



Communicable Disease Report

2017

Davis County Health Department
Communicable Disease & Epidemiology Bureau



Acknowledgments

Prepared by Davis County Health Department

Brian Hatch, MPH, EHS
Health Officer

Wendy Garcia, RN
Family Health & Disease Control
Division Director

Sarah Willardson, MPH
Communicable Disease & Epidemiology
Bureau Manager/Epidemiologist

Acknowledgments

Wendy Fleming
Tina L'Estrange
Sandra Love
Neriza Oka
Debbie Patton
Jan Taylor



22 South State Street
Clearfield, Utah 84015
801-525-5200

www.daviscountyutah.gov/health



For questions about this report, contact: Wendy Garcia, 801-525-5202 or
wendyb@daviscountyutah.gov.

Table of Contents

	Page Number
Executive Summary	1
Introduction	3
Utah Reportable Diseases	5
Methods	6
Reportable Disease Summary	7
Top 20 Diseases	9
Diseases Reported by Year, 2012-2017	10
Enteric Diseases	11
<i>Campylobacteriosis</i>	13
<i>Cryptosporidiosis</i>	14
<i>Giardiasis</i>	15
<i>Norovirus</i>	16
<i>Salmonellosis</i>	17
<i>Shiga Toxin-Producing E. coli (STEC) Infection</i>	19
Vaccine-Preventable Diseases	20
<i>Hepatitis A</i>	22
<i>Hepatitis B (Acute & Chronic Infections)</i>	23
<i>Influenza</i>	24
<i>Measles</i>	26
<i>Mumps</i>	27
<i>Pertussis</i>	28
Vector-borne/Zoonotic Diseases	29
<i>Rabies</i>	30
<i>West Nile virus</i>	32
<i>Zika virus</i>	33
Invasive Diseases	34
<i>Invasive Streptococcal Infections</i>	35
Other Diseases	37
<i>Carbapenem-Resistant Enterobacteriaceae (CRE)</i>	38
<i>C. perfringens</i>	39
<i>Creutzfeldt-Jakob Disease (CJD)</i>	40
<i>Hepatitis C</i>	41
<i>Legionellosis</i>	42
Sexually Transmitted Diseases	43
<i>Chlamydia</i>	45
<i>Gonorrhea</i>	47
<i>Syphilis</i>	49
Tuberculosis	50
<i>Active Tuberculosis Disease (ATBD)</i>	51
<i>Latent Tuberculosis Infection (LTBI)</i>	52
Program Highlights	54
Davis County Demographics – 2017	61

Executive Summary

This annual communicable disease surveillance report summarizes all communicable diseases reported in Davis County in 2017. It provides a baseline picture of the disease burden in Davis County, describing trends and highlighting those diseases that had the greatest impact on the health and well-being of our community. Unusual disease occurrences are also discussed.

Several notable disease events occurred in Davis County during 2017. These have been summarized below:

- A large, multi-state outbreak of hepatitis A made its way to Utah during 2017. As of January 2018, 161 cases have been identified in Utah. The cases within this outbreak are often part of high-risk groups including those who are homeless, use illicit drugs, or were recently incarcerated. The majority of cases have been identified in Salt Lake County (67.1%) and Utah County (23.6%) with several other cases reported statewide. Only one confirmed case has been identified in Davis County—although there is a likely possibility for others.
- A simultaneous outbreak of measles and mumps also arrived in Utah during the early months of 2017. The initial cases of measles were identified in Salt Lake County in a special population that is often under- or unimmunized. One of the measles cases sought treatment at a local hospital where several potential exposures may have occurred. As a result, Davis County Health Department evaluated 60 individuals with an exposure and quarantined eight individuals through their incubation period (21-28 days). No cases of measles were identified in Davis County.

The mumps outbreak was associated with a school in Salt Lake County, with several students from a special population. Davis County had two cases of mumps—both of which were students who attended this school. Both had been vaccinated with two doses of the Measles, Mumps, and Rubella (MMR) vaccine. In October 2017, the Advisory Committee on Immunization Practices (ACIP) recommended that persons previously vaccinated with two doses of a mumps-virus containing vaccine who are identified by public health authorities as being part of a group or population at increased risk for acquiring mumps because of an outbreak should receive a third dose to improve protection against mumps disease and related complications.

- The rate of gonorrhea continues to steadily climb in Davis County and Utah. In 2017, 171 cases were reported, as compared to the 129 reported in the previous year. This accounts for a 33% increase in Davis County. It was the second most common disease reported in Davis County this year, following chlamydia at 1,094 cases. Those interviewed were found to have similar risk factors as previous years, including men who have sex with men (MSM), multiple sexual partners, anonymous sexual partners, incarceration, and substance abuse. However, more infections have been identified in a younger age group who identify themselves as heterosexual.
- The summer of 2017 was busy with mosquitoes and West Nile virus infection. Eight human cases were reported in Davis County—the first human cases since 2011. Fortunately, no deaths were reported and all recovered from their illness. Davis County's Mosquito Abatement District had over 100 mosquito pools test positive for West Nile virus. Recent years have typically only seen between 10 to 20 positive mosquito pools. An increase in mosquitoes carrying the virus usually equates to more human cases.

Executive Summary

- In the fall of 2017, Davis County Health Department was notified of approximately 3,000 bats that had been found in the stage and auditorium areas of Layton High School. A sudden drop in temperature had sent the migrating animals in search of a warm place to roost. They found their way into the auditorium through a gap in the building's HVAC system. DCHD evaluated seven students who reported a potential exposure to the animals. One student began rabies post-exposure prophylaxis (PEP), but discontinued when DCHD received test results that the bat was negative for rabies. A second student was given recommendations to start PEP, but declined. It was determined that the remaining five students had no exposure. A total of nine bats were submitted for testing at the Utah Public Health Laboratory. Only eight were able to be tested and all were negative for rabies.
- A case of legionellosis was associated with a local apartment complex. Davis County's Environmental Health Division visited the facility and took water samples from several of the units. One of the samples, retrieved from the unit's water heater, was positive for *legionella*. Davis County Health Department worked with the complex to ensure that the unit was vacated until the water system had been cleared. No additional cases were reported.
- A cluster of enteric illness was also investigated in November 2017. Several students at a local high school reported vomiting, diarrhea, and nausea after attending the Sadie Hawkins' dance. It is estimated that between 50 to 100 students became ill, although only 10 were reported to Davis County Health Department. One stool specimen was collected and was submitted to the Utah Public Health Laboratory to be tested with BioFire FilmArray, a type of culture-independent diagnostic test. This specimen screened positive for norovirus. Typically specimens are forwarded on for confirmation at an out-of-state public health laboratory only when there are 5+ samples.

Through interviews with several ill students or their parents, a common risk factor was identified. Many of the students had reported drinking from a water cooler while at the dance. At some point, the lid was taken off the cooler so students could dip their cup and fill it much faster. It is possible that the water cooler became contaminated and was the source of infection.

- In 2017, three active tuberculosis disease (ATBD) cases were reported in Davis County, two of which were pediatric cases. On average, Davis County investigates about one case of ATBD each year. Two cases were foreign-born, with one who had an existing comorbidity that predisposed them to this infection. The other cases belong to a special population where cultural beliefs complicate compliancy to treatment. Davis County Health Department is working with the Utah Department of Health to identify ways to work with this population to prevent future illness, including tuberculosis.
- The 2016-17 influenza season (October 2016 through May 2017) was a moderately severe season in Davis County. A total of 112 hospitalized-influenza cases were reported and the predominant circulating strain was influenza A (H3). The current influenza season (October 2017 through May 2018) has been quite severe with 114 hospitalized-influenza cases reported to-date. Health officials believe this season will surpass the 2009 swine flu pandemic and the 2014-15 influenza season when especially high numbers of hospitalizations and deaths were reported. The predominant circulating strain this season has also been identified as influenza A (H3).

Introduction

Davis County Health Department Communicable Disease and Epidemiology Bureau works in partnership with the medical community and neighboring health districts to control and prevent the occurrence and spread of communicable diseases. This is accomplished through disease surveillance, disease investigation, coordination of prevention efforts, treatment, education, training, and policy development. The bureau aims to:

- Interrupt/contain the spread of communicable diseases within the community
- Conduct surveillance for >80 communicable diseases/syndromes
- Provide education to infected/exposed citizens
- Facilitate appropriate treatment and preventive therapy
- Enforce measures that protect the community (e.g. isolation)
- Develop policies to address priority health issues



The Communicable Disease and Epidemiology Bureau (CD/Epi) is organized into four main program areas: STD/HIV, Tuberculosis Control, Infectious Disease, and Disease Surveillance.

STD/HIV Program

Sexually transmitted diseases (STDs) affect men and women of all ages, backgrounds, and economic status. The United States has made progress in identifying cases through better testing procedures, sexual partner testing/treatment, and risk-reduction education. There are still an estimated 20 million new cases of STDs acquired each year. Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), chlamydia, gonorrhea, syphilis, and chancroid are the STDs reportable by law in the state of Utah. Hospitals, laboratories, physicians, and clinics are mandated to report these diseases to the local health department.

The STD/HIV Program strives to ensure that all reported infected individuals are interviewed by a trained communicable disease nurse to:

- Verify that appropriate treatment was prescribed and taken
- Confidentially identify and notify contacts/partners of infected individuals who may have been exposed and facilitate testing and treatment
- Provide risk-reduction counseling and education

Tuberculosis Control Program

The Davis County Tuberculosis (TB) Control Program is dedicated to the prevention, control, and elimination of TB disease and the identification and treatment of latent TB infection (LTBI).

The successful control of tuberculosis in Davis County is largely due to the following program activities:

- Early identification, isolation, and appropriate treatment of individuals suspected of or diagnosed with tuberculosis disease
- Effective contact investigation activities to identify individuals exposed to TB and completion of medication therapy for those diagnosed with LTBI
- Targeted testing for those who are at higher risk for developing TB disease following an exposure (e.g. homeless, foreign-born, residents of correctional institutions, substance abusers)

Introduction

Infectious Disease Program

Communicable diseases reportable in the state of Utah, with the exception of STDs and tuberculosis, fall under this program. Once reported, the Infectious Disease program implements the following activities:

- Interview infected individuals to obtain a thorough history and identify exposed contacts
- Review and interpret laboratory results
- Implement control measures to interrupt disease transmission (e.g. exclusion from work/school)
- Monitor the disease process, assessing for changes in expected manifestations
- Facilitate treatment and prophylaxis for those infected or exposed
- Provide education on the specific disease and important preventive measures
- Formalize findings and report to the Utah Department of Health (UDOH)

The Infectious Disease Program has been further divided into the following categories:

- **Enteric Diseases** (Food and/or Waterborne): bacterial, viral, and parasitic diseases involving the gastrointestinal tract
- **Vaccine-Preventable Diseases:** diseases that are preventable with vaccines
- **Vector-borne/Zoonotic Diseases:** diseases transmitted by insects, animals, or birds
- **Invasive Diseases:** bacterial/viral infections of the blood stream, cerebral spinal fluid (e.g. meningitis, encephalitis) or other normally sterile sites (e.g. synovial, pleural, or pericardial fluid)
- **Other reportable diseases/conditions:** diseases that do not fall under the above categories

Disease Surveillance Program

The Surveillance Program is responsible for the systematic collection, analysis, and dissemination of data pertaining to infectious diseases of public health importance. The goal of the Surveillance Program is to provide statistics that prompt public health preventive action. Core functions of the Surveillance Program include:

- Providing medical professionals with access to disease reporting 24-hours a day/seven days a week
- Maintaining a computerized system for efficient storage and access to data
- Incorporating a variety of data sources including:
 - ◇ Notifiable disease reports
 - ◇ School absenteeism
 - ◇ Sentinel physician reports
 - ◇ Syndromic data
- Monitoring the occurrence and distribution of infectious disease activity
- Disseminating surveillance data to the public and medical professionals

Communicable diseases are reported to the local health department for investigation in accordance with the Utah State Health Code (R386-702). Prompt reporting of confirmed and suspect cases helps ensure necessary control and preventive actions. All reports required by rule are confidential and are not open to public inspection.

Entities required to report confirmed or suspected diseases are physicians, hospitals, healthcare facilities, laboratories, schools, and daycares. All case reports should include:

- Disease
- Patient's name
- Address
- Telephone number
- Date of birth
- Pertinent clinical information

REPORTABLE DISEASES

UTAH LAW REQUIRES THAT THE FOLLOWING DISEASES BE REPORTED TO YOUR LOCAL HEALTH DEPARTMENT OR THE UTAH DEPARTMENT OF HEALTH IMMEDIATELY.

Davis County Health Department Disease Reporting Line: (801) 525-5220

- **Anthrax*** (*Bacillus anthracis*)
- **Botulism*** (*Clostridium botulinum*)
- **Cholera** (*Vibrio cholerae*)
- **Diphtheria*** (*Corynebacterium diphtheriae*)
- ***Haemophilus influenzae****, invasive disease
- **Hepatitis A**
- **Influenza infection, non-seasonal strain***
- **Measles*** (Rubeola virus)
- **Meningococcal disease*** (*Neisseria meningitidis*)
- **Plague*** (*Yersinia pestis*)
- **Poliomyelitis**, paralytic and non-paralytic
- **Rabies** (human and animal)
- **Rubella** (excluding congenital syndrome)
- **Severe Acute Respiratory Syndrome (SARS)**
- **Smallpox** (Variola virus)
- ***Staphylococcus aureus****, with resistance (VRSA) or intermediate resistance (VISA) to vancomycin isolated from any site
- **Transmissible spongiform encephalopathies (prion diseases) including Creutzfeldt-Jakob disease**
- **Tuberculosis*** (*Mycobacterium tuberculosis*)
- **Tularemia*** (*Francisella tularensis*)
- **Typhoid**, cases and carriers
- **Viral hemorrhagic fevers**, e.g. *Ebola*, *Lassa*, *Marburg*, and *Nipah* virus-related illnesses
- **Yellow Fever**
- **Unusual Diseases or Outbreaks of any kind**

UTAH LAW REQUIRES THAT THE FOLLOWING DISEASES BE REPORTED TO YOUR LOCAL HEALTH DEPARTMENT OR THE UTAH DEPARTMENT OF HEALTH WITHIN 3 DAYS AFTER IDENTIFICATION.

Davis County Health Department Disease Reporting Line: (801) 525-5220

Or FAX (801) 525-5210

- **Acute flaccid myelitis (AFM)**
- **Adverse event resulting after smallpox vaccination** (*Vaccinia virus*)
- **Anaplasmosis** (*Anaplasma phagocytophilum*)
- **Arbovirus infection**, including Chikungunya, West Nile virus*, and Zika virus*
- **Babesiosis** (*Babesia*)
- **Botulism, infant*** (*Clostridium botulinum*)
- **Brucellosis*** (*Brucella* species)
- **Campylobacteriosis*** (*Campylobacter*)
- **Carbapenem-resistant or carbapenemase-producing *Acinetobacter* species, *Enterobacter* species, *Escherichia coli*, and *Klebsiella* species**
- **Chancroid** (*Haemophilus ducreyi*)
- **Chickenpox** (Varicella-zoster virus)
- ***Chlamydia trachomatis* infection**
- **Coccidioidomycosis** (*Coccidioides*)
- **Colorado tick fever**
- **Cryptosporidiosis** (*Cryptosporidium*)
- **Cyclosporiasis** (*Cyclospora cayetanensis*)
- **Dengue fever**
- **Ehrlichiosis** (*Ehrlichia*)
- **Encephalitis**
- **Giardiasis** (*Giardia lamblia*)
- **Gonorrhea**, (*Neisseria gonorrhoeae*) sexually transmitted and ophthalmia neonatorum
- **Hantavirus infection** (Sin Nombre virus)
- **Hemolytic Uremic Syndrome**, post-diarrheal
- **Hepatitis, viral**, including hepatitis B (acute, chronic, and perinatal), C, D, and E
- **Human immunodeficiency virus (HIV) infection**, including perinatal and acquired immunodeficiency syndrome (AIDS)
- **Influenza-associated hospitalization***
- **Influenza-associated death in a person less than 18 years of age**
- **Legionellosis*** (*Legionella*)
- **Leprosy** (Hansen's Disease)
- **Leptospirosis** (*Leptospira*)
- **Listeriosis*** (*Listeria monocytogenes*)
- **Lyme disease** (*Borrelia burgdorferi*)
- **Malaria** (*Plasmodium*)
- **Meningitis** (aseptic, bacterial, fungal, parasitic, protozoan and viral)
- **Mumps**
- **Mycobacteria other than tuberculosis***
- **Pertussis** (*Bordetella pertussis*)
- **Pregnancy associated with a Hepatitis B, Hepatitis C, HIV, *Listeria*, Rubella, Syphilis, or Zika virus infection**
- **Psittacosis** (*Chlamydophila psittaci*)
- **Q Fever** (*Coxiella burnetii*)
- **Relapsing fever, tick-borne and louse-borne** (*Borrelia*)
- **Rubella**, including congenital syndrome
- **Salmonellosis*** (*Salmonella*)
- **Shiga toxin-producing *Escherichia coli* (STEC) infection***
- **Shigellosis*** (*Shigella*)
- **Spotted fever rickettsioses, including Rocky Mountain spotted fever** (*Rickettsia*)
- **Streptococcal disease, invasive, due to *Streptococcus pneumoniae* and Groups A and B**
- **Syphilis**, all stages and congenital
- **Tetanus** (*Clostridium tetani*)
- **Toxic-Shock Syndrome**, staphylococcal or streptococcal
- **Trichinellosis** (*Trichinella*)
- **Vibriosis*** (*Vibrio*), including Cholera

REPORTABLE DISEASES THROUGH ELECTRONIC LABORATORY REPORTING (ELR) FOR PARTICIPATING LABORATORIES AND HOSPITALS

- ***Clostridium difficile***
- **CD4+ T-Lymphocyte tests**
- **Cytomegalovirus (CMV)**, congenital
- **Liver function tests**, including ALT, AST, and bilirubin associated with a viral hepatitis case
- **Norovirus infection**
- **Streptococcal disease**, invasive, other

*Laboratories shall submit clinical material to the Utah Public Health Laboratory for all cases identified with these organisms, or any organism implicated in an outbreak when instructed by authorized local or state health department staff.

Diseases may be reported to Davis County Health Department by fax (801-525-5210) or telephone (801-525-5220). For questions about disease reporting, please contact Sarah Willardson by phone (801-525-5206) or by email (swillardson@co.davis.ut.us) or visit <http://www.co.davis.ut.us/health/health-services/disease-control-services/healthcare-professionals-medical-providers>

Revised March 2017



Methods

Information retrieved during investigations of reported infectious disease cases is maintained in UT-NEDSS/EpiTrax—a secure, online database that allows epidemiologists and infectious disease workers to access case information statewide. Davis County Health Department (DCHD) exported data acquired for cases reported during 2017 into Microsoft Excel (2013) for further analysis. Descriptive statistics were also calculated in Microsoft Excel (2013).



Population estimates by city were only available for 2016. These estimates were obtained from the U.S. Census Bureau’s American Fact Finder at <http://factfinder.census.gov> in January 2018. The population estimate for Hill Air Force Base was obtained by searching the Air Force Base’s zip code (84056).

Population estimates by age group, gender, race, and ethnicity were available for 2016. These estimates were retrieved in January 2018 from the Utah Department of Health’s (UDOH) Indicator-Based Information System for Public Health (IBIS-PH) available at <http://ibis.health.utah.gov>.

All incidence rates were calculated in Microsoft Excel (2013) and are expressed as the number of cases reported in 2017 per 100,000 people. The incidence rates of all sexually-transmitted diseases (STDs) by city were similarly calculated, after controlling for age. This was done to account for the increased prevalence of STDs among the young adult population.



Disease morbidity and mortality have decreased over the past century, partly due to the partnership between private and public health care. Unfortunately, new and emerging diseases are surfacing, requiring additional efforts from both the medical community and public health. Existing pathogens are also increasing as our population increases. Disease affects all races, ethnicities, ages, and genders.

Davis County Health Department (DCHD) received a total of **2,128** disease reports during 2017, 9.3% more than the 1,947 disease reports received in 2016.

Over half (61.2%) of the diseases reported were sexually transmitted diseases, followed by vaccine-preventable diseases (10.6%), enteric diseases (8.3%), other diseases (7.5%), invasive diseases (6.5%), tuberculosis infections (5.0%), and vector-borne/zoonotic diseases (1.0%) (see Figure 1).

Cases were slightly more often reported among females (55.3%) and among 20-29 year olds (see Figure 2). Sexually transmitted diseases had a significant impact on the 20-29-year old age group. Statistically, females are more impacted by sexually transmitted diseases.

