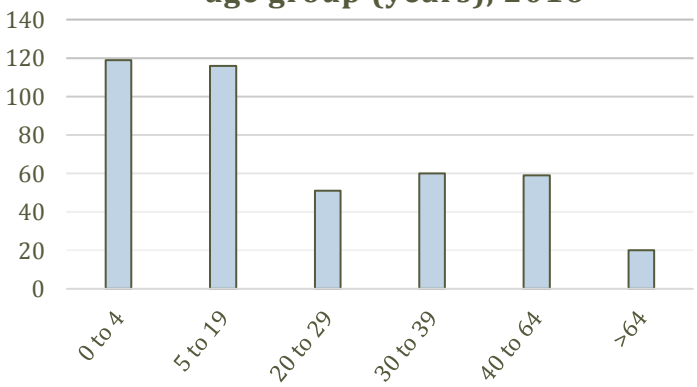
Race			
	Cases	Percent	Rate
White	190	44.7	6.8
Black	19	4.5	21.3
Other/ Unknown	17/199	50.8	-

Ethnicity			
	Cases	Percent	Rate
Non-Hispanic	203	47.8	7.0
Hispanic	29	6.8	19.1
Unknown	193	45.4	-

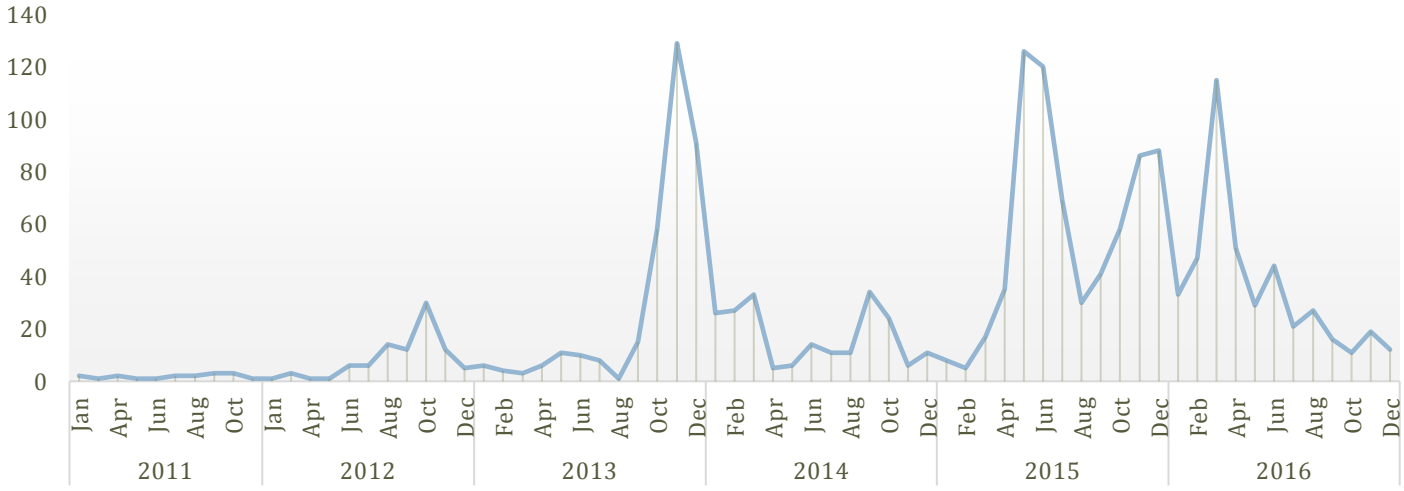
Number of shigellosis cases by month, 2016



Number of shigellosis cases by age group (years), 2016



Shigellosis cases by month and year - Iowa, 2011-2016



Section 4

2016 MOSQUITO-BORNE DISEASE

West Nile Virus (WNV)

WNV is endemic in Iowa and activity usually peaks in late summer and early fall. IDPH works in collaboration with local public health agencies (LPH) and other appropriate partners to investigate all reported cases.

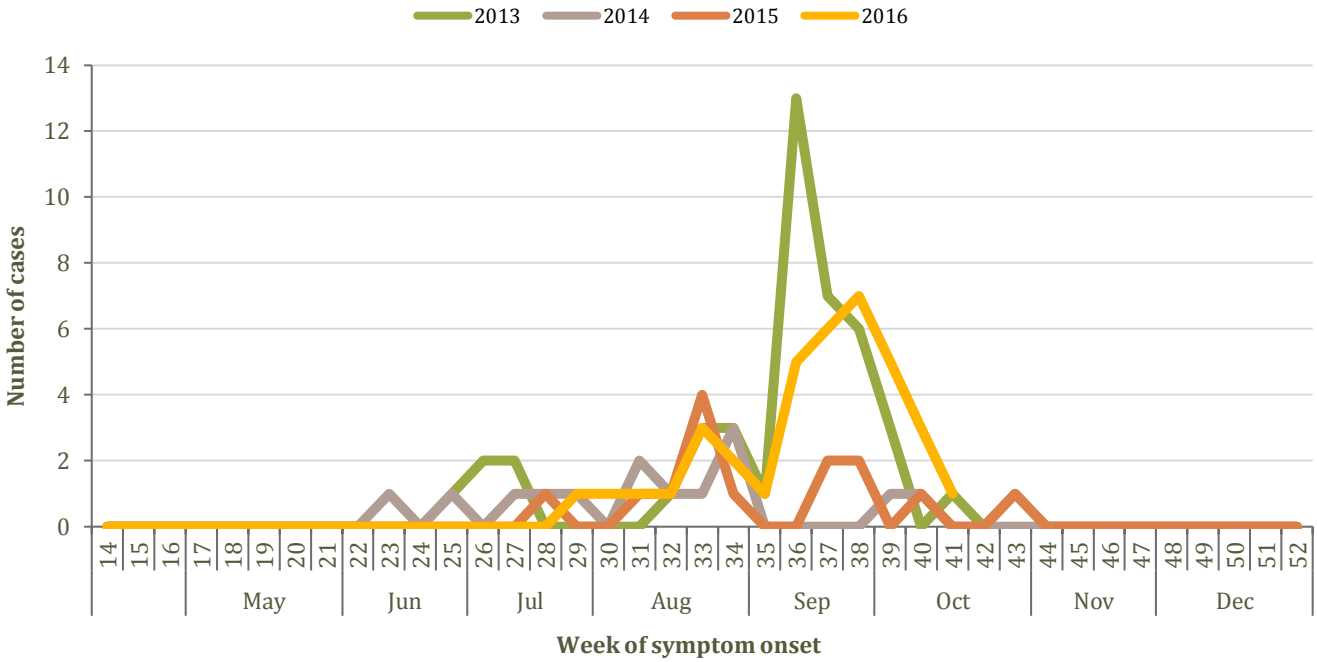
In addition, IDPH, in collaboration with the State Hygienic Laboratory (SHL), Iowa State University (ISU), and local public environmental health, conducts ecological surveillance in four counties by monitoring mosquitoes and testing pools of them for amount of infected populations.

Thirty-seven human cases of WNV and one WNV-related death were reported in Iowa in 2016 [Table 13]. Forty-six mosquito pools and 15 horses were also tested positive for this virus. During the 2015 surveillance season, 14 human cases of WNV were reported, in 13 Iowa counties [Figure 1].