Figure 1. Diseases Reported by Type, Davis County, 2017

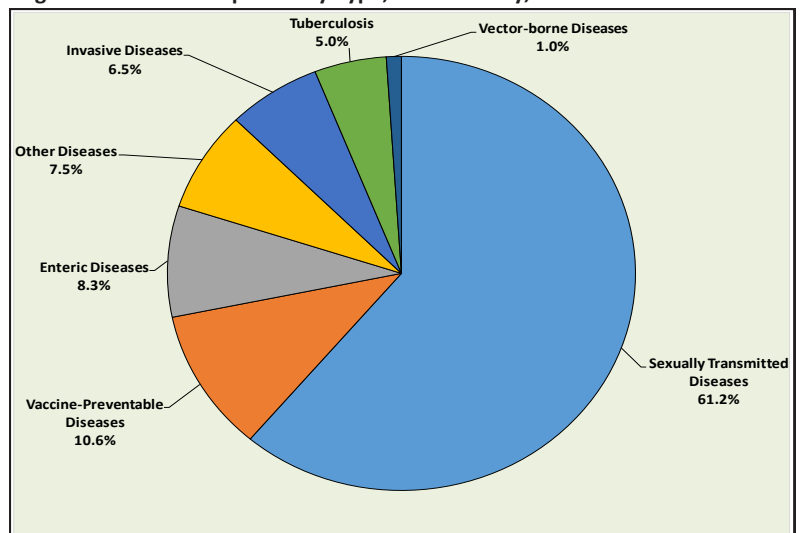
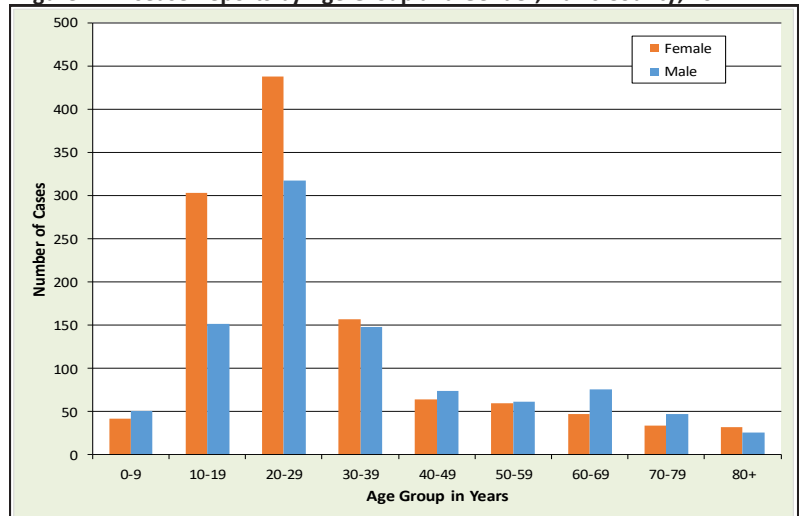
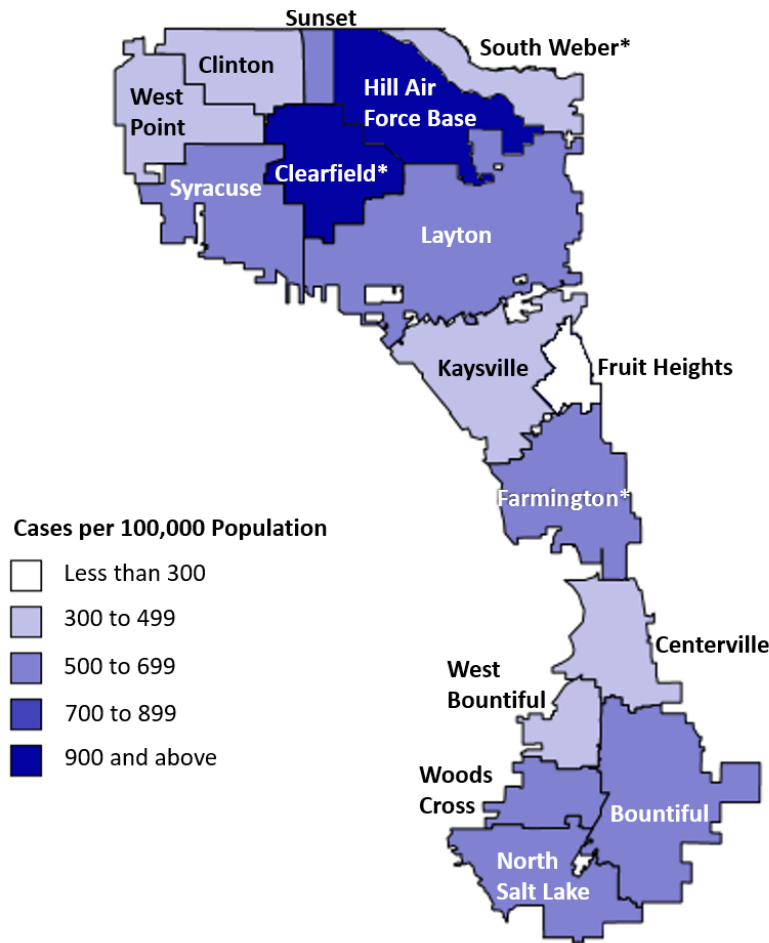


Figure 2. Disease Reports by Age Group and Gender, Davis County, 2017



Reportable Disease Summary

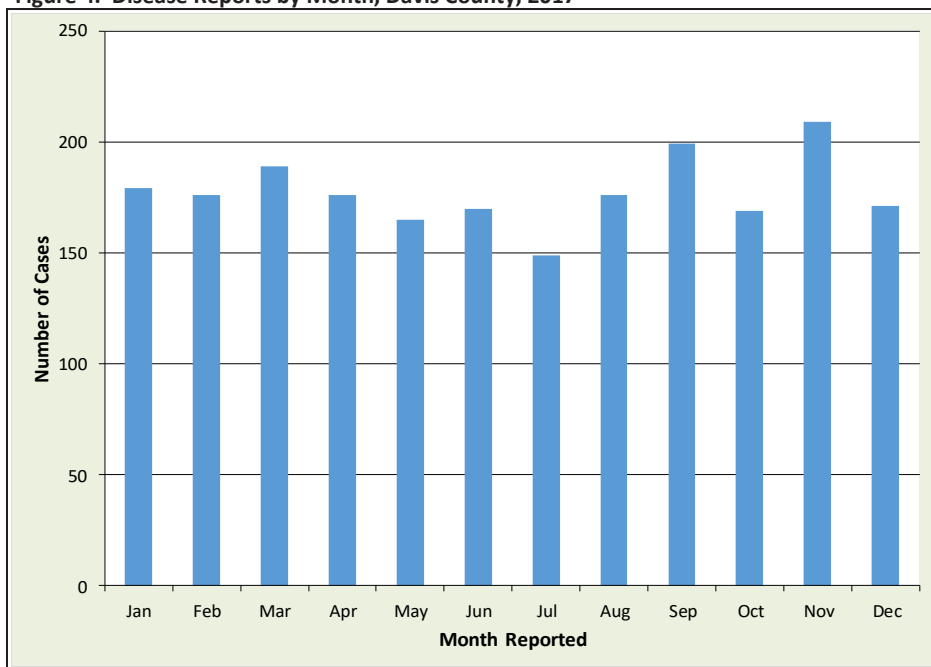
Figure 3. Incidence of All Reportable Diseases, Davis County, 2017



Disease rates by city are identified by the place of residence of the affected individual at the time of diagnosis. These rates do not suggest that one city is better or worse than another, but simply describe the disease burden in each city (see Figure 3). Tuberculosis data are not included because most infections were acquired outside of Davis County. Clearfield and Hill Air Force Base had the highest rates of all reportable diseases among all cities, whereas Fruit Heights had the lowest rates.

*These cities are impacted by temporary residential establishments (i.e. federal job corps and correctional facilities.)

Figure 4. Disease Reports by Month, Davis County, 2017



The disease burden in Davis County normally stays consistent throughout the year (see Figure 4). November 2017 had the highest number of disease reported. This is most likely due to two norovirus outbreaks that were identified during this time. In 2017, an average of 178 diseases were reported each month.

Top 20 Diseases

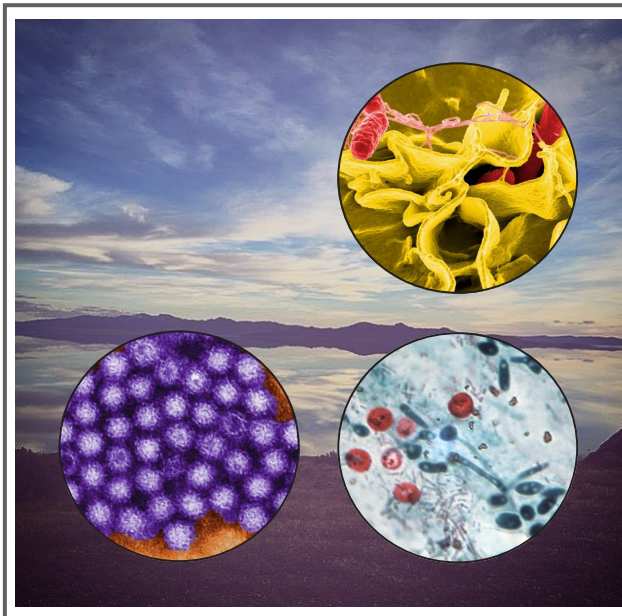
Table 1. Frequently Occurring Diseases in Davis County, 2017

Rank	Disease	Number of Cases
1	Chlamydia	1,094
2	Gonorrhea	171
3	Hepatitis C, Acute & Chronic	129
4	Influenza-Associated Hospitalization	122
5	Streptococcal Disease, Invasive	103
6	Tuberculosis, Latent Infection	102
7	Campylobacteriosis	59
8	Salmonellosis	41
9	Pertussis	37
10	Hepatitis B, Acute & Chronic	34
11	Chickenpox	26
11	Norovirus	26
13	Viral/Aseptic Meningitis	24
14	Syphilis – All Stages	23
15	Carbapenem-Resistant Enterobacteriaceae (CRE)	19
16	Giardiasis	18
17	HIV	14
18	Shiga Toxin-Producing <i>E. coli</i> (STEC)	13
19	Cryptosporidiosis	11
20	Lyme disease	9

Diseases Reported by Year, 2012 - 2017

Table 2. Diseases Reported by Year, Davis County, 2012 - 2017

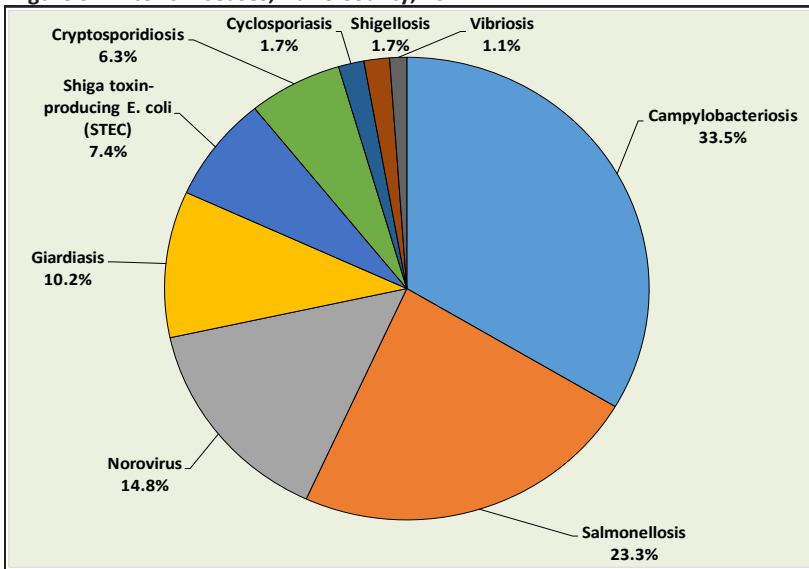
Disease	2012	2013	2014	2015	2016	2017	5 Yr Ave (2012 – 16)
Amebiasis	0	1	0	0	0	0	0.2
Botulism, infant	3	0	1	2	0	0	1.2
Brucellosis	1	0	0	0	0	0	0.2
Campylobacteriosis	36	43	71	46	41	59	47.4
Carbapenem-Resistant Enterobacteriaceae (CRE)	2	3	7	9	14	19	17.0
Chickenpox	37	39	33	15	23	26	29.4
Chikungunya	*	*	*	2	1	0	1.5
Chlamydia	862	847	923	886	934	1,094	890.4
<i>Clostridium perfringens</i>	0	0	0	0	0	1	0.0
Coccidioidomycosis	9	3	3	4	7	5	5.2
Colorado Tick Fever	1	0	0	0	0	0	0.2
Creutzfeldt-Jakob Disease (CJD)	1	0	2	1	0	1	0.8
Cryptosporidiosis	46	33	14	26	27	11	29.2
Cyclosporiasis	0	0	0	0	1	3	0.2
Dengue Fever	1	1	0	0	0	2	0.4
Encephalitis	1	0	0	2	1	0	0.8
Giardiasis	37	29	20	17	27	18	26.0
Gonorrhea	40	60	94	87	129	171	82.0
<i>H. influenzae</i> , invasive disease	1	3	4	2	6	5	3.2
Hansen's disease (Leprosy)	0	0	1	0	0	1	0.2
Hantavirus Pulmonary Syndrome (HPS)	0	0	0	0	1	0	0.2
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0.0
Hepatitis A	1	3	2	0	1	4	1.4
Hepatitis B, acute & chronic	21	24	42	22	34	34	28.6
Hepatitis C, acute & chronic	196	189	189	132	166	129	174.4
Hepatitis E	0	0	0	1	0	0	0.2
HIV/AIDS	11	4	9	11	7	14	8.4
Influenza, hospitalized	43	82	130	83	133	122	94.2
Legionellosis	2	2	4	4	1	4	2.6
Listeriosis	1	2	1	0	1	0	1.0
Lyme disease	4	3	5	1	2	9	3.0
Malaria	0	0	0	2	0	0	0.4
Meningitis, aseptic/viral	16	10	21	14	7	24	13.6
Meningitis, bacterial & other	1	2	4	2	0	6	1.8
Meningococcal disease	0	1	1	0	0	0	0.4
Mumps	0	0	0	0	1	2	0.2
Norovirus	6	20	27	21	69	26	28.6
Pertussis	139	104	117	72	24	37	91.2
Q fever, chronic	0	1	0	0	0	0	0.2
Salmonellosis	19	49	33	58	42	41	40.2
Shiga toxin-producing <i>E. coli</i> (STEC)	12	12	9	18	11	13	12.4
Shigellosis	1	0	3	21	9	3	6.8
Spotted Fever Rickettsiosis	0	0	1	1	1	2	0.6
<i>Staphylococcus aureus</i> with intermediate-resistance to vancomycin (VISA)	0	0	1	0	0	0	0.2
Streptococcal disease, invasive	78	73	67	87	87	100	78.4
Syphilis – all stages	21	20	14	14	19	23	17.6
Toxic-Shock Syndrome	2	0	1	2	4	3	1.8
Tuberculosis, active disease	1	1	0	0	2	3	0.8
Tuberculosis, latent infection	81	75	84	89	112	102	90.3
Vibriosis	0	0	0	1	0	2	0.2
West Nile virus infection	0	0	0	0	0	8	0.0
Zika virus	0	0	0	0	2	1	0.4
Total	1,734	1,739	1,938	1,755	1,947	2,128	1,874.0



Enteric Diseases

Enteric infections enter the body through the mouth and intestinal tract and are usually spread through contaminated food and water or by contact with vomit or feces.

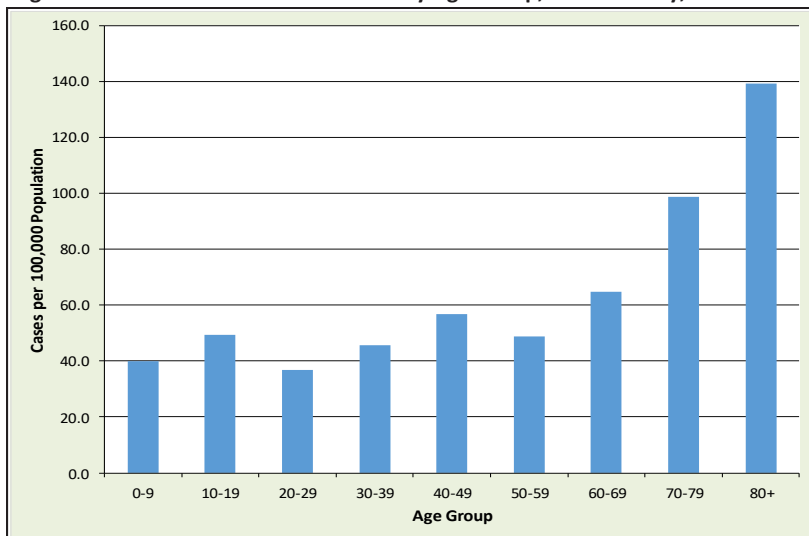
Figure 5. Enteric Diseases, Davis County, 2017



Enteric diseases are caused by bacterial, viral, or parasitic organisms that are shed in feces and can be spread person-to-person or through contaminated food and water. Enteric diseases are generally characterized by gastrointestinal symptoms such as nausea, vomiting, and diarrhea.

There were **176** enteric disease cases reported during 2017. Campylobacteriosis was the most frequently reported enteric disease with **59** cases (33.5%), followed by salmonellosis with **41** cases (23.3%), norovirus with **26** cases (14.8%), giardiasis with **18** cases (10.2%), Shiga toxin-producing *E. coli* (STEC) with **13** cases (7.4%), cryptosporidiosis with **11** cases (6.3%), cyclosporiasis with **three** cases (1.7%), shigellosis with **three** cases (1.7%), and vibriosis with **two** cases (1.1%) (see Figure 5).

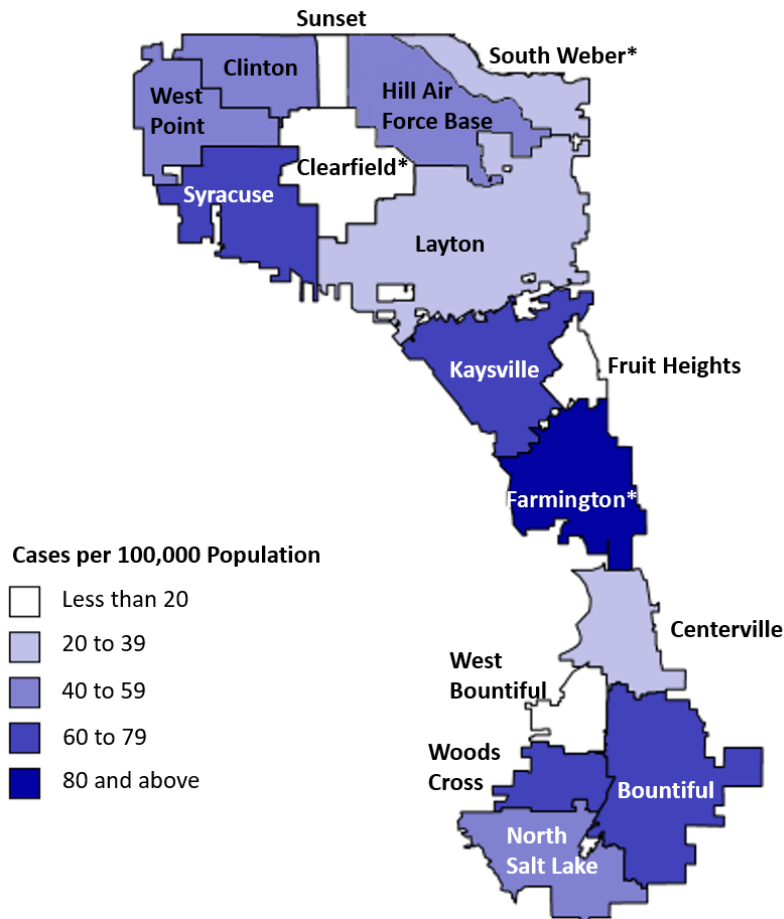
Figure 6. Incidence of Enteric Diseases by Age Group, Davis County, 2017



Just over half of the cases were male (50.6%) and rates of illness were highest among those greater than 80 years of age (see Figure 6). Enteric illnesses are common among the elderly and other susceptible groups, including children and the immunocompromised.

Enteric Diseases

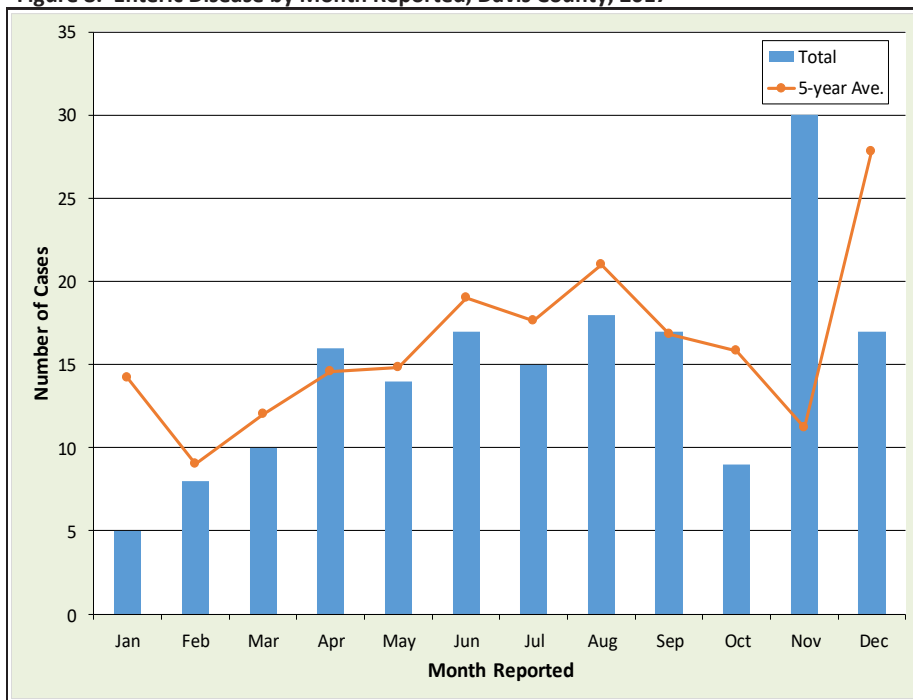
Figure 7. Incidence of Enteric Diseases by City, Davis County, 2017



*These cities are impacted by temporary residential establishments (i.e. federal job corps and correctional facilities.)

Enteric diseases were reported among residents of every city within Davis County, except Fruit Heights. The rate by city varied, but the average rate of enteric diseases was 46.4 per 100,000 residents (see Figure 7). Farmington had the highest rate of enteric illnesses (86.4 per 100,000 residents).

Figure 8. Enteric Disease by Month Reported, Davis County, 2017



Enteric diseases are reported year-round, but a higher incidence is usually noted during the summer months (see Figure 8). In 2017, enteric illnesses peaked during November when two outbreaks of norovirus were reported. However, enteric illnesses were also elevated during the summer season of 2017.

Campylobacteriosis

Campylobacteriosis is an infectious disease caused by bacteria of the genus *Campylobacter*. The bacteria are transmitted via the fecal-oral route. Improperly cooked poultry, untreated water, and unpasteurized milk are the main sources of infection. *Campylobacter* is one of the most common bacterial causes of diarrheal illness in the United States. Virtually all cases occur as isolated or sporadic events and are not usually associated with an outbreak. Active surveillance through the Centers for Disease Control and Prevention (CDC) indicates that about 14 cases are diagnosed each year for every 100,000 persons in the population. Many more cases go undiagnosed or unreported, and campylobacteriosis is estimated to affect over 1.3 million persons every year.

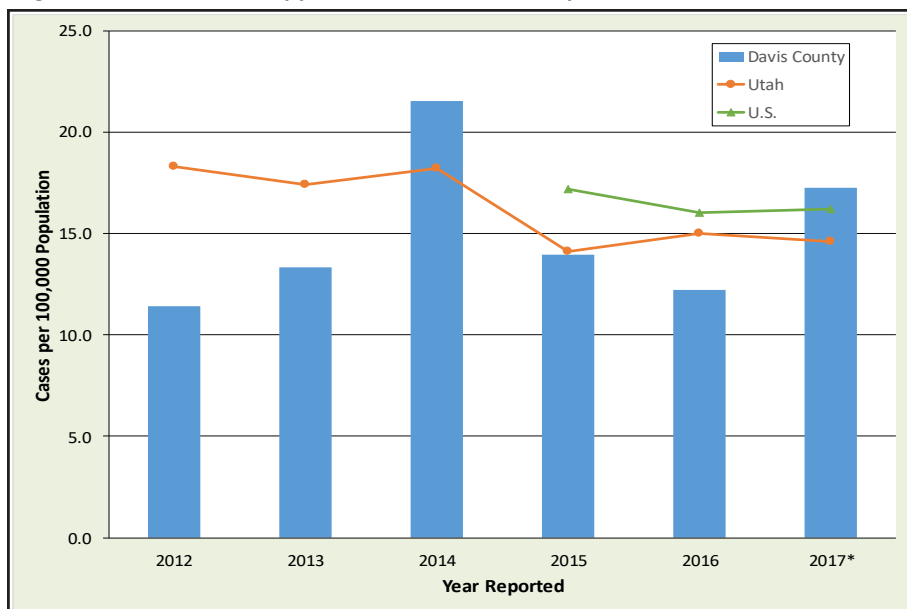


Campylobacter, one of the most common bacterial causes of diarrheal illness in the United States.

During 2017, there were **59** cases of campylobacteriosis reported in Davis County (see Figure 9). This corresponds to a 44% increase from the 41 cases that were reported in 2016. One statewide outbreak was identified during 2017, linked to raw milk from a dairy in a neighboring jurisdiction. Two Davis County residents were associated with this cluster.

When compared with the state of Utah, Davis County usually has lower rates of campylobacteriosis (see Figure 9). In more recent years, however, Davis County has risen above the state's rate. This is most likely due to outbreaks of campylobacteriosis in Davis County that were linked to raw milk during 2014 and contaminated culinary water in 2015. During 2017, Utah saw an increase of infections statewide; however, most cases had no commonalities or other shared risk factors.