Table 13: 2016 WNV cases and positive mosquito pools

				Mosquito Pools					
County	**Human**	**Blood Donor**	**Horses**	***Aedes japonicus***	***Culex erraticus***	***Culex pipiens***	***Culex pipiens* Group**	***Culex restuans***	***Culex salinarius***
Appanoose	1	0	0	0	0	0	0	0	0
Boone	1	0	0	0	0	0	0	0	0
Clinton	2	0	0	0	0	0	0	0	0
Crawford	0	1	1	0	0	0	0	0	0
Des Moines	1	0	0	0	0	0	0	0	0
Floyd	0	0	1	0	0	0	0	0	0
Franklin	0	0	1	0	0	0	0	0	0
Fremont	1	0	0	0	0	1	0	0	0
Hardin	0	0	1	0	0	0	0	0	0
Harrison	0	0	1	0	0	0	0	0	0
Henry	1	0	0	0	0	0	0	0	0
Humboldt	1	0	0	0	0	0	0	0	0
Jackson	0	1	0	0	0	0	0	0	0
Jefferson	0	0	1	0	0	0	0	0	0
Johnson	2	0	2	0	0	0	0	0	0
Linn	1	0	0	0	0	0	0	0	0
Lyon	3	1	0	0	0	0	0	0	0
Monona	1	0	0	0	0	0	0	0	0
O'Brien	2	0	0	0	0	0	0	0	0
Plymouth	2	0	0	0	0	0	0	0	0
Polk	0	0	0	0	0	10	6	8	1
Pottawattamie	2	1	1	0	0	0	0	1	0
Scott	1	0	0	0	0	0	0	0	0
Shelby	1	1	0	0	0	0	0	0	0
Sioux	11	0	1	0	0	0	0	0	0
Story	0	0	0	1	0	8	2	4	0
Tama	1	0	0	0	0	0	0	0	0
Washington	0	0	3	0	0	0	0	0	0
Webster	0	0	1	0	0	0	0	0	0
Woodbury	2	0	0	0	0	1	0	1	0
Van Buren	0	0	1	0	1	0	0	1	0
Total	**37**	**5**	**15**	**1**	**1**	**20**	**8**	**15**	**1**

Figure 1. WNV disease cases reported to IDPH by week of onset – Iowa, 2016



Chikungunya

Chikungunya is a viral disease that is spread to people by the bite of an infected *Aedes aegypti* and *Aedes albopictus* mosquito. Mosquitoes become infected when they feed on a person already infected with this virus. Neither this disease nor these mosquitoes are sustained in Iowa.

In 2015, three imported cases of chikungunya virus disease were reported in Iowa. Cases occurring in Iowa are in travelers returning from parts of the world where Chikungunya transmission occurs. Two cases of chikungunya were reported in Iowa in 2016.

Dengue Fever

Dengue is a disease caused by any one of four related viruses, which are passed by the bite of an infected *Aedes aegypti* or *Aedes albopictus* mosquito. Infection with one of the four viruses does not protect against the others and consecutive infections put people at greater risk of developing dengue hemorrhagic fever (DHF).

Dengue is not sustained in Iowa. Cases occur in travelers and immigrants from parts of the world where dengue transmission occurs. Eight cases of Dengue were reported in Iowa in 2016. In 2015, four cases of Dengue were reported to IDPH.

Malaria

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects *Anopheles* mosquitoes. Malaria is spread to humans by the bite of the infected female mosquito. Only *Anopheles* mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken from an infected person.

Twenty-two cases of malaria were reported in Iowa. Cases are in travelers and immigrants from parts of the world where malaria transmission occurs. In 2015, 17 cases of Malaria were reported to IDPH.

Rocky Mountain spotted fever (RMSF)

American dog ticks are carriers of *Rickettsia rickettsii*, the bacteria that causes RMSF. The American dog tick is the most common species of tick in Iowa, can be found in every county in the state, and is most active late March through August.

Eleven cases of RMSF were reported in Iowa. In 2015, nine cases of RMSF were reported to IDPH in 2016.

Ehrlichiosis/Anaplasmosis

There are at least three species of bacteria responsible for ehrlichiosis/anaplasmosis in the United States: *Ehrlichia chaffeensis, Ehrlichia ewingii, and Anaplasma phagocytophilum*. Ehrlichiae are transmitted by the bite of an infected lone star tick (*Amblyomma americanum*) which is found in Iowa. *A. phagocytophilum* is transmitted by the bite of an infected blacklegged tick or deer tick (*Ixodes scapularis*) in Iowa. The clinical signs and symptoms of these infections are similar. Symptoms vary from person to person but may include fever, headache, chills, malaise, muscle pain, rash, nausea, vomiting, and diarrhea.

Fourteen cases of *ehrlichiosis/anaplasmosis* were reported in Iowa. In 2015, eleven cases of ehrlichiosis/anaplasmosis were reported to IDPH.

Babesiosis

Babesiosis is caused by microscopic parasites that infect red blood cells. Most human cases in the United States are caused by the parasite *Babesia microti,* and is spread by the blacklegged tick or deer tick (*Ixodes scapularis*). The parasite typically is spread by the young nymph stage of the tick. They are most common during the warm months of spring and summer in areas with woods, brush, or grass.

In 2016, one case of Babesiosis was reported to IDPH. In 2015, no cases of Babesiosis were reported to IDPH.

Lyme

Lyme disease is caused by *Borrelia burgdorferi* and in Iowa is transmitted to humans by the bite of an infected tick, the blacklegged tick or deer tick (*Ixodes scapularis*). Ticks are most likely to spread *Borrelia burgdorferi* during their pre-adult stage (nymph). They are most common between May and July and found in tall grasses and brush of wooded areas.

In 2016, 232 confirmed and probable cases of Lyme were reported in Iowa. In 2015, 318 cases of Lyme disease were reported to IDPH.

Section 5

2016 RABIES SUMMARY

Animal rabies in Iowa:

In 2016, 19 animals with rabies were reported in Iowa. Rabies was identified most frequently in wildlife species including 12 bats and 1 skunk; 3 dogs, a cat, cow, and horse were also diagnosed.

Table 14. Positive Rabies Cases 2006-2009

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Bat	28	13	11	11	10	12	17	6	10	7	12	137
Skunk	13	5	7	13	13	7	9	4	2	1	1	75
Cat	7	7	9	3	1	3	1	0	1	1	1	34
Cow	4	0	1	5	1	3	4	2	2	0	1	23
Dog	2	5	1	2	1	0	0	0	0	3	3	17
Horse	3	1	0	0	0	0	0	0	0	0	1	5
Fox	0	0	0	0	1	0	0	0	0	0	0	1
Squirrel	0	0	0	1	0	0	0	0	0	0	0	1
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Total	57	31	29	35	27	25	31	12	15	12	19	293

During 2016, 1386 animals in Iowa were tested for rabies and 19 were confirmed positive (1.4%). The percent positive varies greatly by species (see the Table 15). Most animals are tested because they have contact with humans or domestic animals and they exhibit unusual behavior/clinical signs indicating that they may be infected with the rabies virus. Thus, the below percentages are not representative of the true distribution of disease within the animal population in Iowa.

Table 15. Percent Positive by Species in 2016

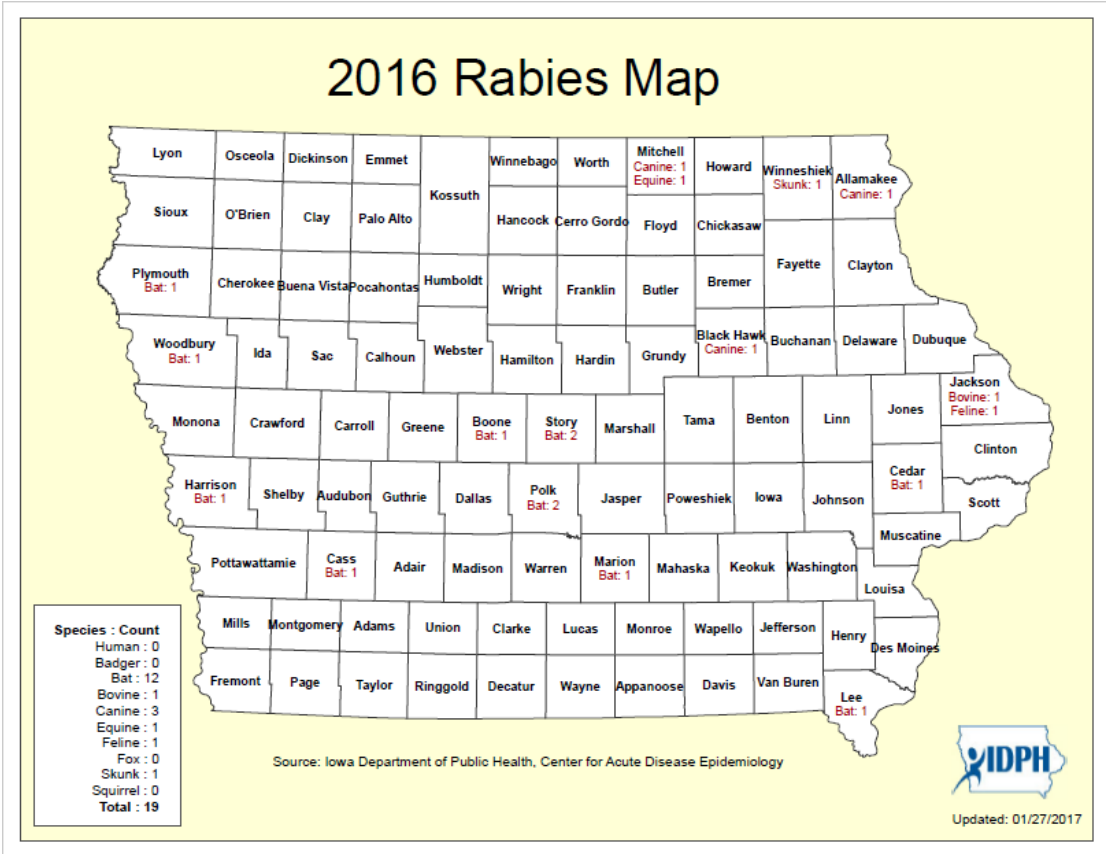
Species	Positive	Total Tested	% Positive
Skunk	1	10	10%
Bat	12	503	2.4%
Dog	3	283	1.1%
Cat	1	365	0.3%