Figure 9. Incidence of Campylobacteriosis, Davis County, Utah, United States, 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

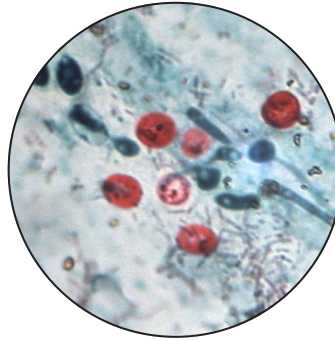
There were **59** cases of *Campylobacter* infection reported in Davis County in 2017.

Two cases were linked to a statewide outbreak associated with raw milk.

On average, Davis County has had lower rates of *Campylobacter* infection when compared to Utah.

Cryptosporidiosis

Cryptosporidiosis is an infection caused by the protozoan organism *Cryptosporidium parvum*. *Cryptosporidia* have been found in many hosts, including humans, cattle and other domestic mammals. Infections may occur via person-to-person, fecal-oral, animal-to-person, or waterborne transmission. During the past two decades, cryptosporidiosis has become recognized as one of the most common causes of waterborne disease in humans in the United States. The parasite may be found in drinking water and recreational water in every region of the United States and throughout the world.

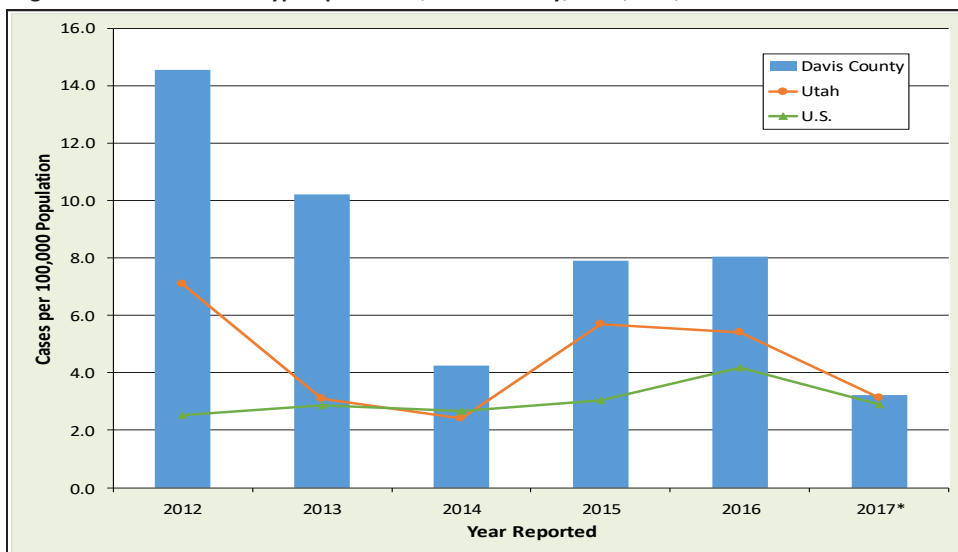


This micrograph of a direct fecal smear is stained to detect *Cryptosporidium*, a protozoan parasite.

During 2017, Davis County had **11** cases of cryptosporidiosis - a 59% decrease from 2016 when 27 cases were reported (see Figure 10). No outbreaks or clusters of illness were identified. Common exposures reported by cases included animal exposure, recreational water exposure, and international travel.

Historically, Davis County has had higher rates of cryptosporidiosis when compared to Utah and the United States (see Figure 10). In 2007, Utah experienced one of the largest cryptosporidiosis outbreaks in the United States with over 3,500 cases statewide, including nearly 300 in Davis County. These cases were largely associated with public swimming pools. Since that time, cases have diminished due to the implementation of new control measures, including installation of UV light filters in several Davis County pool systems and effective public service announcements.

Figure 10. Incidence of Cryptosporidiosis, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

There were **11** cases of cryptosporidiosis reported in Davis County in 2017.

Common exposures included animal exposure, recreational water exposure, & international travel.

Historically, Davis County has had higher rates of cryptosporidiosis when compared to Utah and the United States.

Giardiasis

Giardiasis is caused by *Giardia lamblia*, a microscopic parasite that causes diarrheal illness. *Giardia* is found on surfaces or in soil, food, or water that has been contaminated with fecal matter from infected humans or animals. Humans and other mammals (especially beavers, dogs, and cats) are reservoirs and shed the organism in their stool.



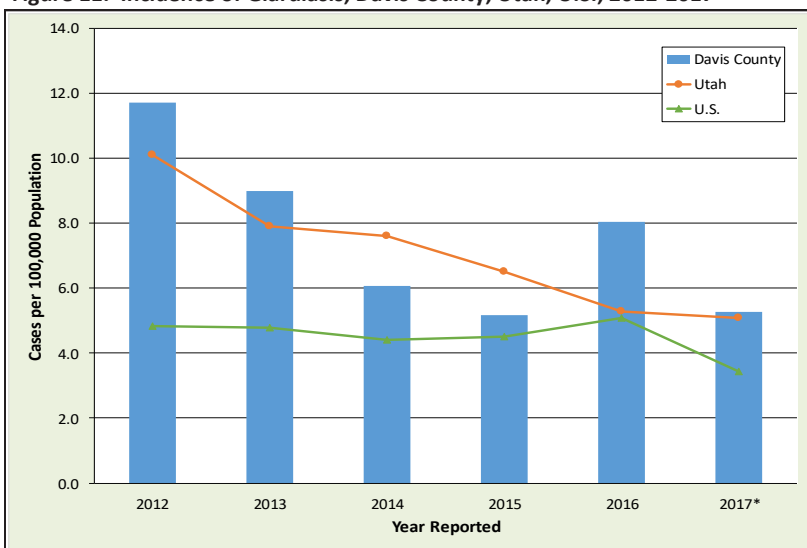
Giardia is a microscopic parasite that causes the diarrheal illness known as giardiasis.

Giardia is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it tolerant to chlorine disinfection. While the parasite can be spread in different ways, water (either drinking or recreational) is the most common mode of transmission.

Persons with giardiasis are infectious to others for the entire period of their illness, which can be weeks or months. Severity of disease varies from no symptoms to chronic diarrhea. Giardiasis tends to have intermittent symptoms, thus individuals may seek medical attention months after the initial infection occurred.

During 2017, there were **18** cases of giardiasis reported in Davis County, a 33% decrease from the 27 cases reported in 2016 (see Figure 11). No outbreaks of giardiasis were investigated in Davis County during 2017. However, common exposures reported by cases included recreational water/outdoor activities and international travel. In Utah (including Davis County), cases of giardiasis typically peak in the summer and early fall months, coinciding with more outdoor recreation and potential exposures to *Giardia lamblia*.

Figure 11. Incidence of Giardiasis, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

When compared to the state of Utah, Davis County traditionally has higher rates of giardiasis (see Figure 11). Davis County Health Department (DCHD) continues to conduct disease surveillance to identify cases and/or clusters, determine the source of infection, and prevent further transmission.

2017 Highlights

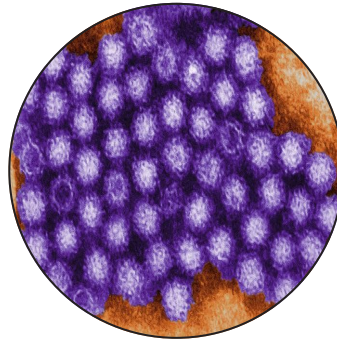
There were **18** cases of giardiasis reported in Davis County in 2017.

Common exposures include recreational water/outdoor activities and international travel.

When compared to the state of Utah, Davis County had a comparable rate of giardiasis during 2017.

Norovirus

Noroviruses are named after the original strain “Norwalk virus,” which caused an outbreak of gastroenteritis in a school in Norwalk, Ohio, in 1968. There are at least five known norovirus geno-groups, which in turn are divided into at least 31 genetic clusters. Noroviruses are transmitted primarily through the fecal-oral route, by consumption of fecal-contaminated food/water or by direct person-to-person contact. Environmental and fomite contamination are also sources of infection. Evidence exists of transmission via aerosolization of vomitus resulting in droplets contaminating surfaces or entering the oral mucosa and then swallowed. No evidence suggests that infection occurs through the respiratory route. The Centers for Disease Control and Prevention (CDC) estimates that 19-21 million cases of acute gastroenteritis due to norovirus infection occur each year (see Figure 12). Norovirus is the leading cause of foodborne illness in the United States and is responsible for about 50% of foodborne disease outbreaks due to known agents.



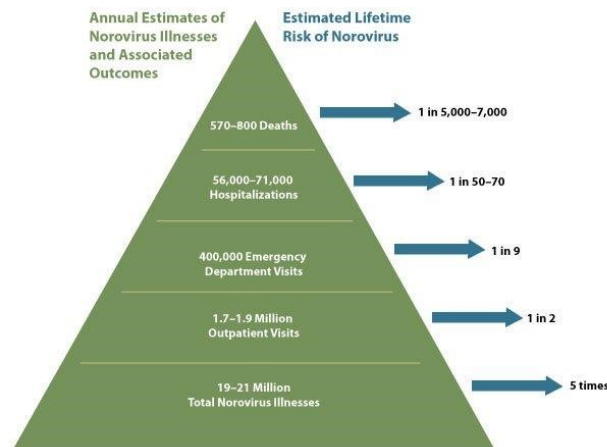
Norovirus is a very contagious virus. You can get norovirus from an infected person, contaminated food or water or by touching contaminated surfaces.

Due to the short duration of illness (typically 24 hours) and the self-limited, mild-to-moderate manifestation, persons infected with norovirus often do not seek medical care. Those who do are rarely tested for norovirus because testing is not widely available. As a result, many outbreaks are not identified. When suspect cases are reported to the health department, they are often received after the patient has recovered or late into the illness, making it difficult to confirm a diagnosis.

During 2017, there were **26** cases of norovirus reported to Davis County Health Department (DCHD), including an outbreak associated with a high school dance.

In November 2017, several reports of ill students were reported to DCHD after they had attended a high school dance. DCHD was able to collect a stool specimen from one of the ill students. It was tested at the Utah Public Health Laboratory (UPHL) using BioFire FilmArray. This specimen screened positive for norovirus, but was not sent for confirmation. UPHL typically only sends samples for confirmation when >5 specimens are available. In total, only 10 students were reported to DCHD, although there is reason to believe many more were ill.

Figure 12. Burden of Norovirus Illnesses, United States



2017 Highlights

A total of **26** cases of norovirus were reported in Davis County during 2017.

An outbreak of norovirus associated with a high school dance was reported in 2017. A total of **10** students were reported ill.

Norovirus is the leading cause of foodborne illness in the United States.

Salmonellosis

Salmonellosis is a bacterial infection generally transmitted through ingestion of contaminated food or water. Salmonellosis can also be transmitted by direct contact with an infected human or animal. *Salmonella* bacteria are commonly found in food products and can be carried by many domestic animals. The Centers for Disease Control and Prevention (CDC) estimates that approximately 1.2 million illnesses due to salmonellosis occur in the United States every year and is more common in summer than in winter. Young children, the elderly, and those who are immunocompromised are most likely to have severe infections. It is estimated that approximately 450 persons die each year from salmonellosis.



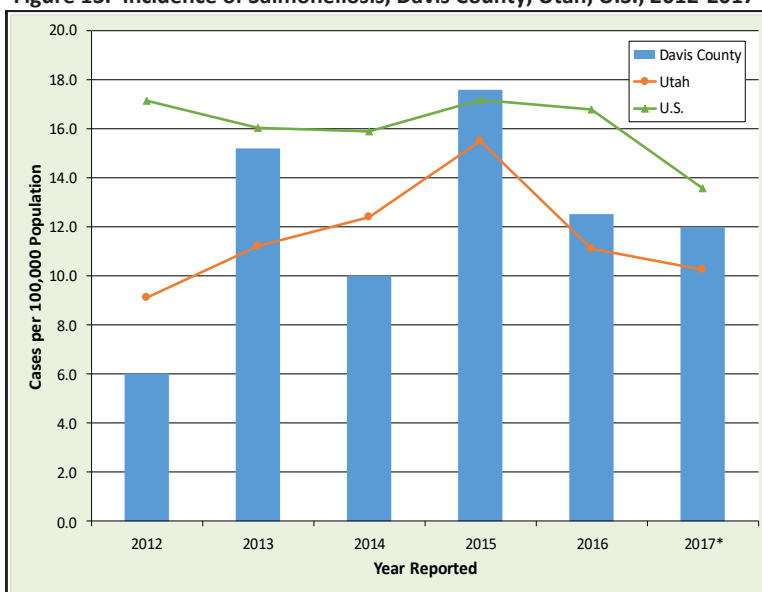
Salmonella is a bacteria that was discovered by an American scientist named Dr. Salmon and has been known to cause illness for over 125 years.

During 2017, there were **41** cases of salmonellosis reported in Davis County, a 2% decrease from the 42 cases reported in 2016 (see Figure 13). A few clusters of salmonellosis in Davis County were associated with national outbreaks in 2017.

Because of the many different strains of *Salmonella*, determining the serotype and Pulse-Field Gel Electrophoresis (PFGE) pattern of *Salmonella* isolates is critical in identifying sources and epidemiological links among cases. Serotypes are conventionally named after the city where they were discovered. Private laboratories are required to submit *Salmonella* isolates to the Utah Public Health Laboratory (UPHL) for serotyping and PFGE analysis. PFGE patterns are compared with other Utah and U.S. *Salmonella* isolates to identify possible clusters and suspect sources.

Salmonella Saintpaul was the most commonly reported *Salmonella* serotype during 2017 (see Table 3). *Salmonella* Typhimurium also had a significant presence in Davis County in 2017. Additional serotypes were reported in 2017, but were not as common. The number of cases of salmonellosis among Davis County residents by serotype is shown in Table 3.

Figure 13. Incidence of Salmonellosis, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

There were **41** cases of salmonellosis reported in Davis County in 2017.

Salmonella Saintpaul was the most commonly reported strain.

Davis County traditionally has lower rates of salmonellosis when compared to the United States.

Salmonellosis

Table 3. Salmonellosis Serotypes, Davis County, 2017

Serotype	Number of Cases (%)
Saintpaul	7 (17.1%)
Typhimurium	6 (14.6%)
Enteritidis	4 (9.8%)
Infantis	4 (9.8%)
Unknown	3 (7.3%)
Braenderup	2 (4.9%)
Javiana	2 (4.9%)
Montevideo	2 (4.9%)
Oranienburg	2 (4.9%)
Paratyphi B [1], 4, [5], 12:b:1,2	2 (4.9%)
Serovar I 4, [5], 12:1:-	2 (4.9%)
Agona	1 (2.4%)
Minnesota	1 (2.4%)
Newport	1 (2.4%)
Sandiego	1 (2.4%)
Serovar 50:g,z51:-	1 (2.4%)
Total	41 (100.0%)

A few clusters of salmonellosis were investigated in Davis County during 2017.

Salmonella Saintpaul

A local cluster of *Salmonella* Saintpaul was identified in Utah during April 2017. A total of five confirmed cases from Davis and Utah counties were infected. The cases were generalized in the south end of Davis County, with two in the same neighborhood. However, no common foods or restaurants were identified. In the past *Salmonella* Saintpaul infections have been linked to cucumbers, turkey, jalapeno peppers, and raw milk.

Salmonella Oranienburg

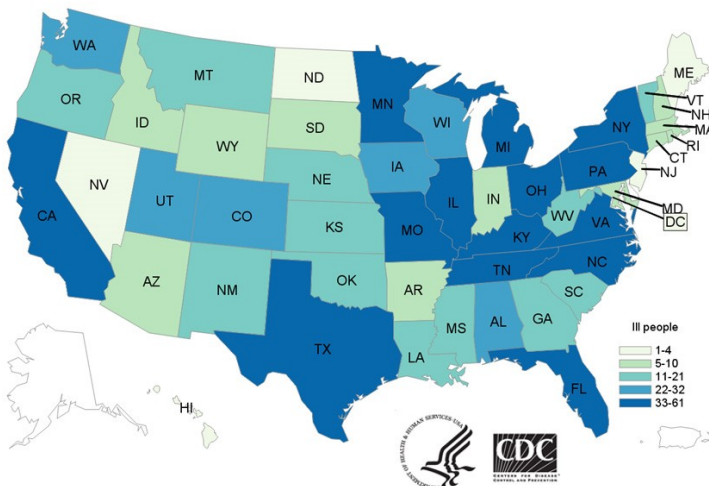
A multistate outbreak of *Salmonella* Oranienburg was identified during 2017 and is still under investigation. This outbreak is suspected to be linked to Mexican-style cheese or rattlesnake supplements imported from Mexico. As of December 2017, a total of 56 people from 16 states were infected, including two Davis County residents. However, neither case reported having exposures to the suspected food items.

Salmonella Infections Linked to Live Poultry in Backyard Flocks

In 2017, CDC reported the largest numbers of illnesses linked to contact with backyard poultry to date. CDC and multiple states investigated 10 separate multistate outbreaks of *Salmonella* infections in people who had contact with live poultry in backyard flocks. A total of 1,120 cases were reported from 48 states (see Figure 14). The outbreaks were caused by several *Salmonella* bacteria, including *Salmonella* Braenderup, *Salmonella* Enteritidis, *Salmonella* Hadar, *Salmonella* I 4,[5],12:i:-, *Salmonella* Indiana, *Salmonella* Infantis, *Salmonella* Litchfield, *Salmonella* Mbandaka, *Salmonella* Muenchen, and *Salmonella* Typhimurium. These outbreaks serve as a reminder to wash hands after touching live poultry, keep birds outside of the home, and avoid kissing or snuggling the animals.



Figure 14. Human *Salmonella* infections linked to live poultry, by state of residence, 2017



Shiga Toxin-Producing *Escherichia coli* (STEC) Infection

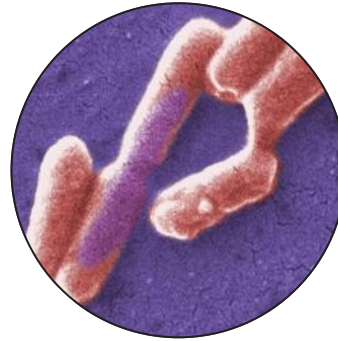
E. coli are bacteria that normally live in the intestines of humans and animals. Certain strains of *E. coli*, including O121, O11, O26, and O157:H7 produce Shiga toxins that can cause hemorrhagic colitis, manifested as bloody stools. The most serious complication of the infection is Hemolytic Uremic Syndrome (HUS), which can lead to permanent kidney damage or death.

Sources of transmission include consumption of undercooked, contaminated ground beef and other beef products, unpasteurized milk, drinking or swimming in water that is contaminated with sewage, or eating unwashed fruits or vegetables. Person-to-person transmission can occur within households, childcare centers, and long-term care (LTC) facilities.

Due to the potential severity of Shiga toxin-producing *E. coli* (STEC) and the fact that it spreads easily, public health investigates all reported cases thoroughly. Individuals in high-risk settings (e.g. food handlers and day care workers or attendees) must be cleared by public health before returning to the facility.

In 2017, there were **13** cases of STEC infection reported in Davis County, an increase of 18% from the 11 cases reported in 2016 (see Figure 15). The most common strain reported in Davis County was O157:H7 with five cases. Other strains identified included O26, O111, O121, and O5:nonmotile (see Table 4).

Only three of the cases were hospitalized and no HUS or deaths were reported. Possible exposures reported by patients included contact with animals and recreational water/outdoor activities.

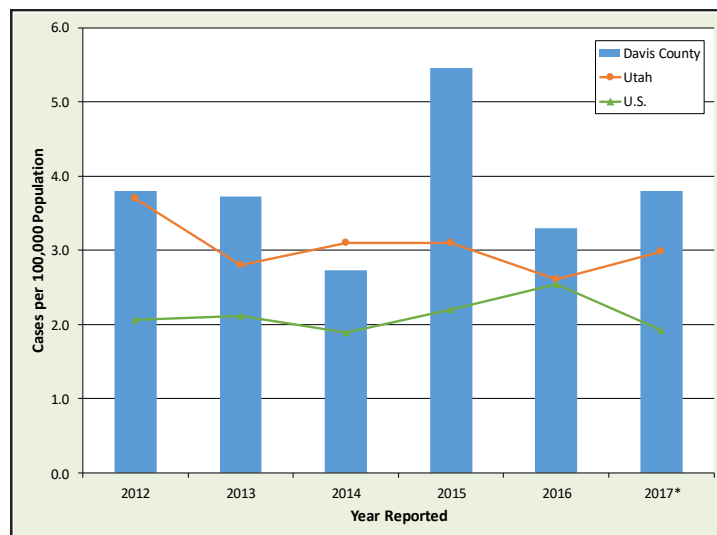


E. coli bacteria normally live in the intestines of people and animals. Most *E. coli* are harmless and actually are an important part of a healthy human intestinal tract.

Table 4. Shiga Toxin-Producing *E. coli* Serotypes, Davis County, 2017

Serotype	Number of Cases (%)
O157:H7	5 (38.5%)
Unknown	3 (23.1%)
O26	2 (15.4%)
O111	1 (7.7%)
O121	1 (7.7%)
O5:nonmotile	1 (7.7%)
Total	13 (100.0%)

Figure 15. Incidence of STEC Infections, Davis County, Utah, U.S., 2012-2017



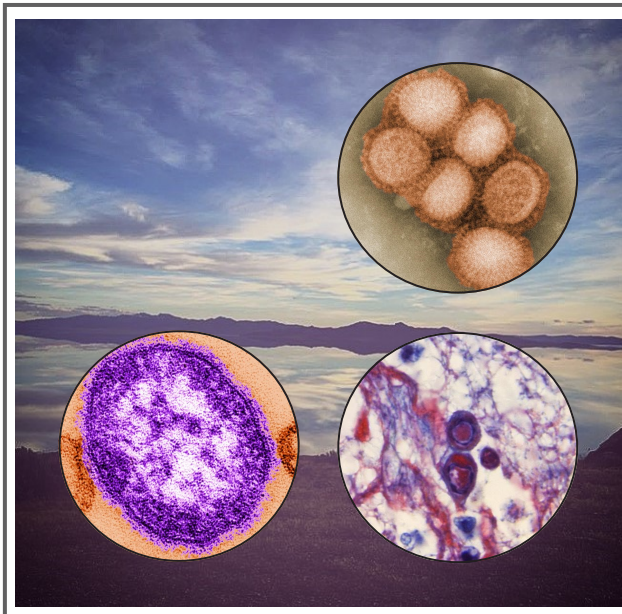
*Utah and United States 2017 data are provisional.

2017 Highlights

There were **13** cases of STEC infection reported in Davis County in 2017.

Common exposures included contact with animals and recreational water/outdoor activities.

When compared to Utah and the United States, Davis County usually has higher rates of infection due to *E. coli*.



Vaccine-Preventable Diseases

Vaccine-preventable diseases are infectious diseases for which an effective preventive vaccine exists.

Vaccine-Preventable Diseases (VPDs) are diseases that are preventable through the use of immunizations. Historically, VPDs caused a great deal of morbidity and mortality in children. Rates of VPDs have dramatically declined in large part because of immunizations. Yet worldwide each year, 22.6 million children do not receive basic vaccines and more than 3 million people die of vaccine-preventable diseases. Immunizations are the most effective step in protecting the community against VPDs. However, these diseases still occur because of importation, vaccine failure or disease breakthrough, and incomplete or no vaccinations.