In Iowa, the most common bat species submitted for testing are the Big Brown bat and Little Brown bat; however other bat species are occasionally tested.

Table 16. Bat Species Tested and Positive for Rabies Infection

Species	Positive	Total Tested
Eptesicus fuscus (Big Brown bat)	12	489
Myotis lucifugus (Little Brown bat)	0	3
Rousettus aegyptiacus	0	4
Unknown	0	7
Total	12	503

Figure 2: 2016 Iowa Rabies Map



There are two laboratories that test animals for rabies in Iowa:

- State Hygienic Laboratory at the University of Iowa
- Iowa State University Veterinary Diagnostic Laboratory

Iowa animals are also periodically tested in out-of-state laboratories

Human rabies in Iowa:

Iowa's most recent human rabies case occurred in 2002, and was caused by the bat strain. Prior to that, the last reported case occurred in 1951.

While the exact number of people who receive rabies post exposure prophylaxis (PEP) each year in the United States is unknown, it is estimated to be about 40,000 people. Based upon Iowa's population approximately 390 Iowan's receiving PEP each year.

Section 6

2016 INFLUENZA SUMMARY

Summary of Iowa activity

The Iowa Influenza Surveillance Network (IISN) is a collaborative effort between the Iowa Department of Public Health (IDPH) and its many partners, including the Centers for Disease Control and Prevention (CDC), Council of State and Territorial Epidemiologists (CSTE), local public health departments, clinical laboratories, hospitals, healthcare providers, clinics, medical examiners, and schools. Influenza surveillance tracks influenza activity, virus type and strain, age group impacted, outbreaks, and severity of the seasonal influenza viruses.

During the 2016-2017 influenza season (Oct 2, 2016-May 20, 2017), influenza activity was low in October and November 2016, increased through December and January, and peaked in February 2017. Influenza A (H3N2) viruses were the most commonly identified through April and were the predominant virus reported for the season. Influenza B viruses, both Yamagata and Victoria lineages, began to increase in December and outnumbered influenza A viruses reported in April and May. Iowa reported "widespread" statewide influenza activity to the CDC, which is the highest level of activity, for 12 consecutive weeks beginning January 15 through the week ending April 8, 2017 (MMWR weeks 3-14). Nearly every measure was higher for the 2016-2017 season compared to 2015-2016.

Highlights of the Iowa 2016-2017 influenza season summary report include the following:

- 1,033 influenza positive specimens confirmed by the State Hygienic Laboratory at the University of Iowa (SHL), peaking with 115 during the week ending February 11, 2017
- 8,526 rapid influenza positive specimens reported with 73 percent positive for influenza A
- 4,572 positive non-influenza respiratory specimens reported to IISN with rhinovirus/enterovirus and respiratory syncytial virus (RSV) accounting for 59 percent of the positive results
- over one million influenza vaccines were reported to Iowa's immunization tracking system
- 135 influenza-related deaths were reported, all among adults, with 65 percent among persons aged 81 and over
- 1,078 hospitalizations were reported, 58 percent of which were among persons over 64 years of age
- weekly percentage of outpatient visits for ILI in Iowa was above the regional baseline for five weeks in a row in January and February 2017 and peaked in the week ending February 11 (MMWR week 6) at 3.2 percent
- 56 influenza outbreaks in long-term care facilities were investigated with 26 were reported in February 2017
- 151 schools reported $\geq$ 10 percent illness among students at least once during the year, with 57 counties reporting 10 percent illness at least once
- percent of ill students at sentinel schools rose above the baseline 10 consecutive weeks during January through March and peaked at 3.8 percent the week ending February 11 (MMWR week 6).

Laboratory surveillance program

SHL is the primary lab for influenza surveillance and reporting in Iowa. SHL reports the number of tests performed and the type and sub-type/lineage of positive tests to the influenza surveillance network several times every week.

There were 2,730 specimens tested for influenza October 2, 2016-May 20, 2017, with 1,033 total positive specimens. The number of specimens testing positive for influenza peaked in the week ending February 11, 2017 (MWR week 6) with 115 positive specimens detected that week (Figure 3). The positive specimens included 817 (79%) influenza A and 216 (21%) influenza B viruses. Among the 810 influenza A specimens subtyped, 794 (98%) were influenza A (H3N02), and 15 (2%) were influenza A(H1N1)pdm09. Iowa reported one human infection with novel influenza A during the 2016-2017 influenza season. The virus identified was an influenza A(H1N2) variant or A(H1N2)v and was associated with exposure to swine. No human to human transmission was reported. Of the 212 influenza B positive specimens with lineage information available, 134 (63%) were identified as B/Yamagata and 78 (37%) as B/Victoria lineage (Table 17). During the 2015-16 influenza season (October 4, 2016 - October 1, 2016), influenza A(H1N1)pdm09 predominated with 271 out of 413 positive specimens in that time period.

Of the 1,033 influenza-positive specimens tested, 497 (48%) were from persons over 64 years of age. Influenza A(H3N2), B/Victoria and B/Yamagata viruses were identified in all age groups with A(H3N2) being predominant in all age groups. The largest number of influenza B viruses was in persons aged 5-17 years with influenza B viruses accounting for 53 percent of the viruses reported for that age group (Table 17).

Figure 3. Number of laboratory confirmed influenza specimens by influenza type and strain, October 2, 2016 - May 20, 2017

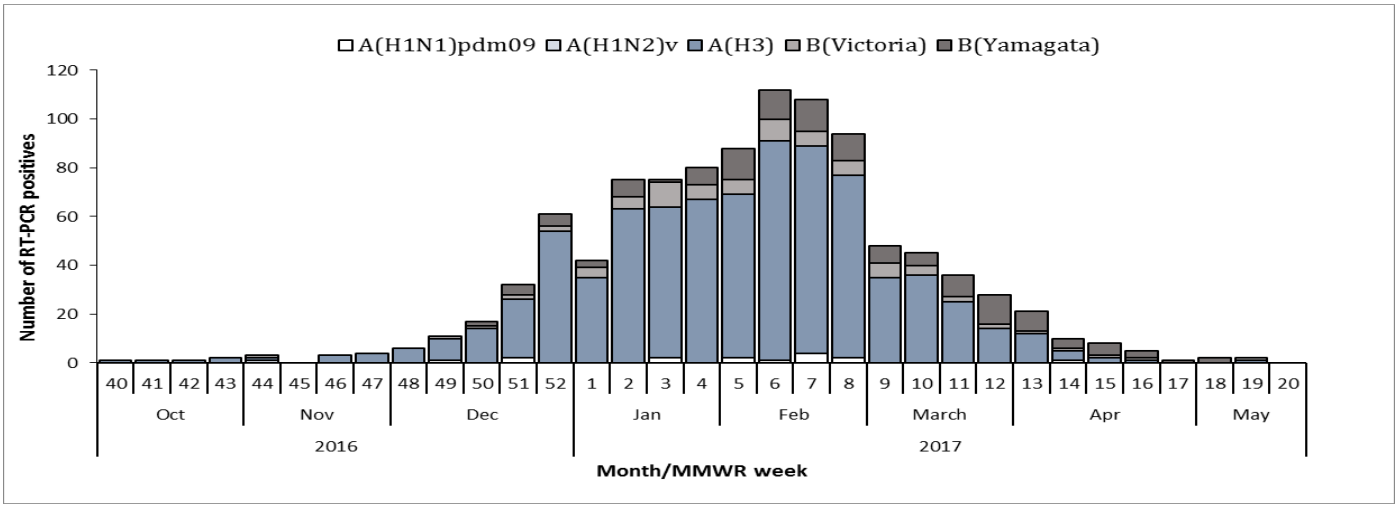


Table 17: Influenza A and B viruses detected by SHL by age group, October 2, 2016 – May 20, 2017