When a VPD is diagnosed, it is important that public health measures be quickly implemented to contain the spread. The measures include the administration of prophylactic medications and vaccines, isolation of the infected individual, quarantine of exposed individuals, and public education.

In 2017, hospitalized influenza was the most commonly reported VPD with **122** cases (54.2%), followed by pertussis with **37** cases (16.4%), hepatitis B with **34** cases (15.1%), chickenpox with **26** cases (11.6%), hepatitis A with **four** cases (1.8%), and mumps with **two** cases (<1%) (see Figure 16).

The incidence of vaccine-preventable diseases is highest among the elderly and children (see Figure 17). Influenza especially affected the elderly population this season.

Figure 16. Vaccine-Preventable Diseases, Davis County, 2017

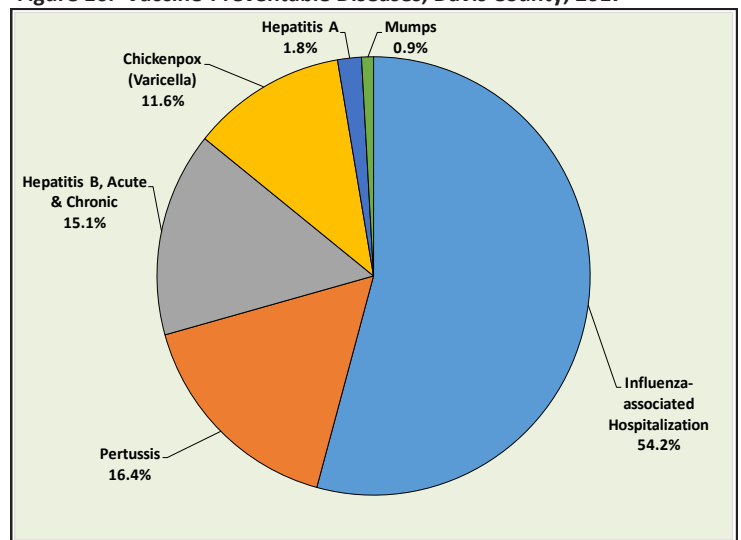
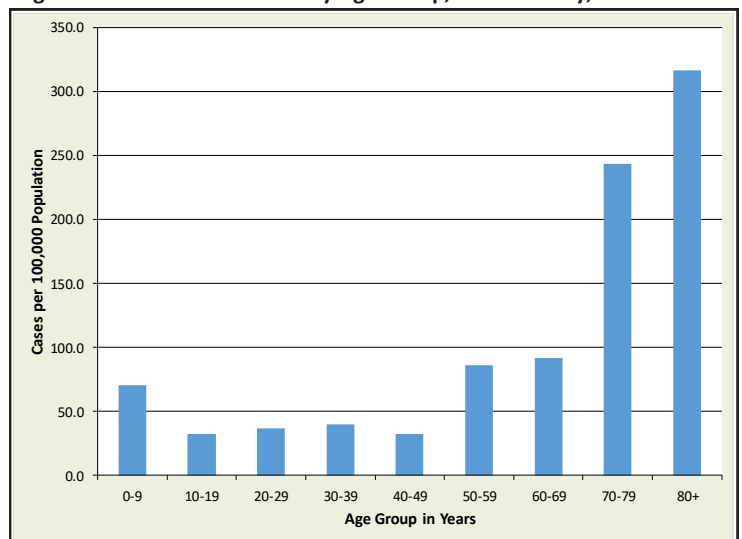
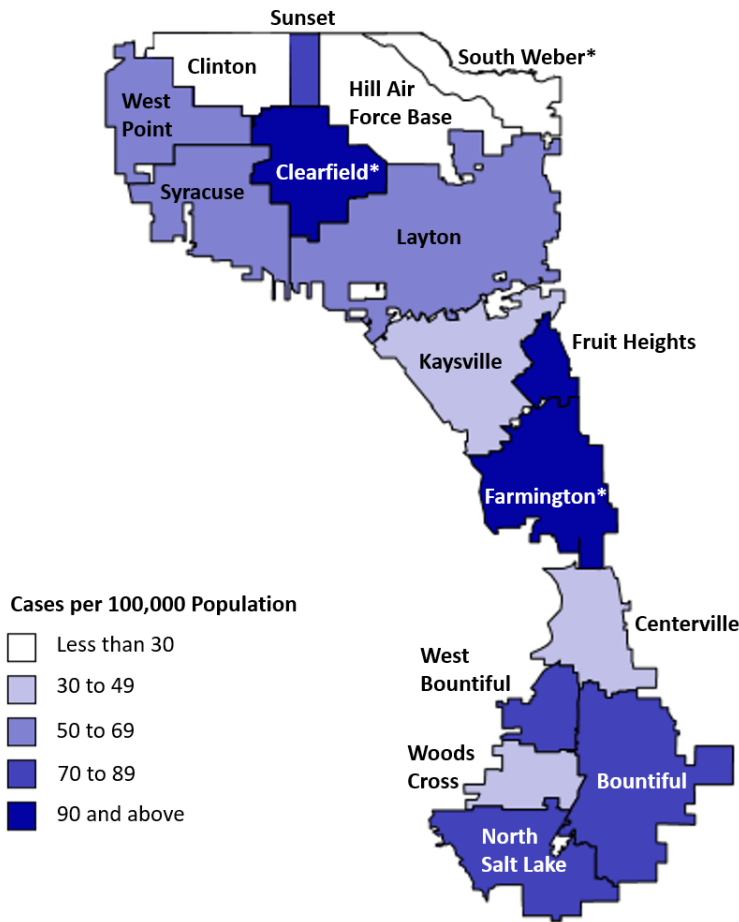


Figure 17. Incidence of VPDs by Age Group, Davis County, 2017



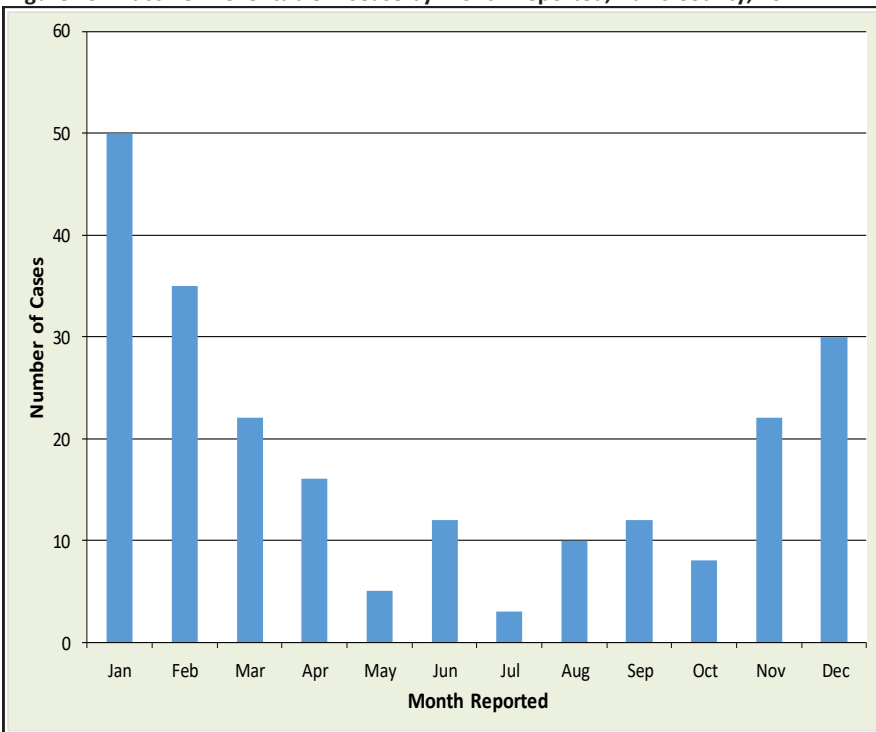
Vaccine-Preventable Diseases (VPDs)

Figure 18. Incidence of Vaccine-Preventable Diseases by City, Davis County, 2017



Vaccine-preventable diseases occurred among residents of every city throughout the county (see Figure 18). The city with the highest incidence was Clearfield. In contrast, Clinton, Hill Air Force Base, and South Weber had the lowest incidence of vaccine-preventable diseases. The average rate of vaccine-preventable diseases was 63.1 cases per 100,000 residents.

Figure 19. Vaccine-Preventable Disease by Month Reported, Davis County, 2017



Vaccine-preventable diseases (particularly pertussis and chickenpox) are usually reported more frequently during the school year (see Figure 19). Influenza season typically begins in December and peaks during January or February. The 2016-17 influenza season was no exception (see Figure 19).

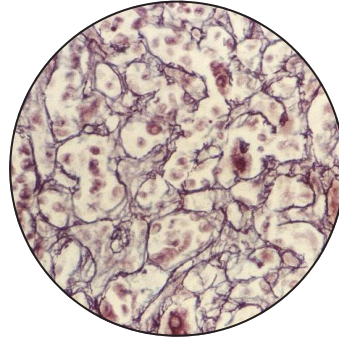
Hepatitis A

Hepatitis A is a disease caused by the hepatitis A virus, which targets the liver. It is transmitted via the fecal-oral route either by person-to-person contact or by consumption of contaminated food or water. Hepatitis A is highly contagious and is best prevented through vaccination.

The hepatitis A vaccine was introduced in 1995 and rates of the disease have declined steadily since 1999 when routine vaccination was recommended for children living in states with high incidence, including Utah (see Figure 20).

Utah is currently experiencing a surge of hepatitis A cases with over 140 cases reported during 2017. Several of these cases have been linked to a national outbreak involving cases in California and Arizona. These cases are often part of high-risk groups including those who are homeless, use illicit drugs, or were recently incarcerated. The majority of cases have been identified in Salt Lake and Utah Counties. In 2017, Davis County had **four** cases of hepatitis A reported, although only one case has been linked to the current outbreak (see Figure 21).

DCHD has also been involved in the current outbreak as several contacts have been reported with potential exposures (i.e. recent incarceration, restaurant exposure, and/or homelessness). Public health continues to provide hepatitis A vaccination to those with exposures who are under- or uninsured.



Hepatitis A is a liver infection caused by the hepatitis A virus (HAV). It is highly contagious and can be transmitted by the fecal-oral route.

Figure 20. Incidence of Hepatitis A, United States, 1980-2014

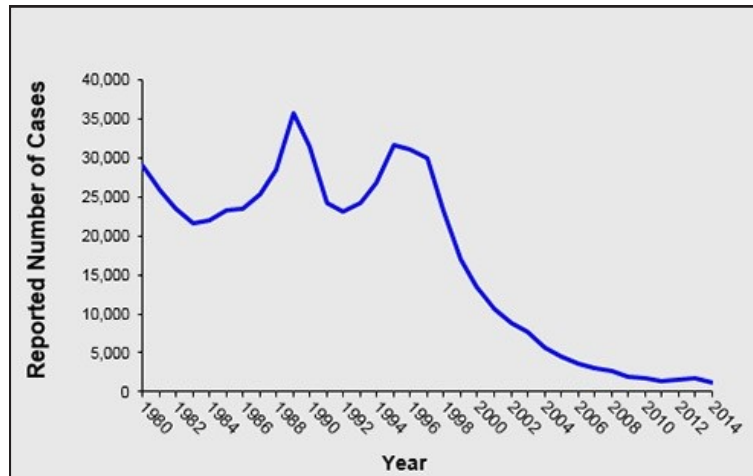
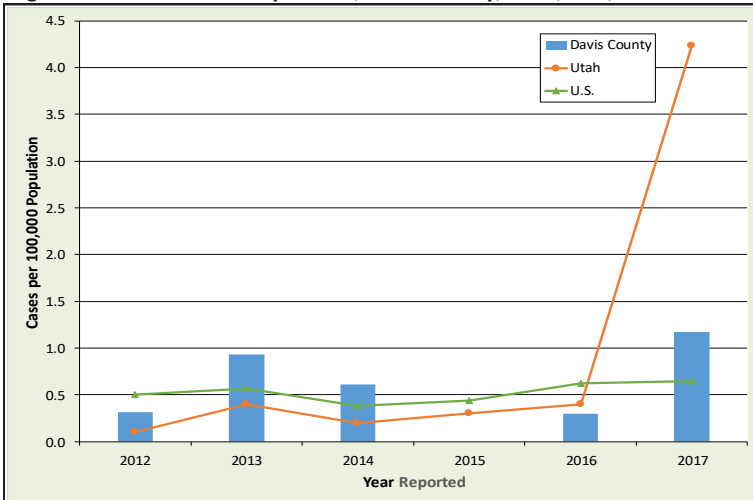


Figure 21. Incidence of Hepatitis A, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

There were **four** cases of hepatitis A reported in Davis County in 2017.

A statewide outbreak of hepatitis A is currently occurring with over 140 cases reported to date.

One Davis County resident has been linked to the statewide outbreak.

Hepatitis B (Acute and Chronic Infections)

Hepatitis B is a vaccine-preventable disease caused by the hepatitis B virus (HBV). It is transmitted through blood or body fluids. Common modes of transmission include percutaneous and permucosal exposure to infectious body fluids, sharing needles or syringes, sexual contact with an infected person, and perinatal exposure from an infected mother. In the United States, an estimated 850,000 to 2.2 million persons have chronic HBV infection. Acute HBV infection occurs most commonly among adolescents and adults in the United States.

During 2017, there were **34** cases of hepatitis B reported in Davis County. Only eight of the 34 cases were determined to be acute infections. **Four** chronic cases were pregnant and were referred to the Perinatal Hepatitis B Prevention Program for further interventions (see below). Several of the non-pregnant HBV cases were at high risk for infection (e.g. foreign born, IDU, sexual/household exposure to a positive contact).

Perinatal Hepatitis B Prevention Program

The Perinatal Hepatitis B Prevention Program is responsible for the case management (evaluation, monitoring, testing, and facilitation of HBIG and hepatitis B vaccination) of all reported cases of HBsAg positive pregnant females in Davis County. Prior to the baby's birth, arrangements are made with the delivering hospital to administer hepatitis B immune globulin (HBIG) and the first dose of hepatitis B vaccine to the newborn within 12 hours after delivery in an effort to prevent the newborn from acquiring the virus. The newborn is monitored until all three doses of vaccine have been administered. After vaccination, serology testing is conducted to ensure antibody protection. If the infant is a non-responder to the vaccine, a second series is given. Testing is repeated at completion of the second series. Women, who are prenatally tested and determined to be chronic hepatitis B carriers, are interviewed to identify close contacts. Identified contacts (sexual partners, household contacts, and children) are recommended to have testing to determine their infection status. If serology testing is negative, the hepatitis B vaccination series is encouraged. The case management of HBsAg positive pregnant females can range from 8-18 months.

As many as 90% of infants who acquire HBV infection from their mothers at birth become chronically infected. Of children who become infected with HBV between 1-5 years of age, 25-50% become chronically infected. The risk drops to 6-10% when a person is infected over 5 years of age.

In 2017, **four** women were followed through Davis County Health Department's (DCHD) Perinatal Hepatitis B Prevention Program.



The mission of the Perinatal Hepatitis B Prevention Program is to increase identification and treatment of women, their infants, and household contacts that are positive for the hepatitis B virus.

2017 Highlights

There were **34** cases of hepatitis B reported in Davis County in 2017.

In 2017, four women were followed through DCHD's Perinatal Hepatitis B Prevention Program.

As many as 90% of infants who acquire HBV infection from their mothers at birth become chronically infected.

Influenza

Influenza is an acute respiratory infection caused by RNA viruses from the *Orthomyxoviridae* family. Humans are the primary reservoir for human influenza, but many influenza species can also infect birds and mammals. Influenza is transmitted via respiratory droplets and direct contact.

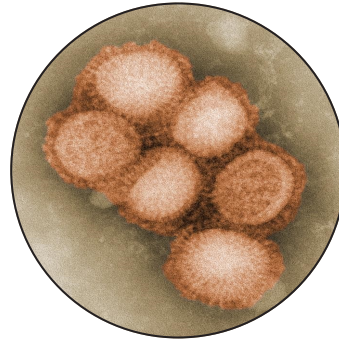
Because of the large number of cases that occur each season, traditional surveillance methods are impractical for influenza. Therefore, the disease is monitored using a variety of mechanisms. One method is through the use of “sentinel sites.” Davis County tracks physician visits for influenza-like illness at sentinel sites throughout the county. These sites report data weekly in order to identify when influenza season begins and ends and to monitor the burden of disease in the county. During the 2016-17 influenza season, three sentinel sites reported data to Davis County Health Department (DCHD) and Utah Department of Health.

Hospitals and other clinics submit specimens for influenza testing/typing to the Utah Public Health Laboratory (UPHL) so that circulating strains can be identified.

In addition, medical providers, hospitals, and laboratories are required by state law to report hospitalized influenza cases and pediatric influenza deaths to the local health departments. These two levels of reporting help public health evaluate disease severity, which is another important aspect of surveillance.

Davis County also partners with Davis School District to monitor elementary school absentee data. When schools experience a higher than expected absentee rate, the district is notified and an investigation is conducted to determine the cause of the excess absences. Increases in absenteeism are often observed when influenza season peaks (see Figure 23).

DCHD publishes a *Weekly Influenza Report* every Thursday during peak influenza season. These reports provide a current view of influenza activity in Davis County, Utah, and the United States. These reports are available on our website at: <http://goo.gl/7P63qq>.



Flu is a contagious respiratory illness caused by influenza viruses. It can cause mild to severe illness.

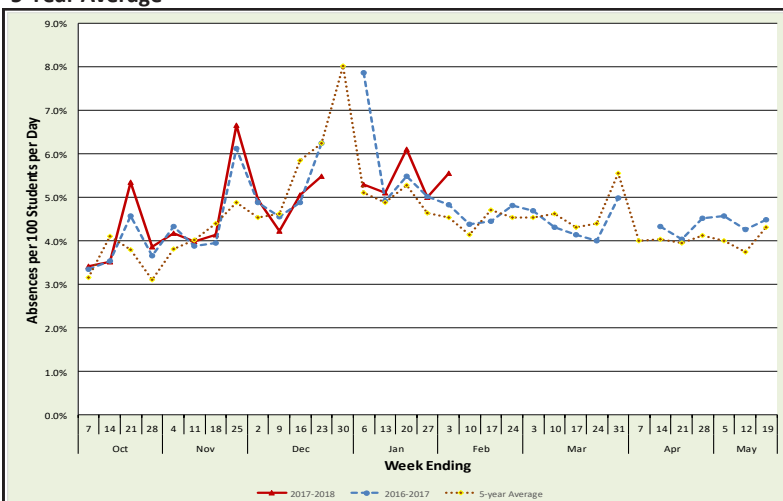
2017 Highlights

A total of 112 hospitalized-influenza cases were reported during the 2016-17 influenza season.

In the 2016-17 season, the most common circulating virus was influenza A (H3).

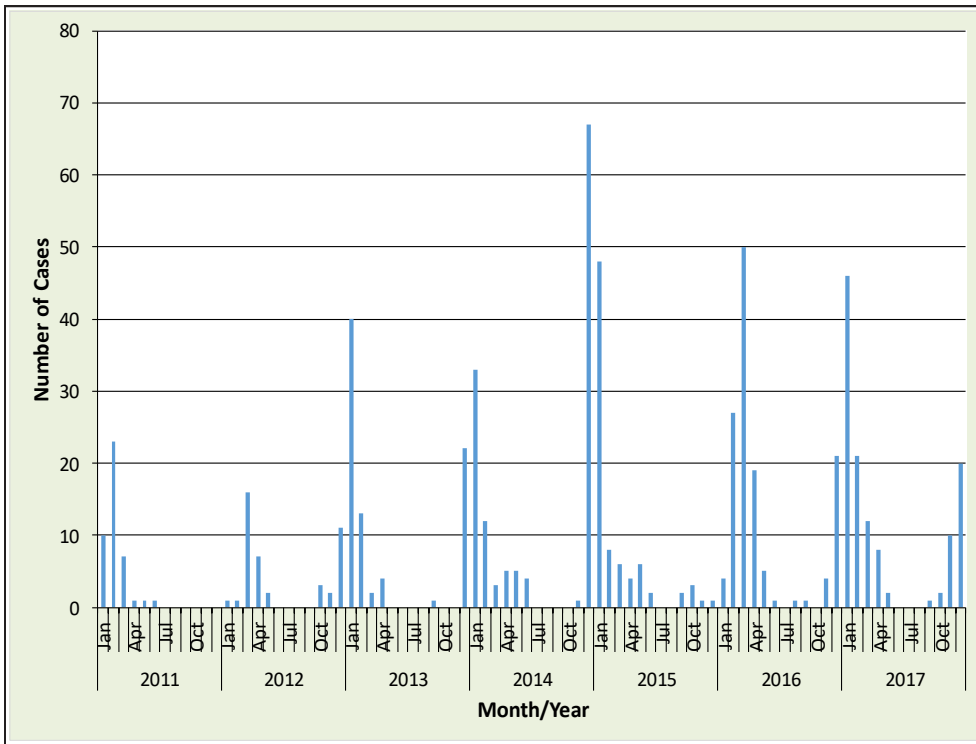
The current influenza season appears to be severe.

Figure 23. Elementary School Absenteeism—Davis County, 2017-18, 2016-17, 5-Year Average



Influenza

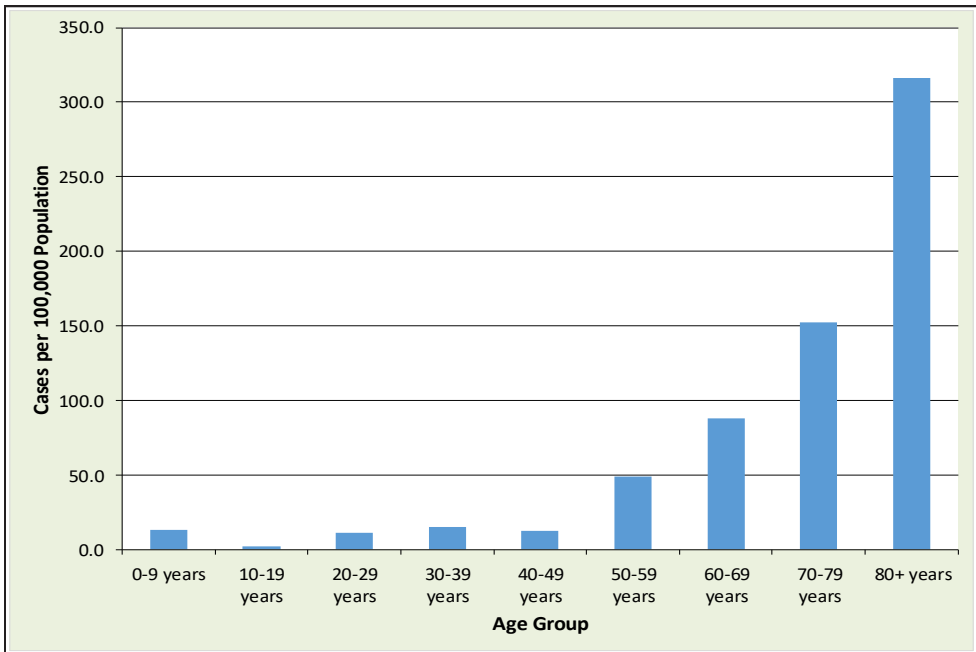
Figure 23. Hospitalized Influenza Cases by Month, Davis County, 2011-17



The 2016-17 influenza season (October 2016 - May 2017) was a moderately severe season in Davis County (see Figure 23). A total of **112** hospitalized-influenza cases were reported during the 2016-17 season, about the same as the 110 cases reported during the 2015-16 season.