Age Group	Flu A				Flu B			Total
	A(H1N1)pdm09	A(H3)	A(H1N2v)	Not subtyped	Victoria Lineage	Yamagata Lineage	No Lineage	
0-4	4	32	0	0	8	7	2	**53 (5%)**
5-17	2	49	0	0	31	28	1	**111 (11%)**
18-24	0	117	0	1	14	15	1	**148 (14%)**
25-49	4	65	0	2	12	16	0	**99 (10%)**
50-64	2	91	1	1	4	26	0	**125 (12%)**
>64	3	440	0	3	9	42	0	**497 (48%)**
Total	**15**	**794**	**1**	**7**	**78**	**134**	**4**	**1033**

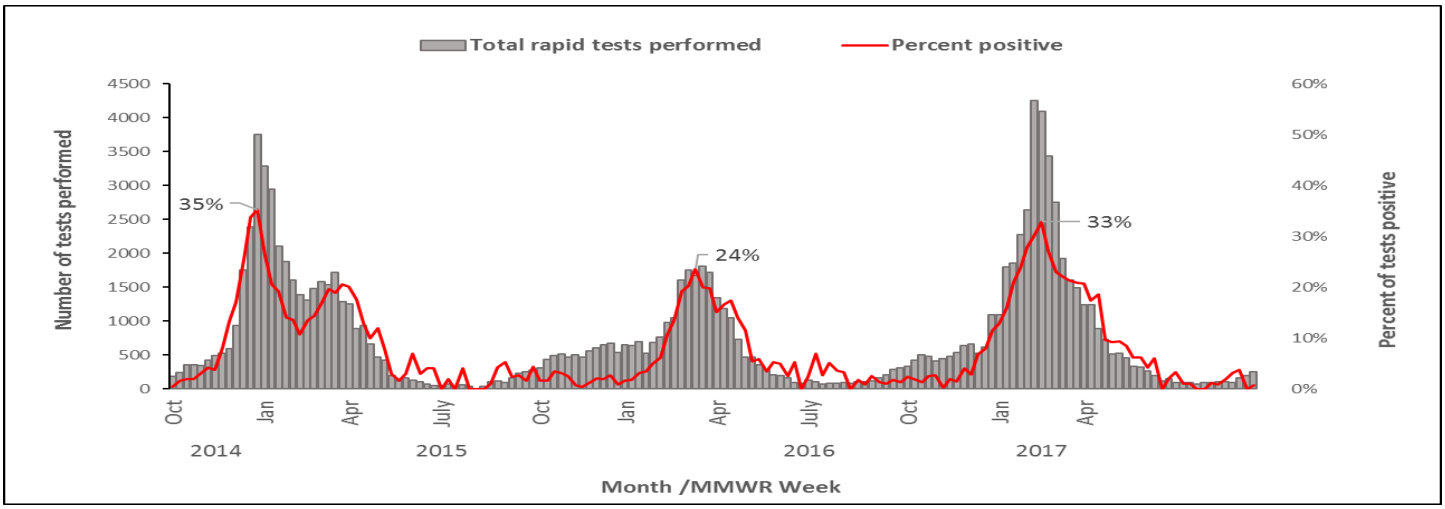
Notes: counts may not add up to the total due to missing age information. Only cases of Iowa residents are included. "Not subtyped" column is due to weak detections. This can be due to poor collection, timing of collection or stage of infection.

Rapid influenza and RSV test surveillance

SHL runs a weekly web-based survey program where laboratorians report the number of influenza and RSV rapid tests performed and the number of tests positive. Only the number of patients tested and the number positive for influenza or RSV are reported, not case counts.

Figure 4 shows the percentage of rapid influenza tests that tested positive and the number of tests performed September 28, 2014 (MMWR week 40) – May 20, 2017 (MMWR week 20). During the 2016-2017 influenza season, the percent of positive influenza rapid tests began to increase consistently in December before peaking at 33 percent during the week ending February 18, 2017 (MMWR week 7) and remained above five percent through the week ending May 20, 2017. The peak was earlier and higher than 2015-16 which had a high of 24 percent positive in the week ending March 12, 2016 (MMWR week 10).

Figure 4. Percent of influenza rapid tests positive and number of tests performed, 2014-2017



Note: survey not collected MMWR week 53 in Dec 2014/Jan 15 and MMWR week 31 July/Aug 2015.

There were 42,296 specimens tested for influenza October 2, 2016-May 20, 2017, with 8,546 total positive specimens (20% positive total – 6,249 influenza A and 2,297 influenza B). The number of specimens tested and percent positivity were more than 50 percent higher in 2016-2017 than during the same time period in 2015-16 (26,637 tests and 12% positive). Rapid positive results for influenza A and B were reported for all influenza regions in Iowa with influenza A predominating in each region (Table 18).

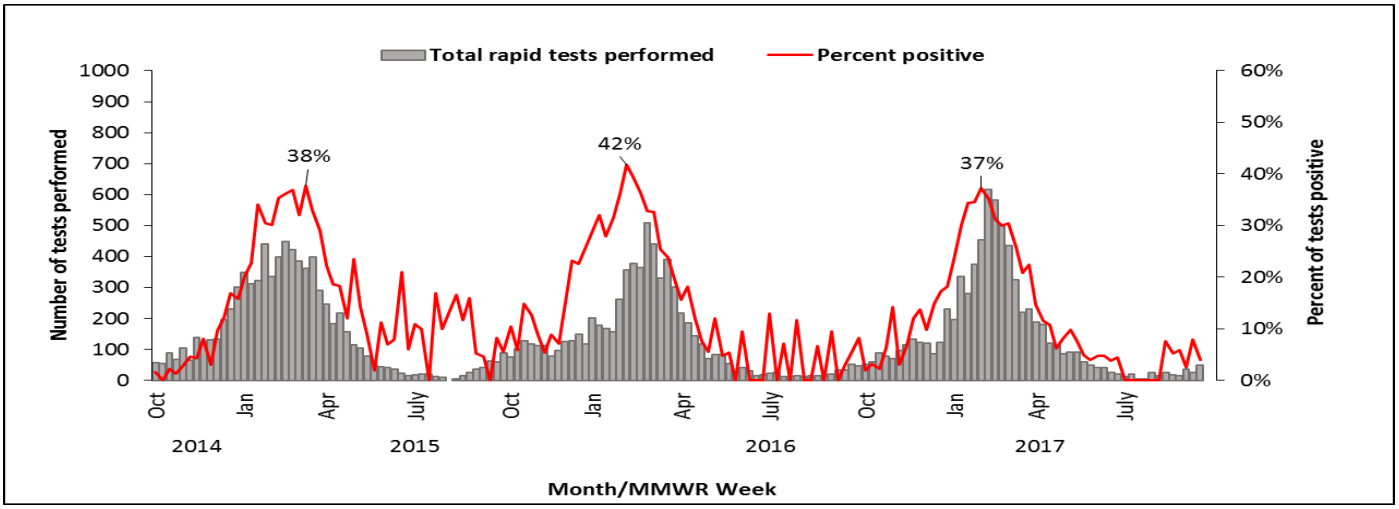
Table 18: Number of rapid influenza and RSV tests, positive results, and percent positive by region – October 2, 2016 – May 20, 2017

REGION*	RAPID ANTIGEN INFLUENZA TESTS				RAPID ANTIGEN RSV TESTS		
	Tested	Flu A	Flu B	Percent Positive	Tested	Positive	Percent Positive
Region 1 (Central)	6297	1150	287	21	679	167	25
Region 2 (NE)	2453	389	154	22	448	118	26
Region 3 (NW)	6304	851	450	21	1258	300	24
Region 4 (SW)	3155	569	182	24	400	110	28
Region 5 (SE)	3897	544	335	23	663	125	19
Region 6 (Eastern)	19,560	2746	889	19	3424	834	24
Total	**42,296**	**6249**	**2297**	**20**	**6872**	**1654**	**24**

*Refer to Figure 11 for Regional Boundaries.