Although influenza cases can occur at any time of the year, influenza viruses thrive during cold weather and cases typically peak in the winter months (January and February). The 2016-17 influenza season was no different with cases peaking in January (see Figure 23). The most common circulating strain was influenza A (H3).

Figure 24. Incidence of Hospitalized Influenza Cases by Age Group, Davis County, 2016-17 Influenza Season

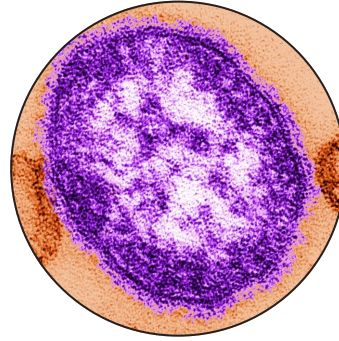


The very young and very old are the populations most severely affected by influenza infection. These groups had the highest rates of hospitalizations in the 2016-17 influenza season. Nearly 61% of the hospitalized cases were ≥ 60 years (see Figure 24).

The current influenza season (October 2017 - May 2018) has been severe thus far. Influenza A (H3) has been the most common circulating strain in Davis County. Several hospitalizations have already been reported (see Figure 23).

Measles

Measles is an acute viral respiratory illness. Although it is one of the most highly infectious diseases known, it is vaccine-preventable. Measles is transmitted by direct contact with infectious respiratory droplets or (less commonly) by airborne spread. Since 1992, the incidence in the United States has been low and indigenous cases are uncommon. Cases of measles continue to occur through importation of the virus from other countries.



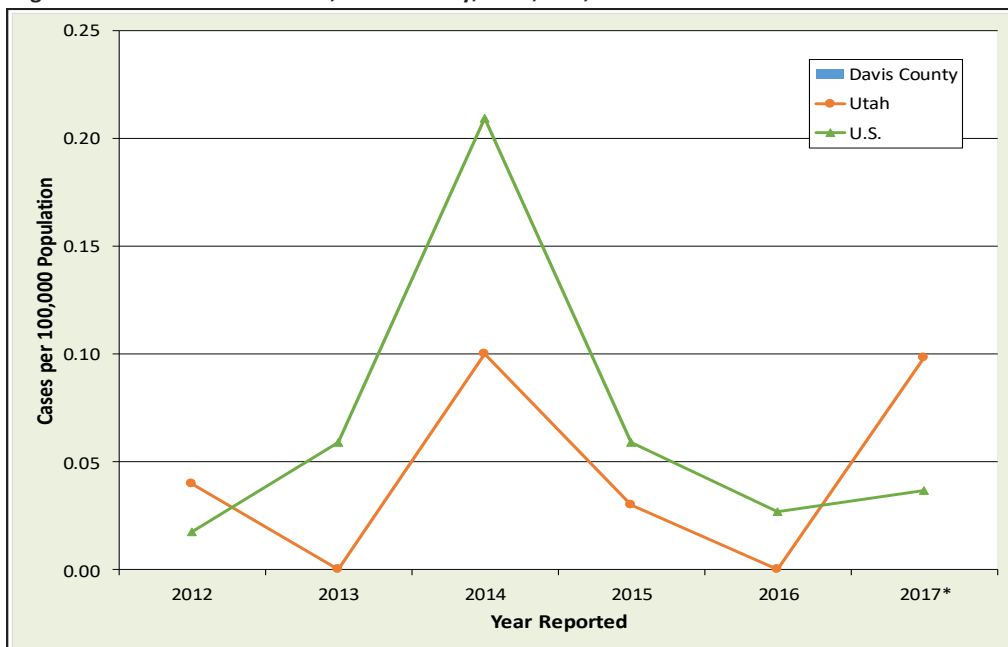
Measles virus is a highly contagious virus and spreads through coughing and sneezing. It starts with fever, runny nose, cough, red eyes, and sore throat, followed by a rash that spread over the body.

In 2017, an outbreak of measles was identified in Salt Lake County in a special population that has unique needs. One of the cases sought treatment at a local hospital where potential exposures may have occurred. As a result, Davis County Health Department evaluated 60 individuals with an exposure and quarantined eight individuals through their incubation period (21-28 days) to ensure no further spread of illness occurred.

Fortunately, no cases of measles were confirmed in Davis County (see Figure 25). However, Davis County Health Department investigated several suspect cases that were reported during the outbreak. All of these cases were ruled out.

This outbreak served as a helpful reminder to the community to fully vaccinate. During the outbreak, Davis County Health Department nurses answered multiple questions regarding the MMR immunization schedule and helped clients review their families' immunization status.

Figure 25. Incidence of Measles, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

An outbreak of measles was identified in Utah during 2017.

No confirmed cases were identified in Davis County.

The outbreak served as a helpful reminder to fully vaccinate.

Mumps

Mumps is a contagious disease caused by a virus and is spread through saliva or mucus from the mouth, nose, or throat. The infection can be spread through any means in which saliva or mucus comes into contact with another individual or an object that an infected individual touches. Examples of potential routes of transmission are coughing, sneezing, talking, sharing items, and touching objects or surfaces with unwashed hands that are then touched by others. The best way to prevent mumps is by getting vaccinated.



Mumps is a contagious disease caused by a virus. It typically starts with fever, headache, and loss of appetite and is followed by swollen salivary glands.

After the mumps vaccination program started in 1967, there has been more than a 99% decrease in mumps cases in the United States. In the United States, the number of cases ranges from a few hundred to few thousand; however, outbreaks do still occur occasionally (see Figure 26). In 2006, a large outbreak on several university campuses affected over 6,500 people. The number of mumps cases in the United States increased dramatically during 2016 and remained elevated during 2017.

A statewide outbreak of mumps associated with a school in Salt Lake County was identified during 2017. Several students from the school were from a special population.

During 2017, **two** cases of mumps were reported in Davis County and were linked to the state outbreak. Davis County has a low rate of mumps when compared to Utah and the United States (see Figure 27).

The Advisory Committee on Immunization Practices now recommends that high-risk groups, who were previously vaccinated with two doses of MMR vaccine, receive a third dose to improve protection during an outbreak situation.

Figure 26. Mumps Cases, United States, 2000-2017

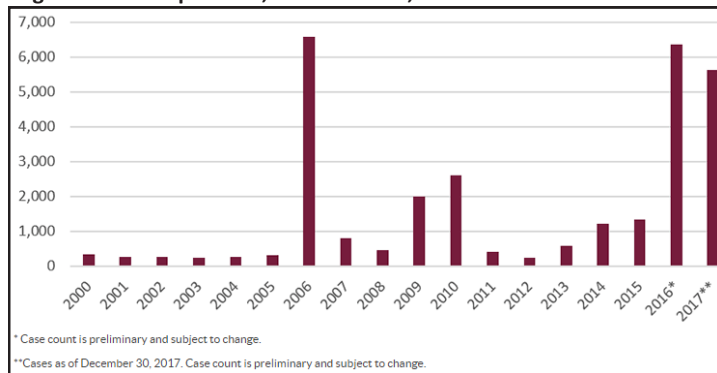
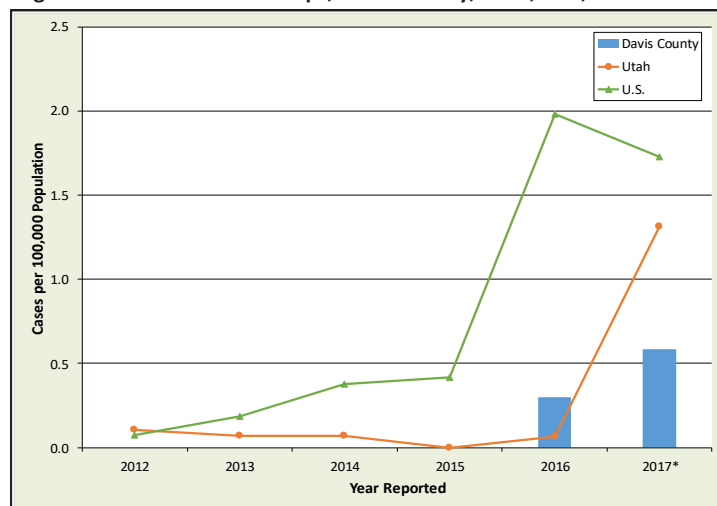


Figure 27. Incidence of Mumps, Davis County, Utah, U.S., 2012-2017



2017 Highlights

Two cases of mumps were reported in Davis County during 2017.

Both cases were associated with a statewide outbreak of mumps linked to a school in Salt Lake County.

Traditionally, Davis County has a low rate of mumps when compared to Utah and the United States.

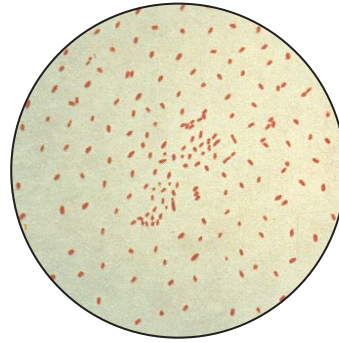
Pertussis

Pertussis is a vaccine-preventable disease caused by the bacteria *Bordetella pertussis*. The disease is of particular concern in infants because of higher rates of hospitalization, pneumonia, and death—compared with older children and adults.

All reported pertussis cases are investigated promptly in an effort to stop disease spread. Contacts that experience a prolonged exposure to an infected case may benefit from antibiotic prophylaxis—if administered in a timely manner. Children are routinely vaccinated against pertussis before entry into the school system. Upon entry into junior high, a booster dose of TD/Tdap is required. The Tdap (tetanus, diphtheria, and acellular pertussis) is a one-time vaccine and is recommended for anyone age 11-64 years. Recent guidance from the Centers for Disease Control and Prevention (CDC) recommends pregnant women receive a Tdap vaccine with every pregnancy, preferably given between weeks 27-36. Tetanus vaccination, however, is recommended every 10 years.

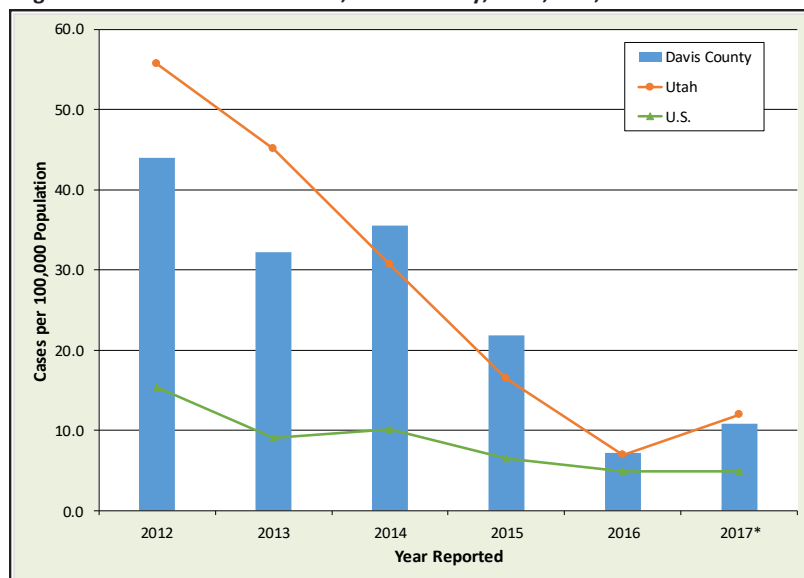
The age groups most often affected by pertussis are those who are under-vaccinated, including infants/children under five years (because they have not yet completed the full vaccination series) (see Figure 28). Although cases are also common in older children and adults due to waning immunity, illness in these age groups is usually milder and the diagnosis is often delayed or missed.

During 2017, there were **37** cases of pertussis reported in Davis County. This corresponds to a 54% increase in comparison to the 24 cases reported in 2016. Davis County Health Department (DCHD) investigates approximately 93 cases each year (based on a 5-year average), thus 2017 has been a very mild year for pertussis. Utah also saw a slight increase in cases of pertussis this year (see Figure 28).



Pertussis is a respiratory illness commonly known as “whooping cough” after the gasping sound a patient makes when they suck in air after a coughing fit.

Figure 28. Incidence of Pertussis, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

There were **37** cases of pertussis reported in Davis County during 2017.

Davis County investigates an average of 93 cases each year. Thus, 2017 could be considered a very mild year for pertussis.

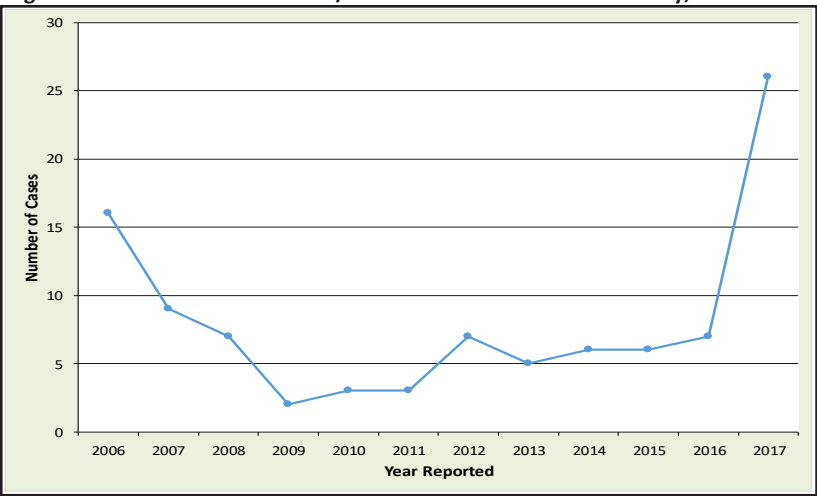
No outbreaks of pertussis were investigated during 2017.



Vector-borne/ Zoonotic Diseases

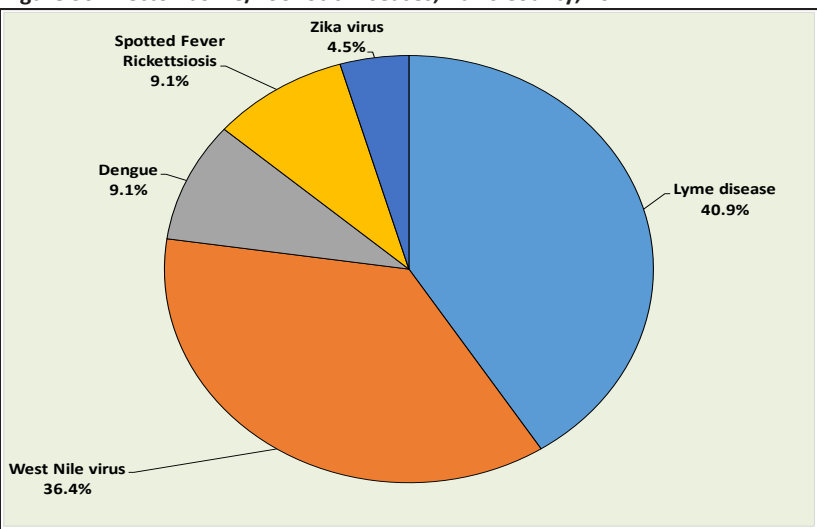
A vector-borne or zoonotic disease is one that can be passed between insect or animal to humans.

Figure 29. Cases of Vector-borne/Zoonotic Diseases in Davis County, 2006-2017



Vector-borne/zoonotic diseases are those diseases transmitted by an animal or insect. Vector-borne/zoonotic diseases do not occur often in Davis County. Typically vector-borne/zoonotic illnesses are contracted during international or out-of-state travel. Several cases were reported during 2006 when West Nile virus was first active in Utah’s mosquito population. However, in recent years, Davis County has remained somewhat consistent in the number of diseases reported, with the exception of 2017 (see Figure 29).

Figure 30. Vector-borne/Zoonotic Diseases, Davis County, 2017

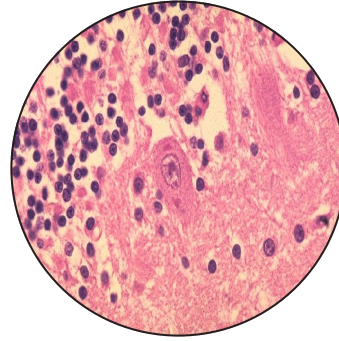


This summer had a very high number of mosquito pools that were positive for West Nile virus, as compared to previous years. As a result, the number of vector-borne/zoonotic illnesses took a dramatic climb in 2017 (see Figure 29).

A total of **22** cases of vector-borne/zoonotic disease were reported in Davis County. Lyme disease was the most frequently reported vector-borne/zoonotic disease with **9** cases (40.9%), followed by West Nile virus with **8** cases (36.4%), dengue and spotted fever rickettsiosis each with **two** cases (9.1%), and Zika virus with **one** case (4.5%) (see Figure 30).

Rabies

Rabies is a preventable viral disease of mammals most often transmitted through the bite of a rabid animal. The vast majority of rabies cases reported to the Centers for Disease Control and Prevention (CDC) each year occur in wild animals such as raccoons, skunks, bats, and foxes. Domestic animals account for less than 10% of reported rabies cases, with cats, cattle, and dogs most often infected. In Utah, the majority of animal cases are reported in bats.



The rabies virus infects the central nervous system, ultimately causing disease in the brain and death.

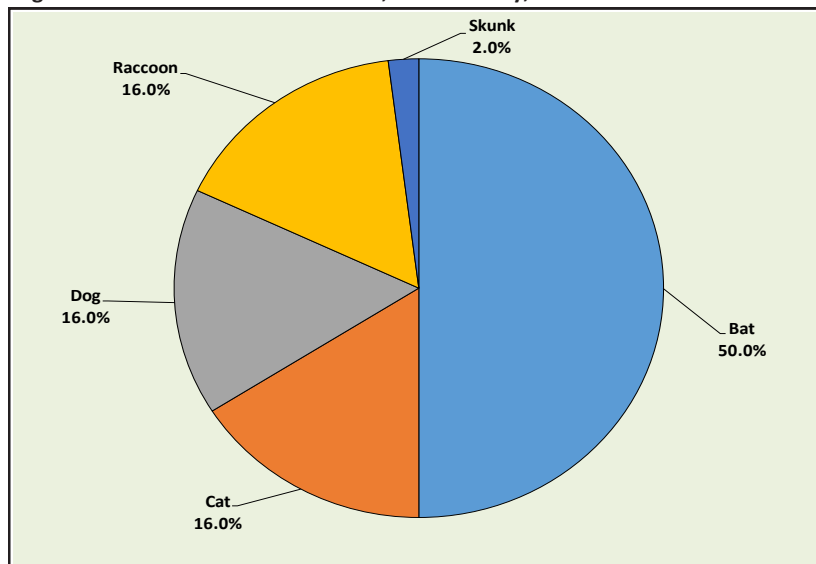
Rabies-related human deaths are very rare in the United States today. Prophylaxis treatment has proven nearly 100% successful, preventing serious illness and mortality in those who are exposed to an at-risk animal. Most human fatalities associated with rabies occur in people who fail to seek medical assistance, usually because they were unaware of their exposure.

The Communicable Disease and Epidemiology Bureau evaluated **530** individuals who reported an exposure to an “at-risk” animal in 2017. The human exposures involved 83 cats, 418 dogs, 23 bats, three raccoons, one squirrel, and one mouse. Each case was evaluated for need of rabies post-exposure prophylaxis (PEP). Those who were recommended PEP were monitored through completion of therapy or until PEP discontinued (either by choice or due to negative test results of the suspect animal). Of the 61 individuals that were recommended PEP, 23 started treatment and 38 declined.

During the late spring and summer months, reports of animal bites become more prevalent. Surveillance of rabies-positive animals helps guide the decision-making process. Rabies PEP is available through some hospital emergency rooms; however, individual insurance plans often dictate where prophylaxis must be obtained.

In 2017, Davis County Environmental Health Division submitted 50 animals for rabies testing (see Figure 31). Of these, 29 (58%) involved a human exposure and 21 (42%) were animal-to-animal exposures. **Five** bats tested positive for rabies — no other animals were positive. No cases of human rabies were reported.

Figure 31. Animals Tested for Rabies, Davis County, 2017



2017 Highlights

A total of **530** individuals who reported an exposure to an at-risk animal were evaluated in 2017.

During 2017, **five** bats tested positive for rabies.

DCHD was involved in investigations with bats at Layton High School and a rabid bat at a daycare facility.

Rabies

DCHD was also involved in several investigations where there was a concern for rabies:

Rabid Bat at Daycare Facility

In May 2017, Davis County Animal Care & Control (DCAC) notified DCHD of a bat that had been found on the playground of a daycare facility. At least one child, with the possibility of others, had come into contact with the bat. The bat was submitted for testing and was found to be positive for rabies.

A total of 50 children were identified as having used the playground on the day the bat had been found. DCHD distributed a letter and information sheet about rabies to each of these parents, instructing them to call DCHD if they felt their child had an exposure. Each parent signed that they had received the information. Seven children received post-exposure prophylaxis (PEP) for rabies after reporting known or possible contact with the bat.

Bat Infestation at Layton High School

In September 2017, DCHD was notified by several community members, including a local media station, of a large number of bats inside Layton High School. Just the week before, a similar situation at West High School in Salt Lake City had captured media coverage when 200 bats were found inside the school. As a result, over 40 students and/or staff with a reported exposure were completing rabies PEP.

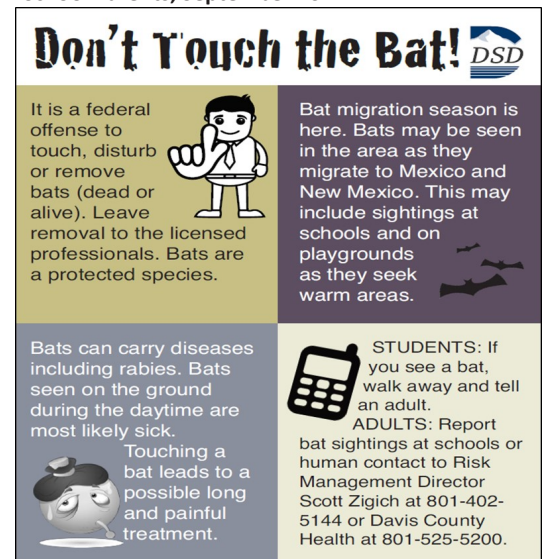
Bats are often found on Layton High School's property, but never before in such large numbers. Due to a sharp drop in temperatures, approximately 3,000 bats had sought shelter in the school's auditorium and stage area—entering through a small gap in the school's HVAC system.

Davis School District notified parents and students of the animals and directed any students with an exposure to contact DCHD for further evaluation (see Figure 32). DCHD evaluated seven students with suspected exposure. Of these, one started rabies PEP but elected to discontinue treatment when the bat was tested and returned with negative results. Another student was given recommendations to start rabies PEP, but parents determined that his exposure was minimal and did not warrant PEP. It was determined that the five remaining students had no exposure and no PEP recommendations were given.

A total of nine bats from the high school were submitted for testing through DCHD. Of these, only eight were able to be tested. All eight were negative for rabies.

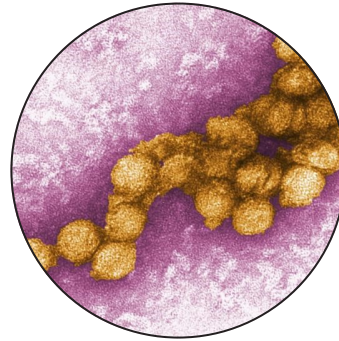
Although rumors and news reports stated several students were touching and playing with the animals, very few students came forward for evaluation with the health department. Students reported that videos of their peers playing with the bats were being shared via Snapchat and other social media platforms, yet no one reported having exposures. There was concern that students were worried that they may be in trouble for harming the animals since they are a protected species. There was also concern that students and/or their parents may not have taken the situation seriously.

Figure 32. Information Distributed to Layton High School Parents, September 2017



West Nile Virus

West Nile virus is a virus most commonly spread to people through mosquito bites. In North America, cases of West Nile virus occur during mosquito season, which starts in the summer and continues through fall. Fortunately, most people infected do not have symptoms. However, some may develop a fever with headache, body aches, joint pain, vomiting, diarrhea, or rash. Most will recover completely, although fatigue and weakness can last for weeks or months. Some may also develop severe illness affecting the central nervous system causing high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weaknesses, vision loss, numbness or paralysis.



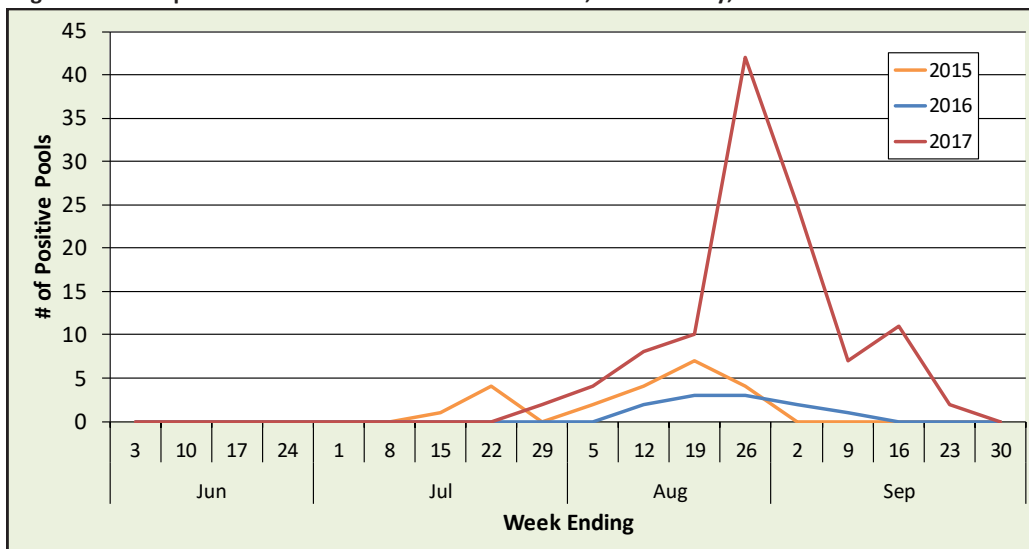
Most people infected with West Nile virus do not have symptoms. However, 1 in 5 may develop a fever and other symptoms. About 1 out of 150 may develop a serious (sometimes fatal) illness.

West Nile virus can be prevented by avoiding mosquito bites. This includes using a mosquito repellent containing DEET and wearing long-sleeved shirts and long pants while outdoors, especially from dusk to dawn - when the mosquitoes that carry West Nile virus are most active.

During 2017, there were **8** cases of West Nile virus reported in Davis County—the first human cases since 2011. No deaths were reported and all recovered from their illness, although the majority of cases this year had neuro-invasive symptoms.

DCHD works with Davis County’s Mosquito Abatement District to conduct surveillance for West Nile virus in mosquito pools each summer. The Mosquito Abatement District also controls for mosquitoes by spraying throughout neighborhoods to kill both adult mosquitoes and their larvae. This summer had a very high number of mosquito pools that were positive for West Nile virus, as compared to previous years (see Figure 33). More positive mosquito pools usually translates into more human cases.

Figure 33. Mosquito Pool Surveillance for West Nile virus, Davis County, 2015 - 2017



2017 Highlights

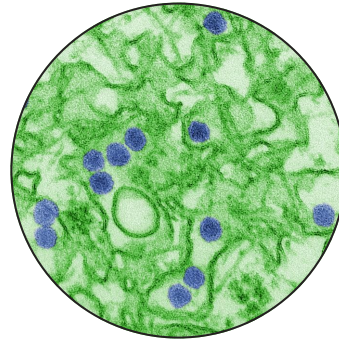
There were **8** cases of West Nile virus reported in Davis County during 2017.

Fortunately, no deaths were reported.

This summer had a very high number of mosquito pools that were positive for West Nile virus.

Zika Virus

Zika virus is a virus that can cause fever, rash, joint pain, and conjunctivitis. It is spread mainly through the bite of an infected *Aedes aegypti* or *Aedes albopictus* mosquito. Zika virus can also be transmitted through sex with an infected person. There is currently no medicine or vaccine for Zika virus infection so the best way to prevent infection is by preventing mosquito bites. Using EPA-registered insect repellent, wearing long-sleeved shirts and pants, and limiting exposure to areas with standing water are all effective methods of mosquito bite prevention.



Zika virus is spread mostly by the bite of an infected *Aedes* mosquito, but can be passed from a pregnant woman to her fetus. Infection during pregnancy can cause birth defects. Sexual transmission of Zika virus is also possible.

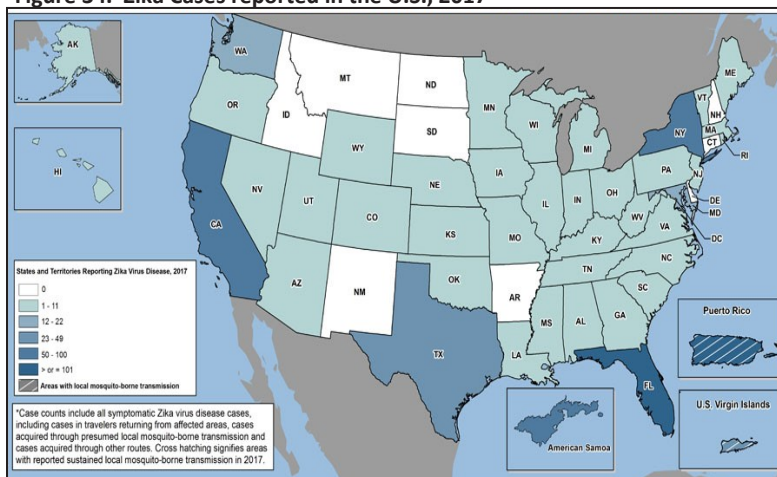
Additionally, Zika virus may be transmitted through sexual contact and can be passed from mother to fetus during pregnancy. Fetuses infected with Zika virus can experience birth defects associated with the brain, such as microcephaly. Other potential fetal complications include defects of the eye, hearing deficits, and impaired growth. Pregnant women should refrain from travelling to areas where Zika virus is actively being transmitted. The Centers for Disease Control and Prevention (CDC) continue to update and distribute travel notices for these areas. Transmission of Zika virus has also been reported in the United States in both Florida and Texas.

In 2017, Davis County Health Department (DCHD) had **one** confirmed case of Zika virus. This individual was not pregnant and had traveled to an area where active transmission of Zika virus was occurring.

As of late January 2018, 418 cases of Zika virus have been reported in the United States. Of these, 409 cases were in travelers returning from affected areas, four were acquired through presumed local mosquito-borne transmission in Florida and Texas, and five cases were acquired through sexual transmission. Utah had four confirmed cases (see Figure 34).

Utah's local health departments continue to oversee and follow Zika virus investigations with help from the Utah Department of Health. As pregnant females deliver, additional follow-up of the mother and her baby are coordinated through the Utah Birth Defect Network.

Figure 34. Zika Cases reported in the U.S., 2017



2017 Highlights

In 2017, one confirmed case of Zika virus was reported in Davis County.

The Davis County case was not pregnant and traveled to an area where active transmission of Zika virus was occurring.

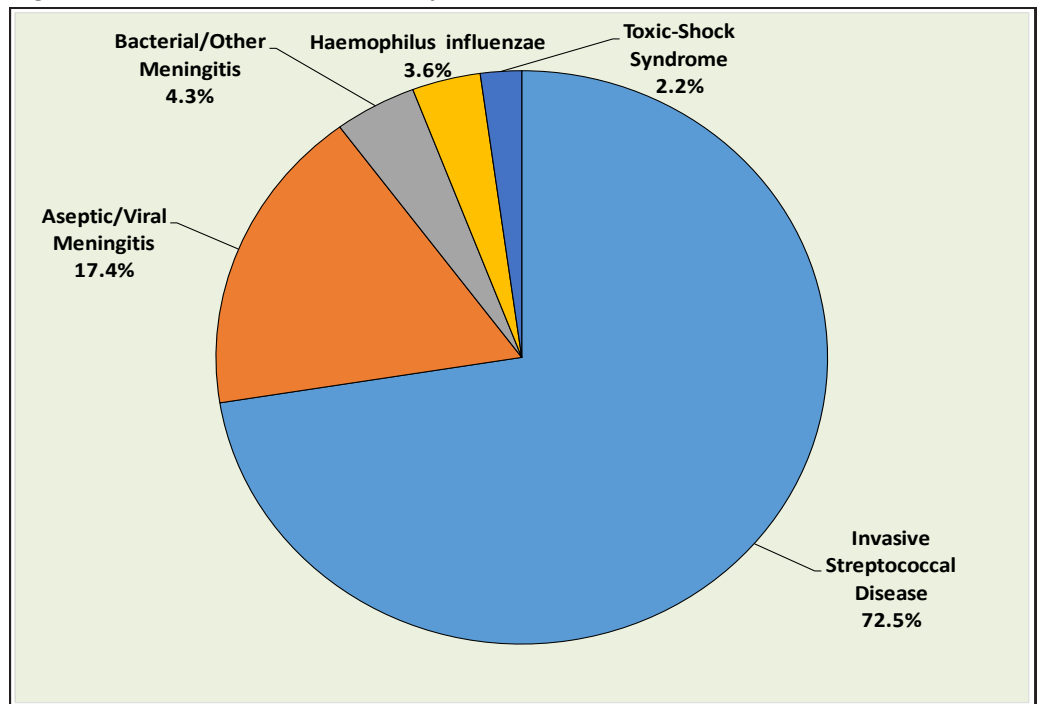
Utah had four confirmed cases of Zika virus during 2017.



Invasive diseases include infections of the bloodstream as well as meningitis and encephalitis. All cases of meningitis, encephalitis, and toxic-shock syndrome are reportable to the health department, regardless of the causative organism. In addition, all cases of invasive streptococcal disease (isolation of *Streptococcus* from a normally sterile site) must be reported.

The most common invasive diseases reported in Davis County in 2017 were invasive streptococcal infections with **100** (72.5%) cases. These included Group A *Streptococcus*, Group B *Streptococcus*, Group C & G *Streptococcus*, *Streptococcus pneumoniae*, and other streptococcal infections. Aseptic/viral meningitis was the second most common disease in this category with **24** (17.4%) cases, followed by bacterial/other meningitis with **six** (4.3%) cases, *Haemophilus influenzae* with **five** (3.6%) cases, and toxic-shock syndrome with **three** (2.2%) cases (see Figure 35).

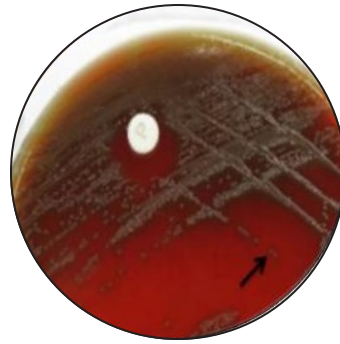
Figure 35. Invasive Diseases, Davis County, 2017



Invasive Streptococcal Infections

The primary invasive streptococcal diseases of public health concern are Group A, Group B, and *Streptococcus pneumoniae*.

- **Group A** streptococcal invasive disease manifests as necrotizing fasciitis (NF), streptococcal toxic shock syndrome (STSS), bacteremia, and pneumonia. It is transmitted person-to-person by contact with infectious secretions. Asymptomatic pharyngeal carriage occurs among all age groups, but is most common among children.
- **Group B** streptococcal invasive disease (GBS) in neonates manifests as sepsis, pneumonia and meningitis. Infection in the first week of life is called “early-onset disease.” In adults, sepsis and soft tissue infections are most common. Pregnancy-related infections include sepsis and amnionitis. Asymptomatic carriage in gastrointestinal and genital tracts is common and intrapartum transmission via ascending spread from vaginal and/or gastrointestinal GBS colonization occurs. Mode of transmission of disease in non-pregnant adults and older infants (>1 week) is unknown.
- **Group C** *streptococcus* is typically a zoonotic illness and the organisms can be found as pathogens in domestic animals such as horses, cows, birds, rabbits, and guinea pigs. Laboratories may misidentify them as Group A *streptococcus*. They can also be found as part of normal human flora. Many people with Group C infections have underlying health problems, but more recent studies have implicated this disease as an emerging human pathogen.
- **Group G** *streptococci* are normal human flora and individuals infected with this organism usually have underlying health problems, especially cancer.
- ***Streptococcus pneumoniae*** invasive disease manifests as pneumonia, bacteremia, meningitis, and sinus/ear infections. More than 90 types of pneumococcal bacteria exist, but not all are considered to be invasive. Of the strains causing invasive disease, 88% are serotypes included in the 23-valent polysaccharide vaccine (PPSV23). Before the first pneumococcal conjugate vaccine (PCV7) was introduced in 2000, the seven serotypes which it prevents were responsible for over 80% of severe pneumococcal infections among children. Now, the PCV13 vaccine includes the original seven serotypes in PCV7, plus six additional serotypes. The best way to prevent pneumococcal disease is by getting vaccinated.



Most strep infections are relatively mild illnesses such as strep throat, scarlet fever, and impetigo. Occasionally these bacteria can cause severe and life-threatening diseases.

2017 Highlights

In 2017, there were 100 cases of invasive streptococcal infections reported in Davis County.

The majority of cases were due to strains that do not require investigation or public health control measures.

There was a 5.8% case fatality rate due to invasive streptococcal infections in 2017.

Invasive Streptococcal Infections

In 2017, **100** cases of invasive streptococcal infections were reported (see Figure 36). The majority of cases were due to strains that do not require an investigation or the implementation of public health control measures (e.g. *S. mitis*) (see Table 5).

Invasive streptococcal infections tend to cause severe illness. In 2010, over 12% of reported invasive streptococcal infections were fatal. Since then, the fatality rate among streptococcal infections has declined. In 2017, six out of 100 cases were fatal - a case fatality rate of 6.0%. This represents a slight decrease from the 6.9% reported in 2016.

Figure 36. Invasive Streptococcal Infections by Month, Davis County, 2017

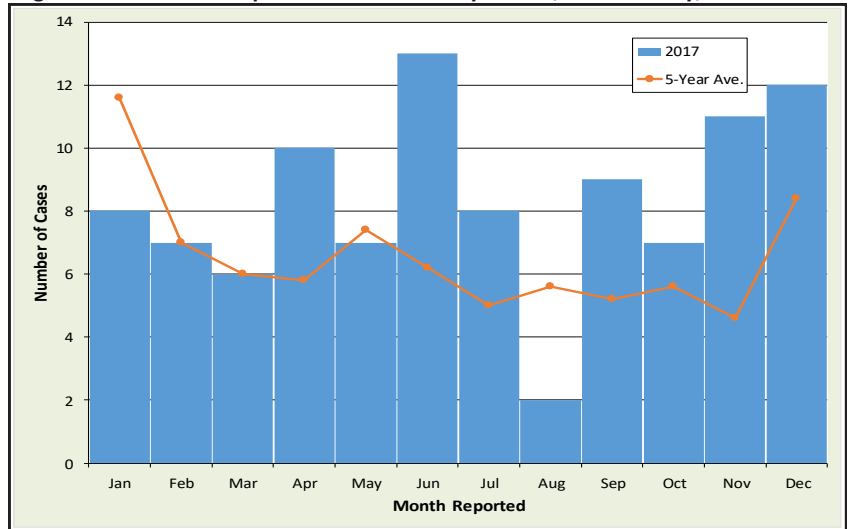
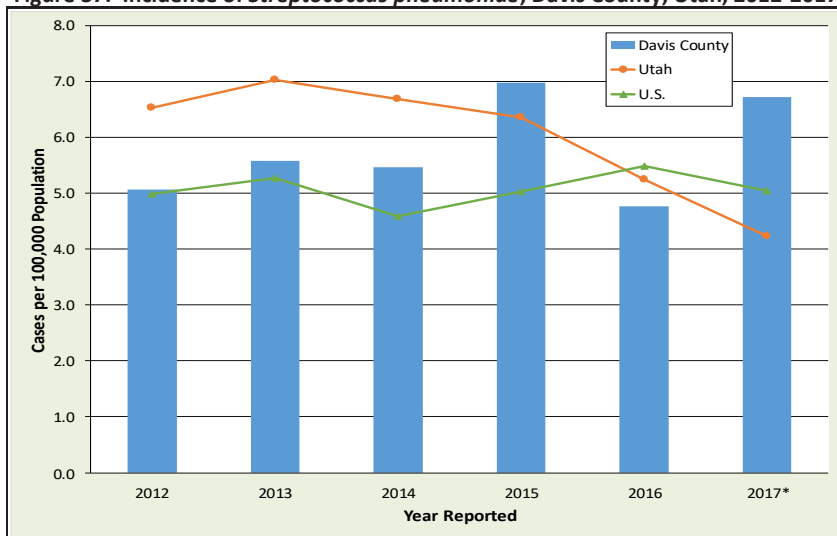


Table 5. Types of Invasive Streptococcus Infections, Davis County, 2017

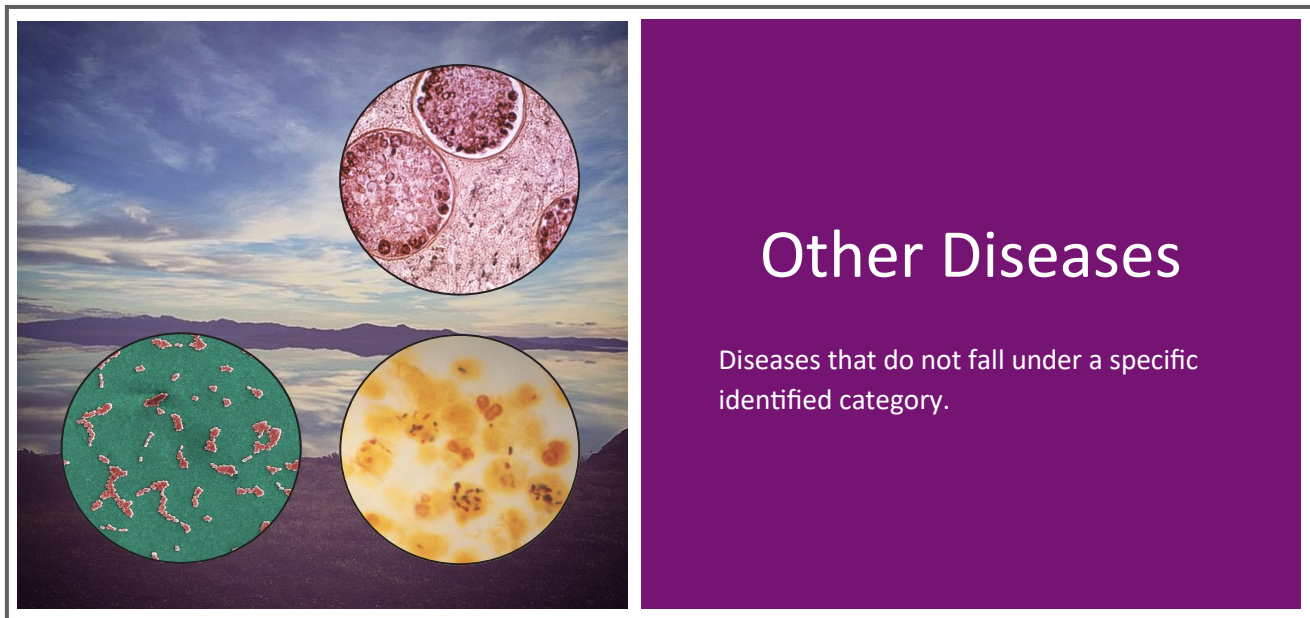
Type	Number of Cases
Group A <i>Streptococcus</i>	15
Group B <i>Streptococcus</i>	18
Group C and Group G <i>Streptococcus</i>	9
Other <i>Streptococcus</i> (<i>mitis</i> , <i>viridans</i> , etc.)	35
<i>Streptococcus pneumoniae</i>	23
Total	100

Figure 37. Incidence of *Streptococcus pneumoniae*, Davis County, Utah, 2012-2017



*Utah and United States 2017 data are provisional.

Infection with *Streptococcus pneumoniae* is particularly serious. Nationally, incidence in healthy young adults is 3.8 per 100,000, but incidence in those less than 2 years or greater than 64 years is ten times higher. In 2017, five of the 23 (21.7%) *S. pneumoniae* cases in Davis County were fatal. *Streptococcus pneumoniae* rates have remained somewhat constant in Davis County and Utah during recent years (see Figure 37).



Diseases that do not fall under a specific identified category will be discussed in this section.

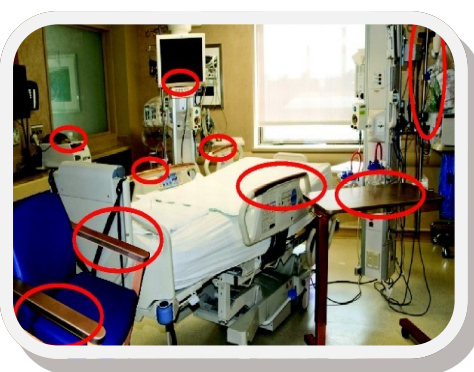
Hepatitis C infections made up the majority of this category, followed by carbapenem-resistant Enterobacteriaceae (CRE), coccidioidomycosis, legionellosis, *C. perfringens*, and Creutzfeldt-Jakob disease (see Table 6).

Table 6. Other Reportable Disease/Conditions, Davis County, 2017

Disease	Number of Cases
Hepatitis C, acute and chronic	129
Carbapenem-Resistant Enterobacteriaceae (<i>Acinetobacter</i> , <i>Klebsiella</i> , <i>E. coli</i> , <i>Enterobacter</i>)	19
Coccidioidomycosis	5
Legionellosis	4
<i>Clostridium perfringens</i>	1
Creutzfeldt-Jakob Disease (CJD)	1
Total	159



Hepatitis C



**Carbapenem-Resistant
Enterobacteriaceae (CRE)**



Coccidioidomycosis

Carbapenem-Resistant Enterobacteriaceae (CRE)

The public health problem of antibiotic resistance is not new. However, due to the overuse of antibiotics in humans and animals, the problem is increasing in magnitude and new multidrug-resistant organisms (MDROs) are emerging. Carbapenem-resistant Enterobacteriaceae (CRE) are particularly concerning. Some CRE infections have developed resistance to most available antibiotics. CRE infections are very difficult to treat, can spread quickly, and may contribute to death in 40% of patients who become infected. Although these organisms are rare, they are increasingly identified in healthcare facilities throughout the United States.