Figure 5 shows the percent of positive RSV rapid tests began to increase consistently in November 2016 before peaking at 37 percent during the week ending February 4, 2017 (MMWR week 5) and did not drop below five percent until the week ending May 20, 2017 (MMWR week 20). Although the percent of positive rapid tests was lower in 2016-2017 (24%) than in 2015-16 (25%), the number of positive tests was higher in 2016-2017 (1654 compared to 1592). Rapid positive results for RSV were reported for all influenza regions in Iowa with (Table 18).

Figure 5. Percent of RSV rapid tests positive and number of tests performed, 2014-2017



Note: survey not collected MMWR week 53 in Dec 2014/Jan 15 and MMWR week 31 July/Aug 2015.

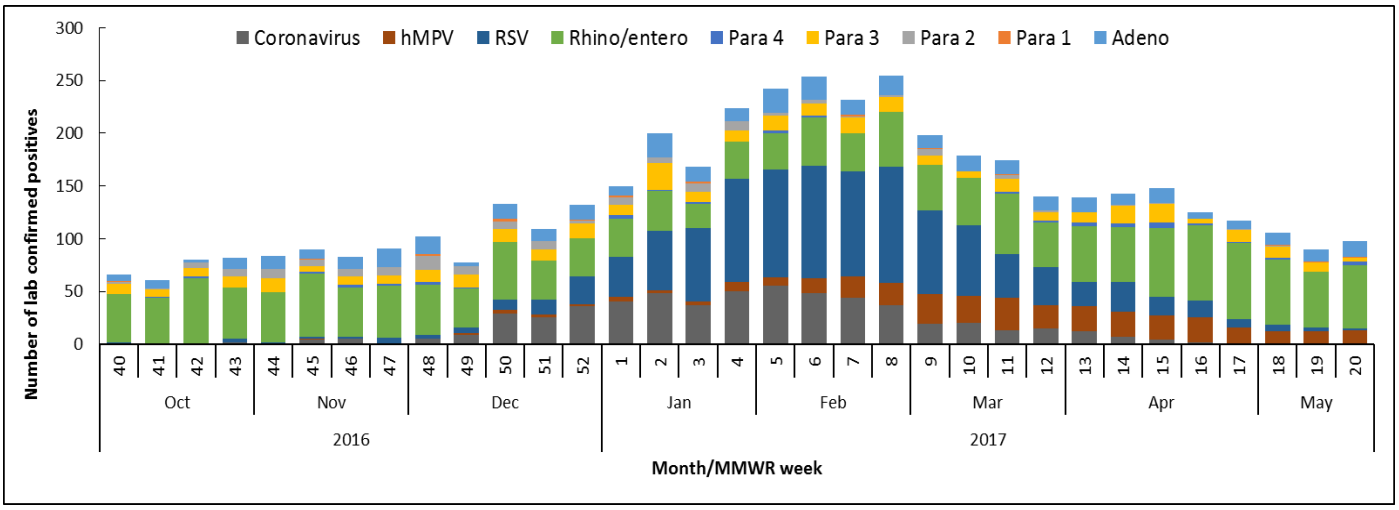
Non-influenza respiratory viruses

SHL also collects information on non-influenza respiratory virus testing with their weekly web-based survey. This information is added to reports from the Dunes Medical Laboratories at Mercy Medical Center in Sioux City. Only the number of patients tested and the number positive for non-influenza viruses are reported, not case counts.

From October 2, 2016 through May 20, 2017, a total of 4,572 positive results for non-influenza respiratory viruses were reported by labs surveyed by SHL and by Dunes Medical Laboratories. Rhinovirus/Enterovirus and RSV accounted for the majority of positive results with 1591 (35%) and 1087 (24%) respectively. Different viruses peaked at different times from December through April

(Figure 6 and Table 19). During the same period in 2015-2016, 2,922 positive non-influenza respiratory viruses were reported.

Figure 6. Number of positive non-flu respiratory viruses by type – October 2, 2016-May 20, 2017



Note: survey not collected MMWR week 53 in Dec 2014/Jan 15 and MMWR week 31 July/Aug 2015.

Table 19. Number of positive results, percent of total, and peak month for non-influenza respiratory virus collected by SHL and Mercy Dunes in Sioux City, October 2, 2016 – May 20, 2017

Viruses	Number	Percent	Peak Month
Adenovirus	421	9	Jan, Feb 2017
Parainfluenza Virus Type 1	18	<1	
Parainfluenza Virus Type 2	137	3	Dec 2016
Parainfluenza Virus Type 3	358	8	Jan 2017
Parainfluenza Virus Type 4	45	1	
Rhinovirus/Enterovirus	1591	35	April 2017
Respiratory syncytial virus (RSV)	1087	24	Feb 2017
Human metapneumovirus (hMPV)	345	8	Mar 2017
Coronavirus	570	13	Feb 2017
Total	**4572**		

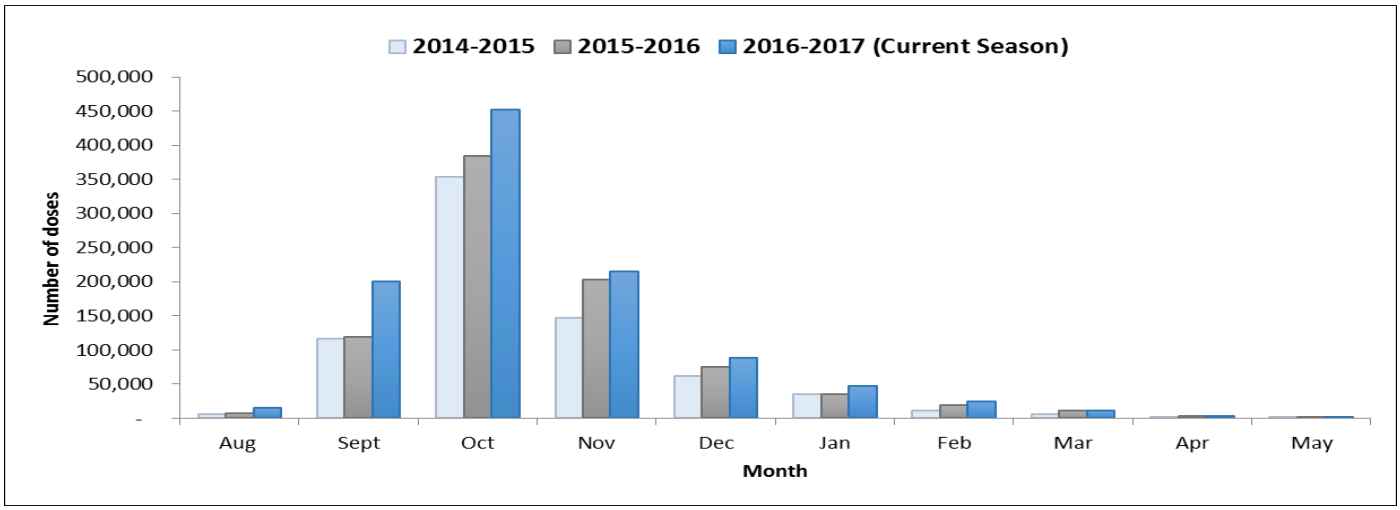
Note: peak month not reported for viruses with no weeks over 10 positive cases

Seasonal influenza vaccination

Seasonal influenza vaccination data in Iowa is based on doses reported to the Iowa Immunization Registry Information System (IRIS). IRIS is a confidential, computerized, population-based system that tracks immunizations for children, adolescents and adults who are seen in a variety of public and private healthcare provider sites throughout the state of Iowa. For more information on the immunization data, contact Kim Tichy, IRIS coordinator at 515-281-4288.

The number of seasonal influenza vaccine doses reported to IRIS during the 2016-2017 season was 1,059,742 which was higher than in each of the two previous seasons (739,989 in 2014-15 and 858, 872 in 2015-16). Over 90 percent of doses were administered September through December 2016 with over 40 percent in October (Figure 7).

Figure 7. Doses of season influenza vaccine reported to IRIS by month for influenza season, 2014-2017



Note: The data for the 2016-2017 season is regularly updated and there is a lag between the vaccine administration date and the date reported to the IRIS.

Mortality surveillance

Influenza-related mortality data primarily comes from the Iowa Bureau of Health Statistics. Reports may also come from influenza-related pediatric deaths (under age 18 years) which are reportable in Iowa as well as reports from the Iowa Office of the State Medical Examiner if they detect unusual clusters of deaths attributed to infectious disease. Deaths are counted as influenza-related if the death report lists influenza as a possible contributor to the cause of death, but not necessarily the primary cause.

There were a total of 135 influenza-related deaths in Iowa for the time period from October 2, 2016 through May 20, 2017, with 89 (60%) being in persons aged 81 years and over (Table 20). Influenza-related deaths peaked in February with 48 deaths reported. Eighty-nine of the 135 influenza-related deaths (over 65%) occurred in February and March. All except for 10 of the influenza-related deaths involved persons with a reported history of underlying health conditions.

Table 20: Number of influenza-related deaths and percent in age group, October 2, 2016-May 20, 2017

Ages	Deaths	Percent
0-17	0	0
18-40	3	2
41-60	11	8
61-80	32	24
81 and over	89	66
Total	**135**	

Influenza-associated hospitalizations

Sentinel hospitals track and report the number of influenza-associated hospitalizations and the total number of inpatients each week. Twenty sentinel hospitals participated in the influenza hospitalization

surveillance in the 2016-2017 influenza season. These hospitals tracked and reported the number of influenza-associated hospitalizations by age group (0-4, 5-24, 25-49, 50-64, and over 64 years) and the total number of inpatients hospitalized for any reason.

Both number and rate of hospitalizations peaked in the week ending February 11, 2017 (MMWR week 6) with 113 hospitalizations and a rate of 173 influenza-associated hospitalizations per 10,000 total hospitalizations (Figures 8 and 9). The number and rate of influenza-associated hospitalizations were at least three times higher in 2016-2017 (1,078 and 63 per 10,000) compared to 2015-16 (352 and 21 per 10,000). Of the 1,078 hospitalizations, 624 (58%) were among people over 64 years of age, which is similar to the national rate of 60 percent (Table 21).

Figure 8. Influenza-associated hospitalizations by age group, October 2, 2016 – May 20, 2017

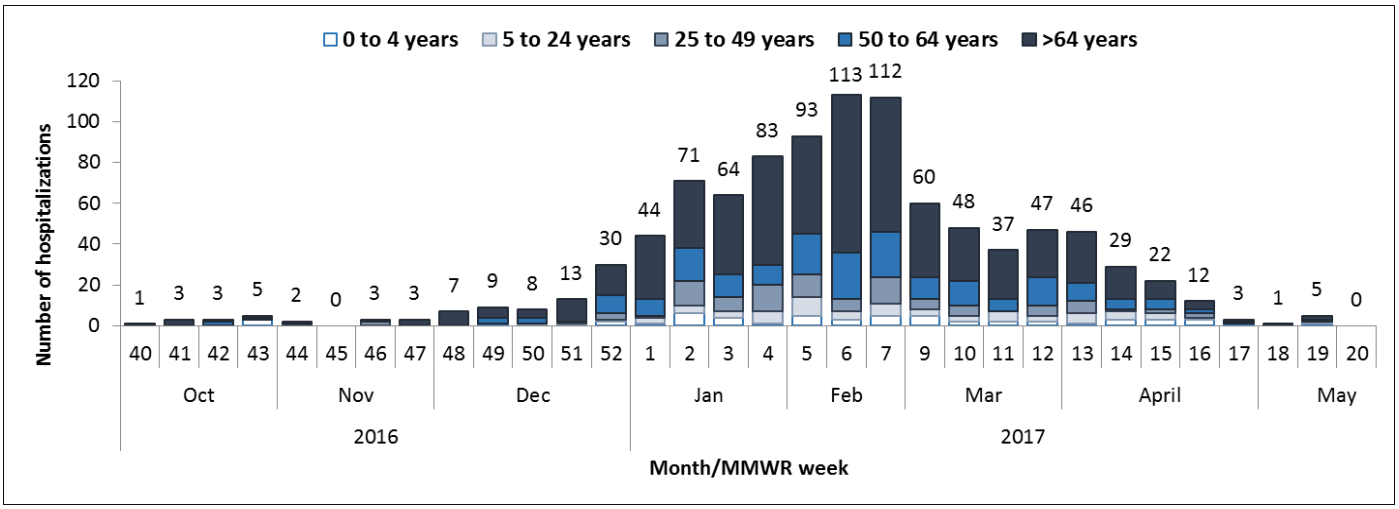


Figure 9. Influenza-associated hospitalizations by age group, 2013 – 2017

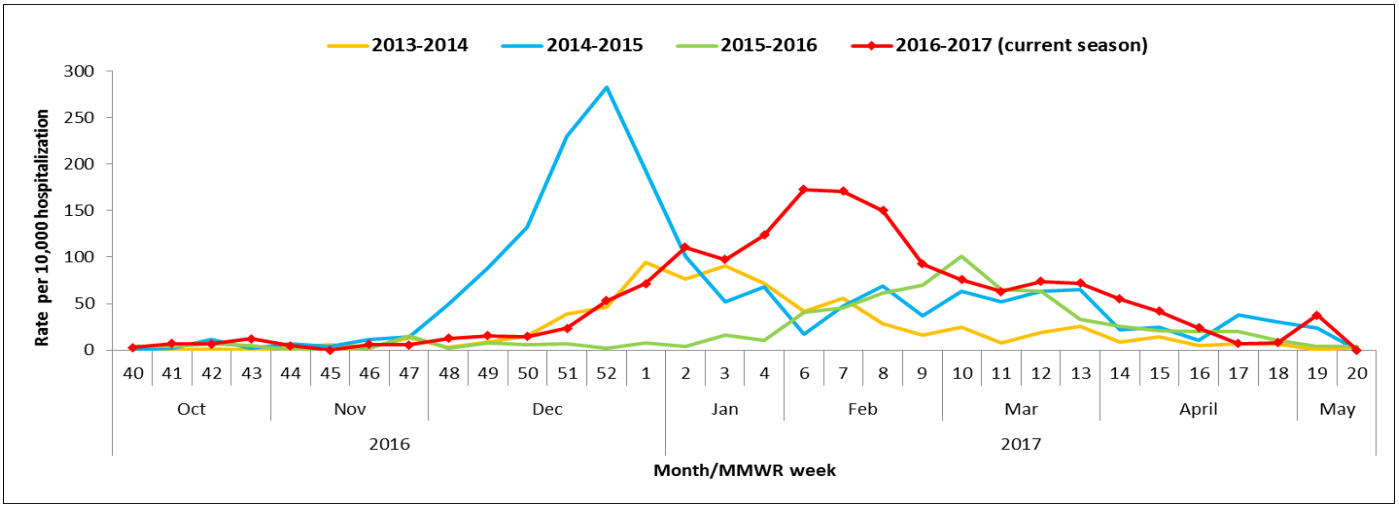


Table 21: Number of influenza-associated hospitalization and percent reported by age group, October 2, 2016 – May 20, 2017