Utah laboratories and healthcare facilities are required to report the following CREs to the state or local health department:

- *Acinetobacter* species with resistance or intermediate resistance to carbapenem (meropenem and imipenem) from any site
- *Enterobacter* species with resistance or intermediate resistance to carbapenem (meropenem and imipenem) from any site
- *Escherichia coli* with resistance or intermediate resistance to carbapenem (meropenem, ertapenem, and imipenem) from any site
- *Klebsiella* species with resistance or intermediate resistance to carbapenem (meropenem, ertapenem, and imipenem) from any site

A total of **19** CREs (including **15** *Acinetobacter* cases, **three** *Enterobacter* cases, and **one** *E. coli* case) were reported to Davis County Health Department (DCHD) during 2017 (see Figure 38). This represents a 36% increase from the 14 cases reported in 2016.

Since CREs have become a reportable condition, public health is learning more about these organisms, including where they are occurring and how to prevent their spread within and between facilities.



Klebsiella is a type of Gram-negative bacteria that can cause different types of healthcare-associated infections, including pneumonia, blood infections, wound or surgical site infections, and meningitis.

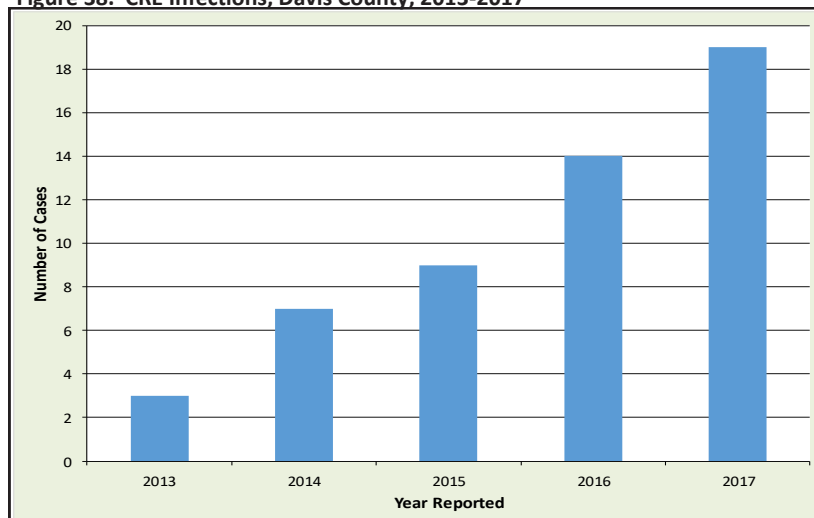
2017 Highlights

A total of **19** CREs were reported to DCHD in 2017.

This includes **15** *Acinetobacter* cases, **three** *Enterobacter* cases, and **one** *E. coli* case.

Public health is learning more about these organisms, including where they are occurring and how to prevent their spread.

Figure 38. CRE Infections, Davis County, 2013-2017



Clostridium perfringens

Clostridium perfringens is a spore-forming gram-positive bacteria that is found in many environmental sources, including the intestines of humans and animals. It is commonly found on raw meat and poultry. *C. perfringens* prefers to grow in conditions with very little or no oxygen. Under ideal conditions, it can multiply very rapidly. Some strains of *C. perfringens* produce a toxin in the intestine that causes illness.

Although *C. perfringens* may live normally in the human intestine, illness is typically caused by eating food contaminated with large numbers of *C. perfringens* bacteria that produce enough toxin in the intestines to cause illness.

People infected usually develop diarrhea and abdominal cramps within 6 to 24 hours. The illness usually begins suddenly and lasts for less than 24 hours. Usually, there is no fever or vomiting.

In August 2017, two severely immunocompromised individuals in Utah died after a transfusion of blood products. *Clostridium perfringens* was cultured from the blood of the deceased individuals and one of the blood product bags. A traceback of the blood product identified a donor from Davis County. Human samples (skin and rectal swabs) were collected from the donor and tested at the Utah Public Health Laboratory (UPHL). Several of the human skin samples yielded *Clostridium perfringens*. The positive bacteria isolates were forwarded to CDC for Whole Genome Sequencing (WGS). WGS showed that all six of the epidemiologically-linked isolates were “highly related” to each other. The investigation of the blood supplier and the healthcare facilities showed no procedural breaches. The donor was permanently deferred from future donations.

Blood product transfusions continue to be a possible source of bacterial infections. However, the safety of the blood supply in the United States continues to improve and is better than ever. Donor screening questionnaires, laboratory testing capabilities and stringent blood center collection, handling, and storing procedures have helped decrease bacterial contamination.



C. perfringens is one of the most common types of foodborne illness in the United States. CDC estimates it causes nearly 1 million cases of illness each year.

2017 Highlights

***C. perfringens* produces a toxin in the intestine that causes illness.**

During 2017, DCHD was involved in an investigation where *C. perfringens* was transmitted via a blood transfusion.

Blood product transfusions continue to be a possible source of bacterial contamination.



Creutzfeldt-Jakob Disease (CJD)

Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long incubation periods, characteristic spongiform changes in the brain associated with neuronal loss and failure to induce inflammatory response.

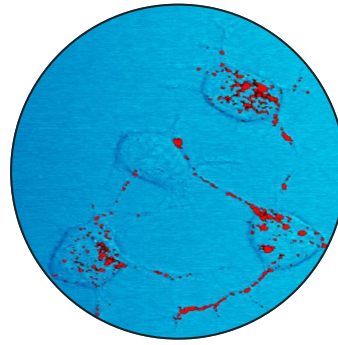
The causative agent of TSEs is believed to be a prion. A prion is an abnormal, transmissible agent that is able to induce abnormal folding of normal cellular prion proteins in the brain, leading to brain damage and the characteristic signs and symptoms of the disease. Prion diseases usually progress rapidly and are always fatal.

Classic CJD is a human prion disease. It is a neurodegenerative disorder with characteristic clinical and diagnostic features. Infection with this disease leads to death usually within one year of onset of illness. It has been recognized since the early 1920s. The most common form of classic CJD is believed to occur sporadically, caused by the spontaneous transformation of normal prion proteins into abnormal prions. This sporadic disease occurs worldwide, including the United States, at a rate of roughly 1 to 2 cases per 1 million population per year. The risk of CJD increases with age. In persons >50 years of age, the annual rate is approximately 3.4 cases per million. Whereas the majority of cases of CJD occur as sporadic disease, a smaller proportion of patients (5-15%) develop CJD because of inherited mutations of the prion protein gene.

CJD is found everywhere in the world, but it is very rare. On average, only one in a million people each year will get this disease. Since 1980, 37 Utahns have died of CJD. This number is not higher than expected.

Appropriate post-mortem care is critical with any suspect case of CJD. A system is in place to assist family members in obtaining appropriate testing, which includes an autopsy that is required to confirm the diagnosis of CJD. These services are provided free of charge. Specimens collected during the autopsy are submitted to the National Prion Disease Pathology Surveillance Center (NPDPSC) for disease confirmation. These cases are examined individually to aid in the timely detection of new or atypical cases and establish more accurate classifications of prion diseases.

Davis County investigated **one** case of sporadic CJD in 2017. The patient experienced a rapid deterioration. The family chose not to proceed with an autopsy, thus the case could not be confirmed. However, the patient's clinical symptoms and preliminary laboratory work could not rule out CJD.



Classic Creutzfeldt-Jakob Disease is a rare, fatal, degenerative brain disease caused by abnormal, transmissible proteins called prions.

2017 Highlights

Since 1980, 37 Utahns have died of CJD. This number is not higher than expected.

DCHD investigated one suspect case of CJD during 2017.

On average, only one in a million people each year will get this disease.

Hepatitis C

Hepatitis C is a disease caused by a virus that infects the liver. Over time it can cause liver damage including cirrhosis, liver failure, and cancer. Approximately 15-25% of those infected with hepatitis C virus (HCV) will recover from the infection. The remaining 75-85% develop chronic infection. Each year approximately 15,000 people die from the complications of liver disease caused by hepatitis C.

Most of those who develop chronic HCV infection remain asymptomatic for many years. Some experience a range of symptoms including fatigue, headache, joint aches, muscle aches, nausea, jaundice, loss of appetite, and abdominal pain.

HCV is a bloodborne pathogen that is predominantly spread by exposure to contaminated blood or blood products. Currently, the most prevalent mode of transmission is sharing needles or syringes to inject drugs. Sexual transmission of HCV can occur, but does not appear to be an efficient mode of transmission. HCV is not spread through casual contact, kissing, sneezing, hugging, sharing glasses/utensils, or from breast milk.

Hepatitis C is typically reported as a positive screening test for HCV antibodies. Investigation of this disease is focused on determining whether the case is acute, chronic, or has a false-positive test. To do so, confirmatory testing is necessary. Several reports of hepatitis C come from blood donation centers, which have limited contact information for the person donating. Therefore, investigation of the disease is difficult. Of those investigated, the most prevalent risk factor identified was injecting drugs, currently or in the past. Most infected individuals were unaware of their infection.

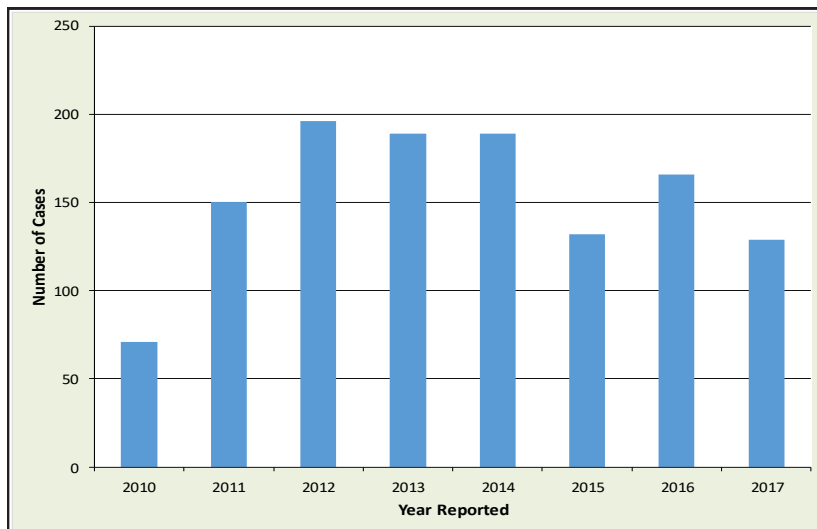
In 2017, Davis County received reports on **129** cases of HCV, a 22% decrease from the 166 cases reported in 2016 (see Figure 39). DCHD recently received additional funding from the Utah Department

of Health to increase surveillance efforts to identify acute hepatitis B & C infections. This funding will allow for confirmatory testing of a reported patient, in addition to their contacts. This grant will begin in early 2018.



Hepatitis C is a bloodborne virus. Today, most people become infected with HCV by sharing needles or other equipment to inject drugs.

Figure 39. Hepatitis C Virus Infections, Davis County, 2010-2017



2017 Highlights

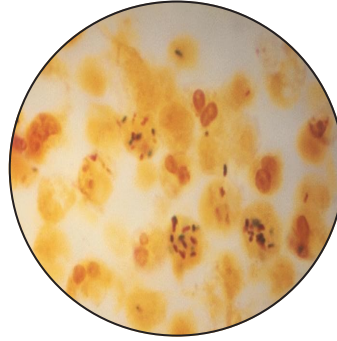
In 2017, **129** cases of HCV were reported in Davis County.

This represents a **22% decrease** from what was reported in 2016.

A new grant, available in early 2018, will provide funding to identify more cases of acute hepatitis B & C.

Legionellosis

Legionella bacteria can cause Legionnaires' disease or Pontiac fever, collectively known as legionellosis. The disease is transmitted through the air from a soil or water source. All studies to date have shown that the organism cannot be spread from person-to-person. Outbreaks occur when individuals are exposed to a common source of *Legionella pneumophila* bacteria in the environment.



Legionellosis is a bacterial infection that may cause mild respiratory illness or pneumonia. It is associated with two distinct illnesses: Legionnaires' disease and Pontiac fever.

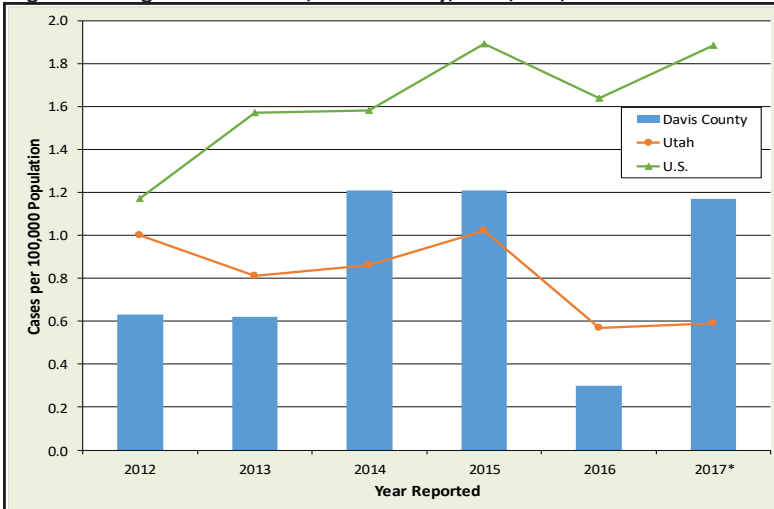
An estimated 8,000-18,000 people need care in a hospital due to Legionnaire's disease each year in the United States. However, many infections are not diagnosed or reported, so this number may be higher. Most legionellosis cases are sporadic; 23% are nosocomial (hospital acquired) and 10-20% can be linked to outbreaks.

It is important for public health to identify the source of the infection before an outbreak occurs. Often, the source remains unknown. Aerosolizing of water, such as showers, humidifiers, swamp coolers, and spas, provide a good mechanism for transmission. Healthy individuals, when exposed, typically do not develop the disease. However, those who are immunocompromised are at higher risk.

During 2017, there were **four** cases of legionellosis reported in Davis County (see Figure 40). Unfortunately, two of these cases were fatal. One of these had several pre-existing medical conditions that caused them to be more susceptible to the infection. Another case was linked to a local apartment complex. Davis County's Environmental Health Division visited the facility to take water samples from several apartments. One sample, from the water heater in the unit, returned with positive results for *legionella*. DCHD worked with the facility to ensure the unit was vacated until the water system had been cleared.

Both Davis County and Utah typically have lower rates of legionellosis when compared to the United States (see Figure 40). An outbreak was identified in New York City during 2017 and is suspected to be due to contaminated air conditioning equipment.

Figure 40. Legionellosis Cases, Davis County, Utah, U.S., 2012-2017



*Utah and United States 2017 data are provisional.

2017 Highlights

A total of four cases of legionellosis were reported in Davis County during 2017.

One case was linked to a contaminated water system at a local apartment complex.

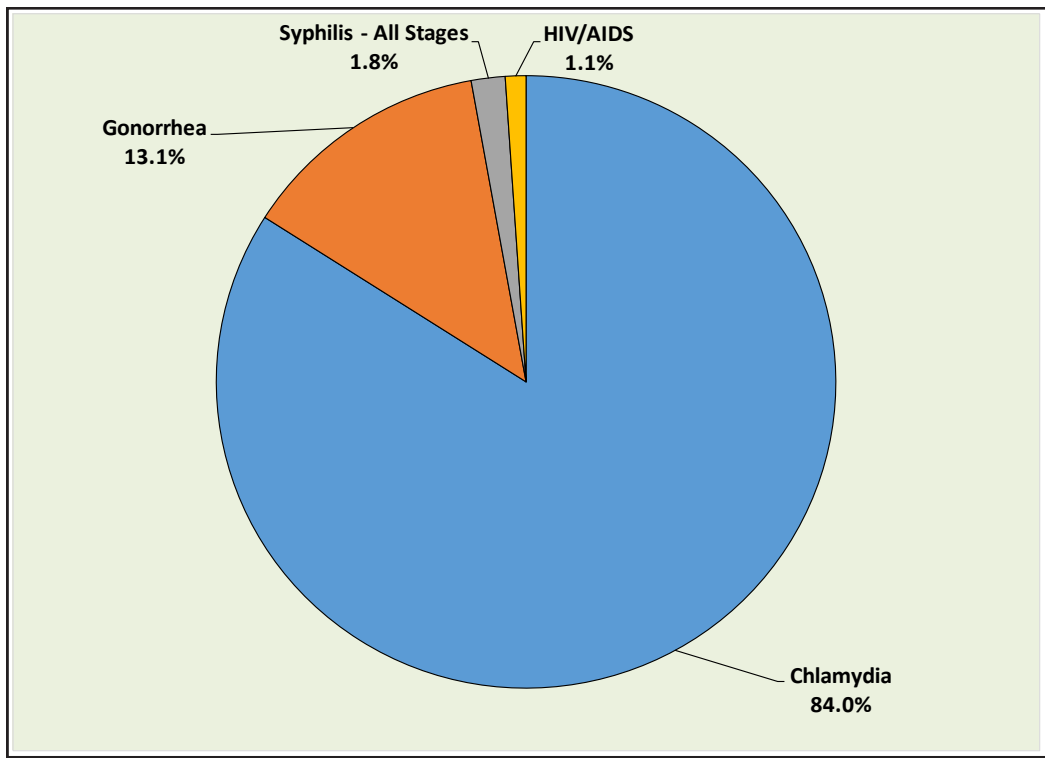
Davis County's Environmental Health Division worked with the facility to ensure the water system was cleared.



Sexually transmitted diseases (STDs) are caused by bacteria, viruses, and other organisms transmitted from one person to another through sexual activity. Bacterial STDs such as chlamydia, gonorrhea, and syphilis are curable - using appropriate antibiotic therapy. However, permanent damage may occur (e.g. pelvic inflammatory disease, sterility, organ damage, meningitis) especially if treatment is delayed. Viral STDs such as herpes simplex virus (HSV) and human immunodeficiency virus (HIV) are not curable, but treatment can slow disease progression by reducing viral load (contagiousness) and improving quality of life. Complications from STDs range from mild/moderate illness to infertility, chronic pain, cancer, and even death. Less invasive testing techniques (e.g. urine testing, self-collected oral/rectal testing) have made chlamydia and gonorrhea testing more acceptable and convenient.

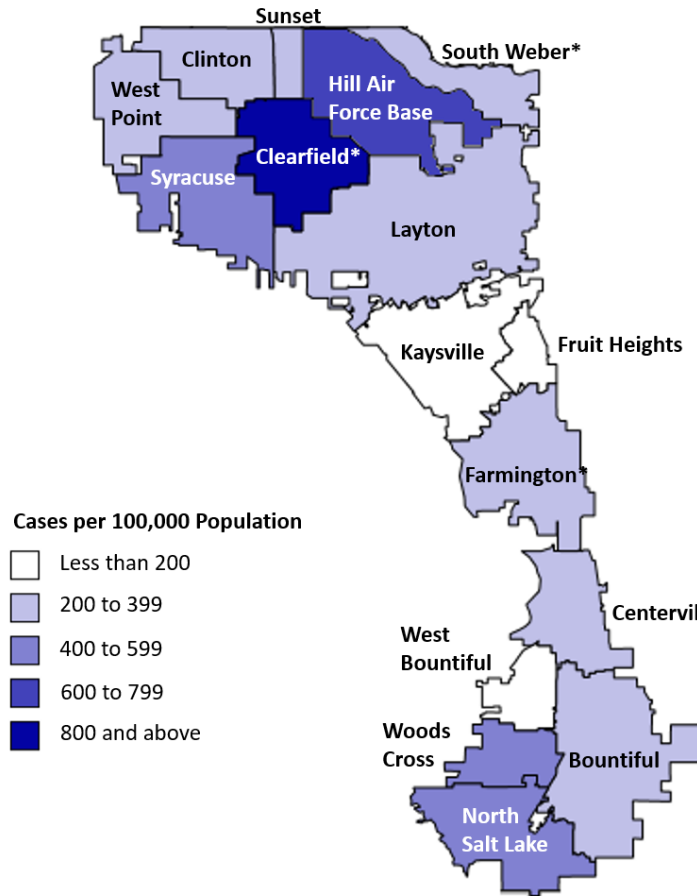
Sexually transmitted diseases reported in Davis County during 2017 included chlamydia, gonorrhea, syphilis, and HIV/acquired immunodeficiency syndrome (AIDS). Chlamydia was the most commonly reported STD with **1,094** (84.0%) cases, followed by gonorrhea with **171** (13.1%) cases, syphilis with **23** (1.8%) cases, and HIV/AIDS with **14** (1.1%) cases (see Figure 41).

Figure 41. Sexually Transmitted Diseases, Davis County, 2017



Sexually Transmitted Diseases (STDs)

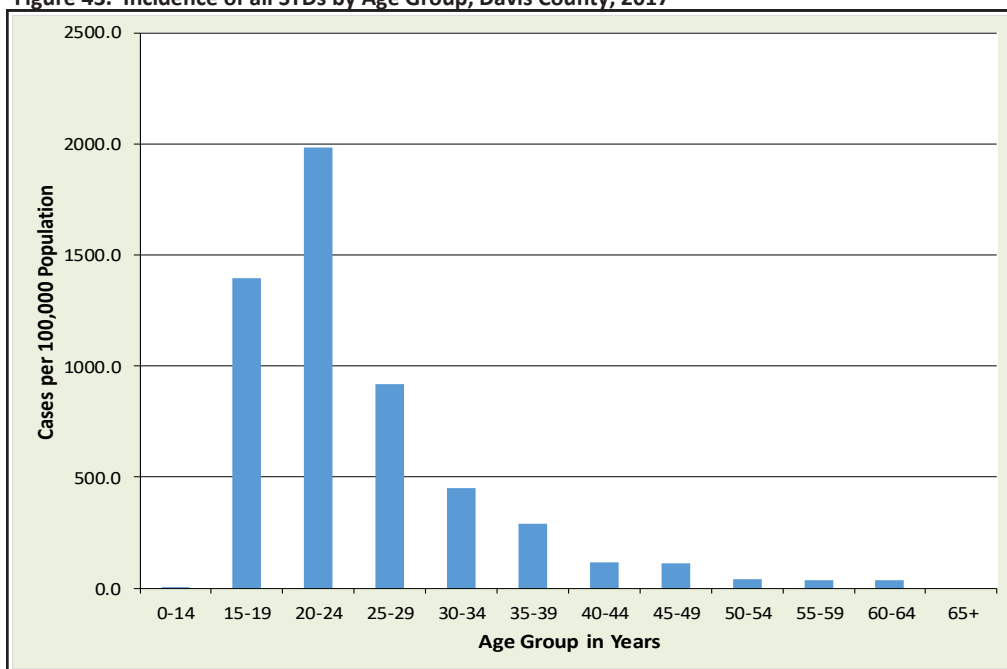
Figure 42. Incidence of all STDs by City, Davis County, 2017



Sexually transmitted diseases occurred among residents of every city in Davis County. The average rate in the county was 365.4 cases per 100,000 residents (see Figure 42). These rates were adjusted by age to account for the higher incidence of STD infection in cities with a larger young adult population. Clearfield had the highest rate of STDs, while Fruit Heights, West Bountiful, and Kaysville had the lowest rates (see Figure 42).

*These cities are impacted by temporary residential establishments (i.e. federal job corps and correctional facilities).