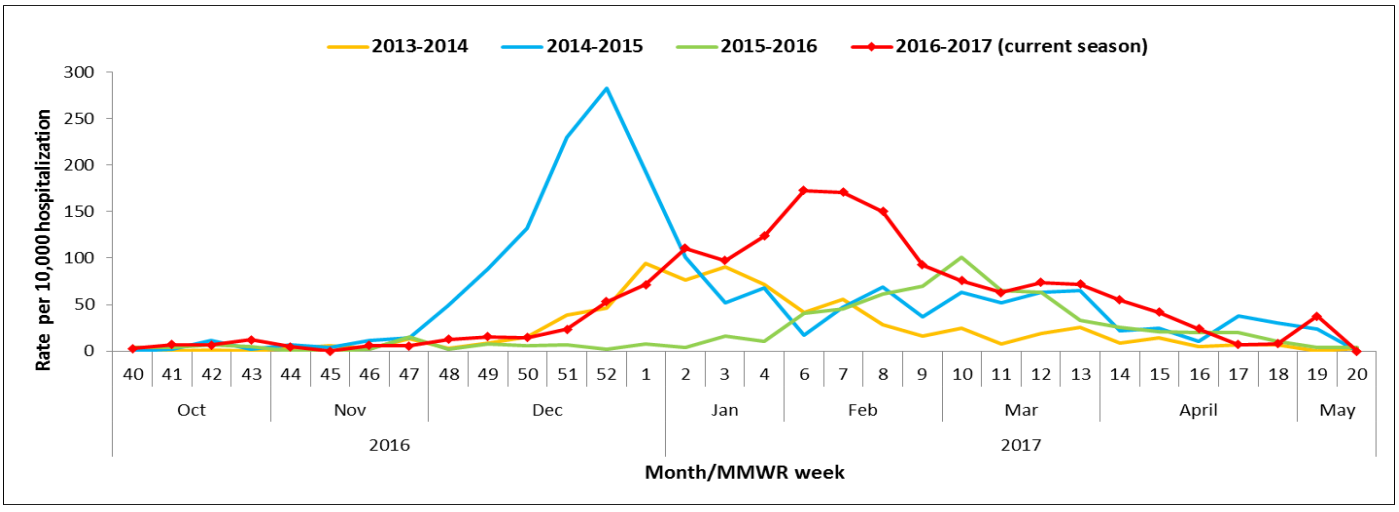
Age	Number Hospitalizations	Percent
Age 0-4	61	6
Age 5-24	74	7
Age 25-49	103	10
Age 50-64	216	20
Age >64	624	58
Total	1078	

Outpatient health care provider surveillance program (ILINet)

Outpatient health care providers who participate in the ILINet (a national influenza surveillance program) report the number of patients seen with influenza-like illness and the total number of patient visits each week. This system is a key part of Iowa's influenza surveillance. Across the state, providers, ranging from family medicine to student health centers, participate weekly in the ILINet program. These sites report the number of patients seen with influenza-like illness and the total number of patient visits each week through the ILINet website maintained by CDC. Influenza-Like Illness is defined as a fever of at least 100°F plus either a cough or a sore throat.

There were 12 outpatient health care provider surveillance sites which participated in ILINet during the 2016-2017 season. During the 2016-2017 influenza season, the weekly percentage of outpatient visits for ILI in Iowa was above the regional baseline of 1.8 percent for five weeks in a row from the week ending January 28 through the week ending February 24, 2017 (MMWR weeks 4-8). ILI percentage peaked the week ending February 11 (MMWR week 6) at 3.2 percent (Figure 10). There were no weeks in 2015-16 where the ILI percentage was above the regional baseline and the peak week was 1.6 percent. Nationally, ILI sites were above the national baseline for 17 weeks in a row nationally starting with week ending December 17, 2016 (week 50) with a peak of 5.1 percent the week ending February 11 (MMWR week 6).

Figure 10. Percent of outpatient visits for influenza-like illness reported by ILINet providers, 2013-2017



Long-term care outbreaks

Influenza outbreaks in long-term care facilities are reported to IDPH directly or through local public health providers. Long-term care facilities are defined as institutions, such as nursing homes and skilled nursing facilities that provide health care to people (including children) who are unable to manage independently in the community. A long-term care influenza outbreak should be suspected if there is one laboratory-confirmed influenza positive case along with other cases of respiratory infection in a unit of a long-term care.

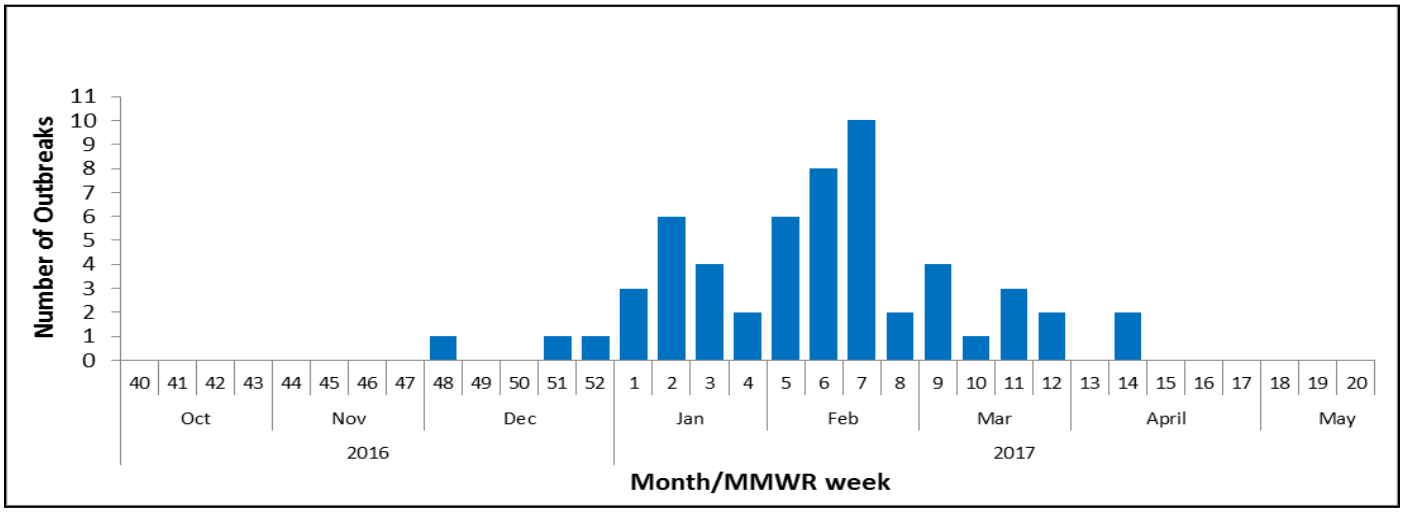
There were a total of 56 long-term care influenza outbreaks reported for the time period from October 2, 2016 through May 20, 2017 with over one-third being reported for the central influenza region of Iowa (Table 22). The number of influenza outbreaks peaked with 10 outbreaks in the week ending February 18, 2017 (MMWR week 7) and 26 total outbreaks occurring in February (Figure 11). During the 2015-2016 influenza season, seven influenza outbreaks in long-term care facilities were investigated.

Table 22: Number of long-term care outbreaks investigated, October 2, 2016 – May 20, 2017

REGION*	Number Outbreaks
Region 1 (Central)	19
Region 2 (NE)	4
Region 3 (NW)	7
Region 4 (SW)	9
Region 5 (SE)	8
Region 6 (Eastern)	9
Total	56

*Refer to Figure 12 for Regional Boundaries.

Figure 11. Number of long-term care outbreaks by week, October 2, 2016 – May 20, 2017



School surveillance program

IDPH monitors illnesses in schools from two different types of reporting: 10 percent school absence reports and weekly sentinel illness reporting. Iowa schools (K-12) track and report (including non-influenza illnesses) when the number of students absent with illness reaches or exceeds 10 percent of

total student enrollment. Iowa sentinel schools that participate in IISN voluntarily track and report absence due to all illness and the total enrollment each week. IDPH tracks more than 30,000 students weekly for absence due to illness. This data provides excellent trends for influenza activity as well as age-specific information used to target vaccination efforts and messages.

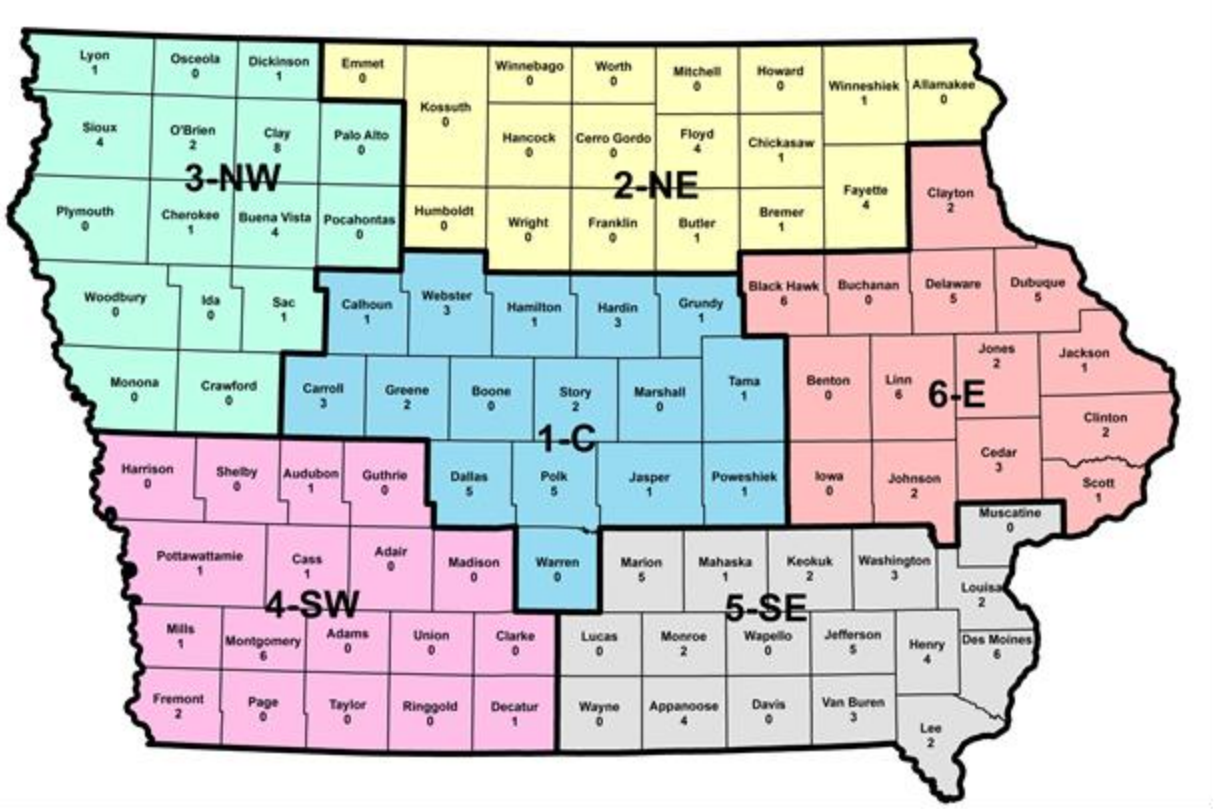
During the 2016-2017 influenza season, 151 schools reported over 10 percent absenteeism due to illness at least once during the year. The number of schools with 10 percent ill peaked during the week ending February 11 (MMWR week 6). At least 10 schools in every region reported 10 percent illness (Table 23) and 57 counties reported at least one school with 10 percent illness during the year (Figure 12).

Table 23: Number of schools with at least 10 percent absenteeism due to any illness, October 2, 2016-May 20, 2017

REGION*	Number of Schools
Region 1 (Central)	29
Region 2 (NE)	12
Region 3 (NW)	22
Region 4 (SW)	14
Region 5 (SE)	39
Region 6 (Eastern)	35
Total	**151**

*Refer to Figure 12 for Regional Boundaries.

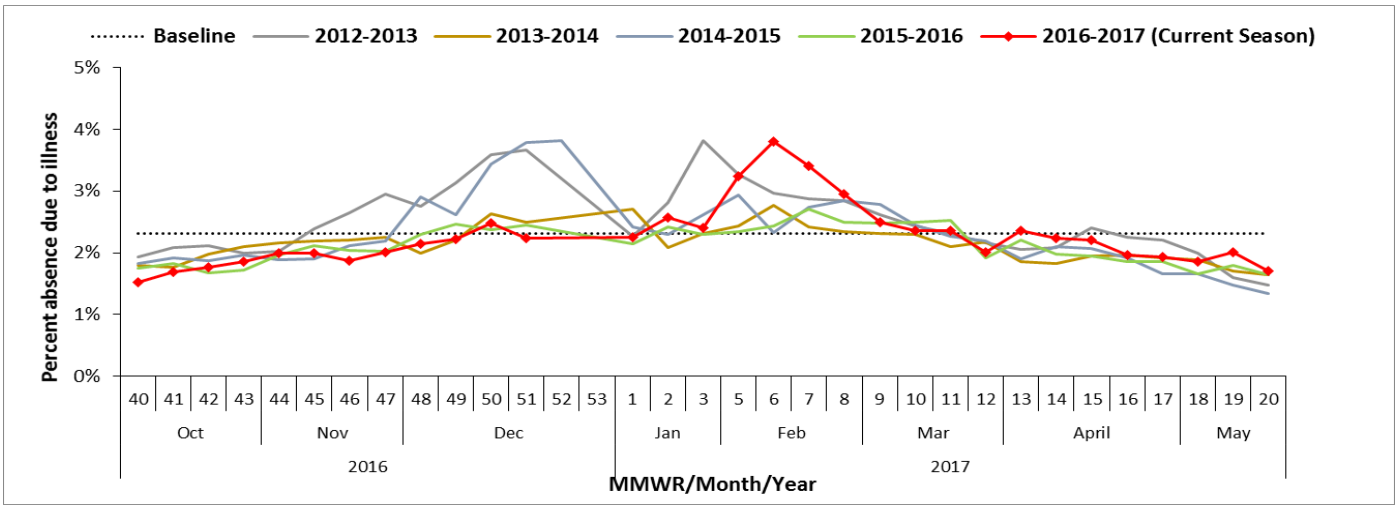
Fig 12. Schools with at least ten percent illness by county and region



Note: The number of schools by county that reported 10 percent absence due to illness at least once for the 2016-2017 influenza season are listed below each county. Region numbers and abbreviations are listed in black.

During the 2016-2017 influenza season, the percent of students absent due to illness from sentinel schools went above the 2.31 percent baseline 12 times including 10 consecutive weeks in January through March (Figure 13). The percentage peaked at 3.8 percent in the week ending February 11(MMWR week 6).

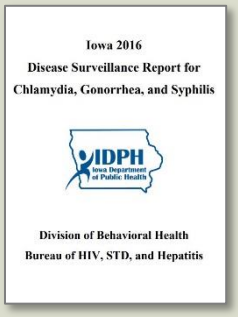
Figure 13 Percent of enrolled students absent due to illness from sentinel school, October 2, 2016-May 20, 2017



Section 6

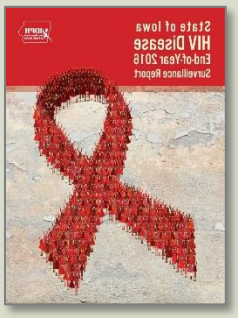
RELATED PROGRAM REPORTS

Division of Behavioral Health, Bureau of HIV, STD and Hepatitis



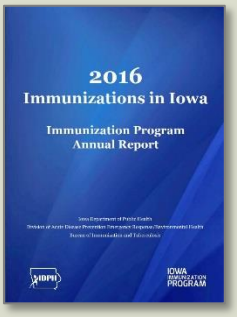
[Iowa 2016 Disease Surveillance Report for Chlamydia, Gonorrhea, and Syphilis]

[Epidemiological Profile of Hepatitis C in Iowa]

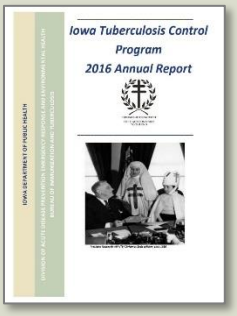


[State of Iowa HIV Disease End-of-Year 2016 Surveillance Report]

Bureau of Immunization and Tuberculosis



[2016 Immunizations in Iowa: Immunization Program Annual Report]



[Iowa Tuberculosis Control Program 2016 Annual Report]