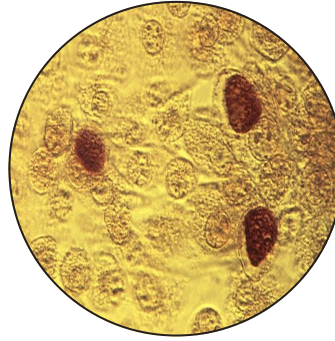
Figure 43. Incidence of all STDs by Age Group, Davis County, 2017



Sexually transmitted diseases were most often reported among women (59.3%) and among 20-24 years old (see Figure 43). Overall, STD incidence was high from 15 years of age to 34 years of age.

Chlamydia

Chlamydia is a sexually transmitted disease caused by the bacteria *Chlamydia trachomatis*. Chlamydia is one of the most common reported sexually transmitted diseases (STDs) in the United States (see Figure 44). The majority of chlamydial infections are asymptomatic. Most females and approximately 50% of males infected with chlamydia do not have obvious symptoms. Serious complications include infertility, ectopic pregnancies, epididymitis, arthritis, and prostatitis.

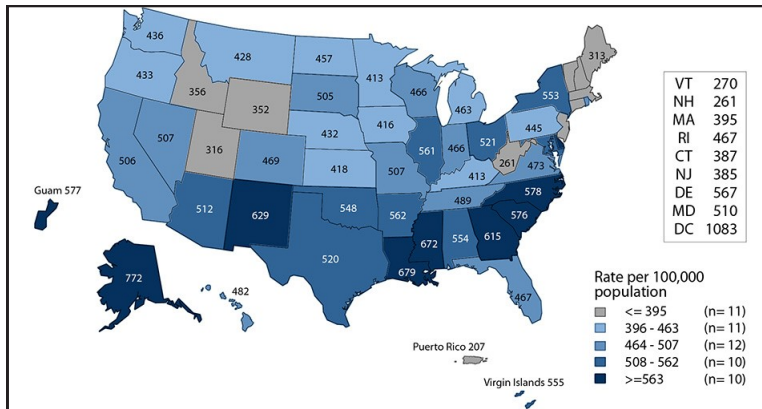


Chlamydia is the most commonly reported STD in the United States.

Chlamydia and gonorrhea rates have been increasing for the past several years (see Figure 45). This is partially due to increased screening of high-risk individuals. During 2017, there were **1,094** cases of chlamydia reported in Davis County, a 17.1% increase from the 934 cases reported in 2016.

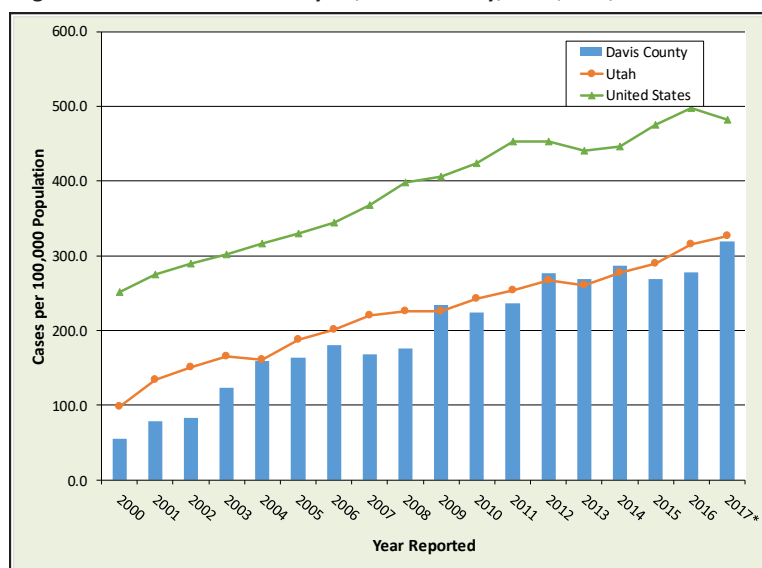
Chlamydial infections continue to account for the largest disease burden in Davis County. However, Davis County traditionally has lower rates of chlamydia when compared to Utah and the United States (see Figure 45).

Figure 44. Incidence of Chlamydia by County, United States, 2016



Most concerning is the age group most commonly affected (15-24 year olds) (see Figure 46). While investigating cases, a number of high-risk behaviors were identified, including early initiation of sexual activity, multiple sex partners, unprotected sex, anonymous partners, using drugs/ alcohol while engaging in sexual activities, group sex, and anal intercourse.

Figure 45. Incidence of Chlamydia, Davis County, Utah, U.S., 2000-2017



*Utah and United States 2017 data is provisional.

2017 Highlights

A total of **1,094** chlamydia cases were reported in Davis County during 2017.

Chlamydial infections continue to account for the largest disease burden in Davis County.

Traditionally, Davis County has lower rates of chlamydia when compared with Utah and the United States.

Chlamydia

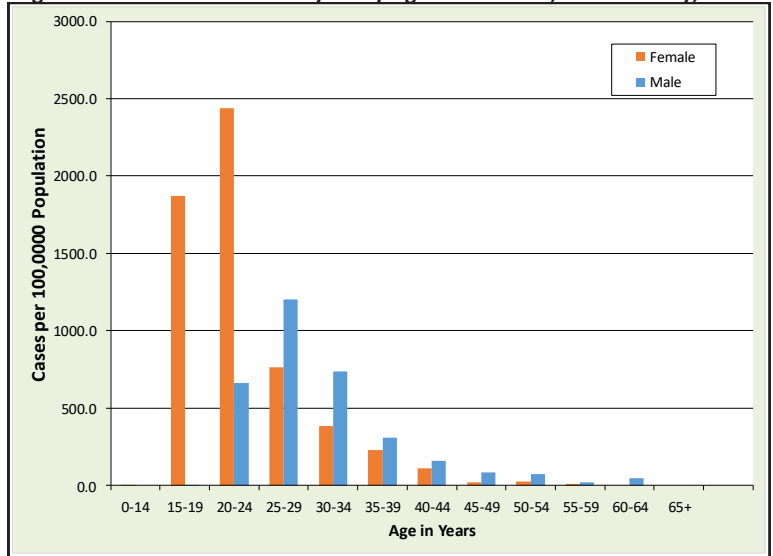
Chlamydia is more prevalent in females versus males (see Figure 47). Women are more susceptible to infection and the female reproductive system is an excellent environment for bacteria to grow. It also makes it more difficult to determine if signs or symptoms from an infection are present. Women are less likely to have symptoms of chlamydia when compared to men. If symptoms do occur, they may go away, yet the infection can remain.

Females are often diagnosed during routine medical visits. Their male partners are typically diagnosed following contact investigations. It is the goal of the health department to locate partners, offer free testing and treatment, provide disease education, and assist in the development of a risk-reduction plan. Contact investigations not only limit the spread of infection to other individuals, but they also decrease the likelihood of re-infection. Re-infections can occur when appropriately treated individuals engage in sexual activity with their untreated partners or resume sexual activity before the infection is cleared.

Because the majority of infected individuals have no symptoms of an STD, it is important for public health to encourage medical providers to routinely test and counsel sexually-active patients, especially those ages 25 and younger. Davis County Health Department (DCHD) continues to notify the medical community of updates to the Sexually Transmitted Diseases Guidelines, 2015. Periodic Health Updates are also distributed to the medical community in an effort to communicate and establish awareness of current disease trends.

Communicable disease and epidemiology staff participate in annual trainings to enhance their knowledge-base and counseling skills in order to treat, identify, and educate those infected with or exposed to sexually transmitted diseases.

Figure 46. Incidence of Chlamydia by Age and Gender, Davis County, 2017



Unique factors place youth at risk for STIs



Insufficient Screening
Many young women don't receive the chlamydia screening CDC recommends



Confidentiality Concerns
Many are reluctant to disclose risk behaviors to doctors



Biology
Young women's bodies are biologically more susceptible to STIs

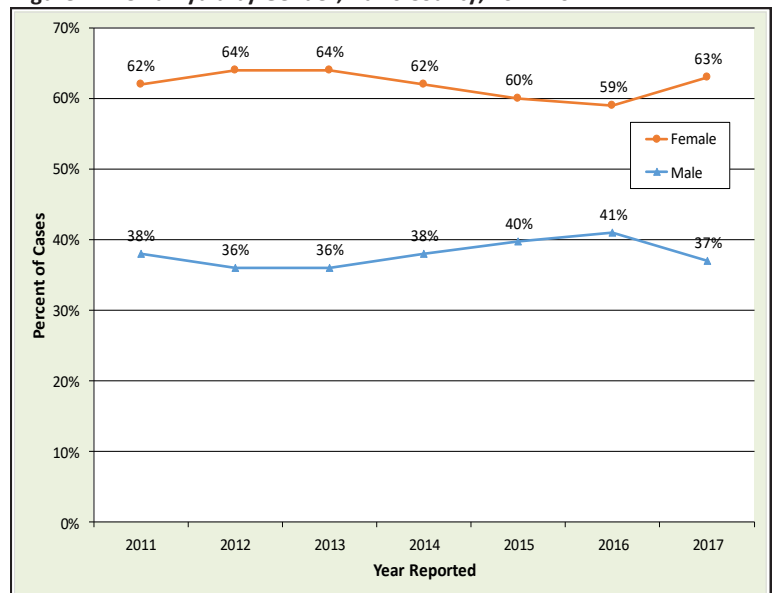


Lack of Access to Healthcare
Youth often lack insurance or transportation needed to access prevention services



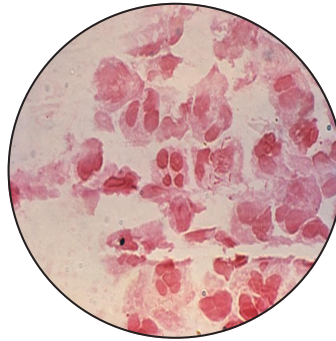
Multiple Sex Partners
Many young people have multiple partners, which increases STI risk

Figure 47. Chlamydia by Gender, Davis County, 2011-2017



Gonorrhea

Gonorrhea is a sexually transmitted disease (STD) caused by the bacteria *Neisseria gonorrhoeae*. Gonococcal infections are often asymptomatic in women and are becoming increasingly so in men. If left untreated, gonorrhea may result in serious complications including chronic pain, infertility, septic arthritis, hepatitis, endocarditis, and meningitis. Gonorrhea is complex and has the ability to develop resistance to antibiotics. Fluoroquinolones are no longer recommended by the Centers for Disease Control and Prevention (CDC) due to increasing resistance. Cephalosporins are the only remaining antibiotic class recommended for treatment.



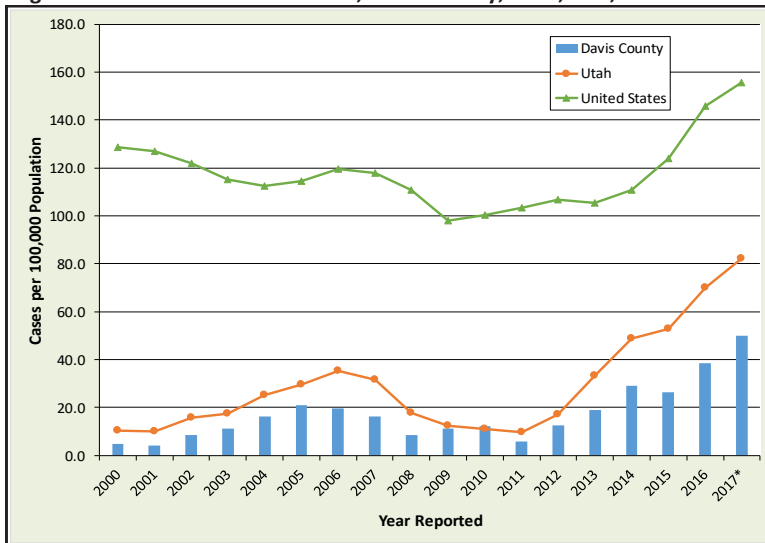
Gonorrhea has progressively developed resistance to several antibiotics used to treat it.

2017 Highlights

During 2017, 171 cases of gonorrhea were reported in Davis County.

During 2017, there were **171** cases of gonorrhea reported in Davis County, a 33% increase from the 129 cases reported during 2016 (see Figure 48). Although increases in gonorrhea rates have been observed in both Davis County and Utah, their rates continue to be well below the rate seen in the United States (see Figure 48).

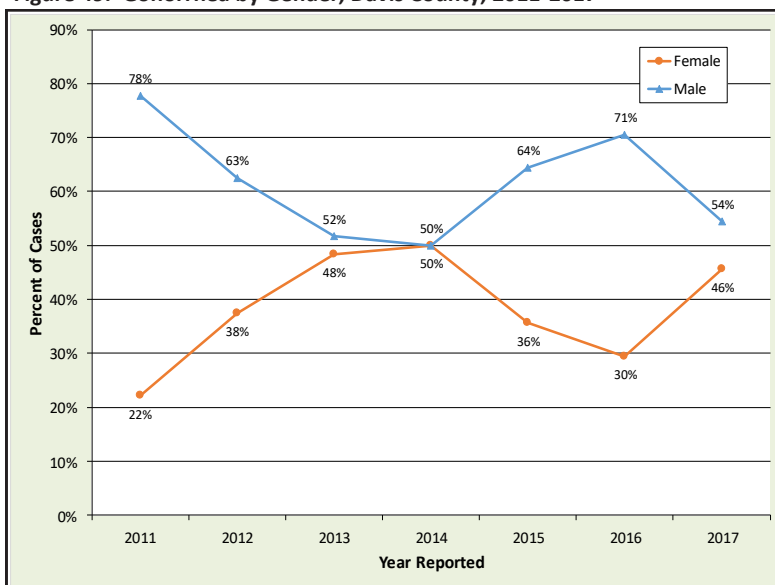
Figure 48. Incidence of Gonorrhea, Davis County, Utah, U.S., 2000-2017



*Utah and United States 2017 data are provisional.

Unlike chlamydia, gonococcal infections in Davis County were more frequent in males (see Figure 49). Disease interviews identified men who have sex with men (MSM), multiple sex partners, anonymous partners, incarceration, and substance abuse as common risk factors for gonococcal infection.

Figure 49. Gonorrhea by Gender, Davis County, 2011-2017



Gonorrhea infections in Davis County are more frequent in males.

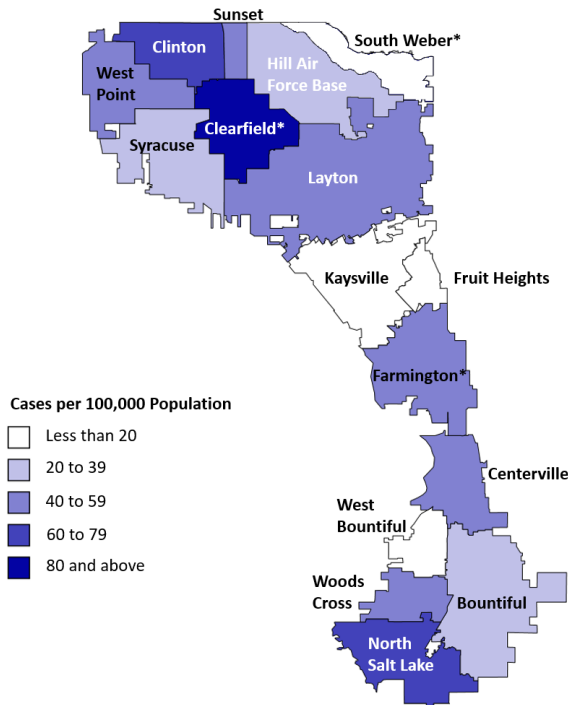
Davis County and Utah have seen significant increases in rates of gonorrhea in recent years.

Gonorrhea

The median age of those infected was 25 years (see Figure 50). This represents no change from what was observed in 2016. Davis County continues to see a rise in gonococcal infections in the younger, heterosexual population.

A significant number of cases were located in North Salt Lake, which geographically borders Salt Lake City (see Figure 51). This trend is also true among the MSM population - North Salt Lake had a higher percentage of cases who were MSM (50%) although Centerville also had high percentage of MSM cases (57%) (see Figure 52).

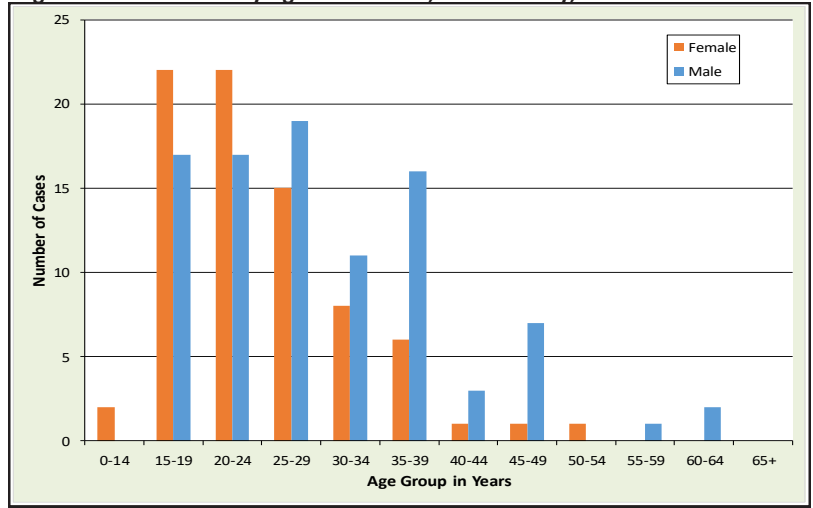
Figure 51. Gonorrhea by City, Davis County, 2017



*These cities are impacted by temporary residential establishments (i.e. federal job corps and correctional facilities).

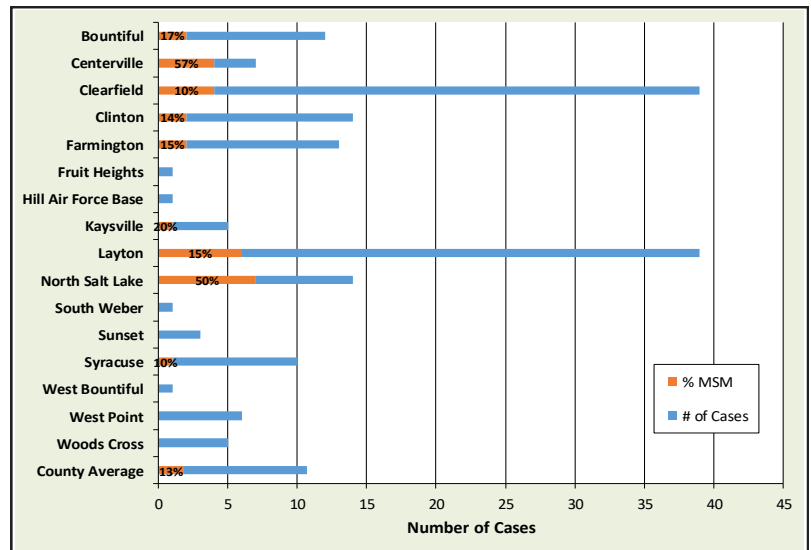
The Sexually Transmitted Diseases Treatment Guidelines, 2015 recommend treating all gonorrhea cases for both gonorrhea and chlamydia - regardless of chlamydia test results. This includes a combination therapy of a ceftriaxone injection (e.g. Rocephin) and oral azithromycin to be given simultaneously. Doxycycline is no longer recommended as a first-line treatment option due to the increase in drug-resistant cases.

Figure 50. Gonorrhea by Age and Gender, Davis County, 2017



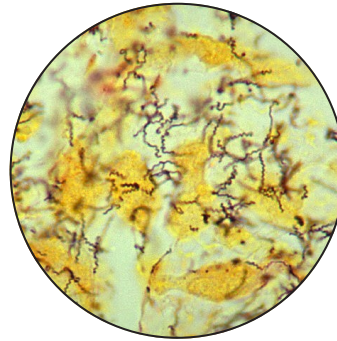
A urine sample can be used to screen for both gonorrhea and chlamydia. This less-invasive testing process is more appealing to patients and may encourage sexually-active individuals to seek testing. However, when participating in anal/oral intercourse, some STDs may be missed if exclusively using the urine test. Medical providers are encouraged to include rectal/oral swabs in STD screenings for patients that engage in anal and/or oral intercourse. Another testing option involves self-collected specimens. Studies have shown that self-collected anal/oral specimens had test results that were of equal or better accuracy than those collected by clinical providers. DCHD plans to implement a similar process to their STD screening program in 2018.

Figure 52. Gonorrhea Cases and % Reporting as MSM by City, Davis County, 2017



Syphilis

Syphilis is a sexually-transmitted disease (STD) caused by the bacterial spirochete *Treponema pallidum*. Syphilis in adults are classified in stages: *primary*, *secondary*, *early latent*, and *late latent* syphilis. Syphilis is usually transmitted from person to person by direct contact with a syphilitic sore, known as a chancre during sexual contact. Pregnant women with the disease can transmit it to their unborn child. Syphilis has been called “The Great Pretender” as its symptoms can mimic many other diseases. The painless sore that appears initially when a person is first infected can be confused as a pimple or other seemingly harmless lesion. However, many of these syphilitic sores develop in the rectum or vagina and are not noticed. Thus, most transmission is from persons who are unaware of their infection. Over the past several years, syphilis has continued to increase among men who have sex with men (MSM). Recent national outbreaks among MSM have been marked by high rates of coinfection with human immunodeficiency virus (HIV) and high-risk sexual behaviors.



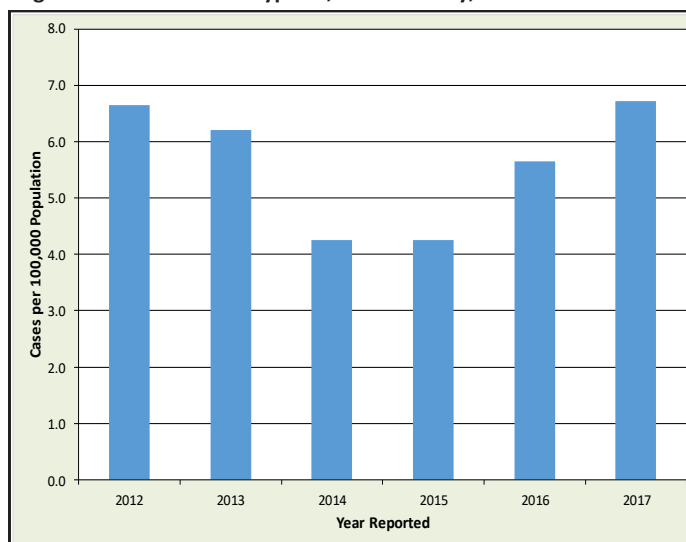
Syphilis is an STD that can cause long-term complications if not treated correctly. Symptoms in adults are divided into stages: *primary*, *secondary*, *early latent*, and *late latent* syphilis.

During 2017, there were **23** cases of syphilis reported in Davis County (see Figure 53). One case was classified as *primary*, three as *secondary*, nine as *early latent*, and ten as *late latent*.

Through disease investigations, it was noted that the majority of those infected with any stage of syphilis were men who have sex with men (MSM). Other identified risk factors include unprotected anal sex, injection drug use (IDU), multiple sex partners, anonymous sex with individuals of unknown STD/HIV status, foreign-born, and substance abuse. Only a few individuals were diagnosed with symptoms.

The staging of syphilis is difficult and requires obtaining a thorough history (including past test results), risk factors, previous treatment regimens, and evaluation of symptoms. Partners’ disease status also helps in the staging process. The later stages of infection require a more rigorous treatment protocol. Transmission to an unborn fetus causes congenital syphilis and can result in miscarriages, stillbirths, and death.

Figure 53. Incidence of Syphilis, Davis County, 2012-2017



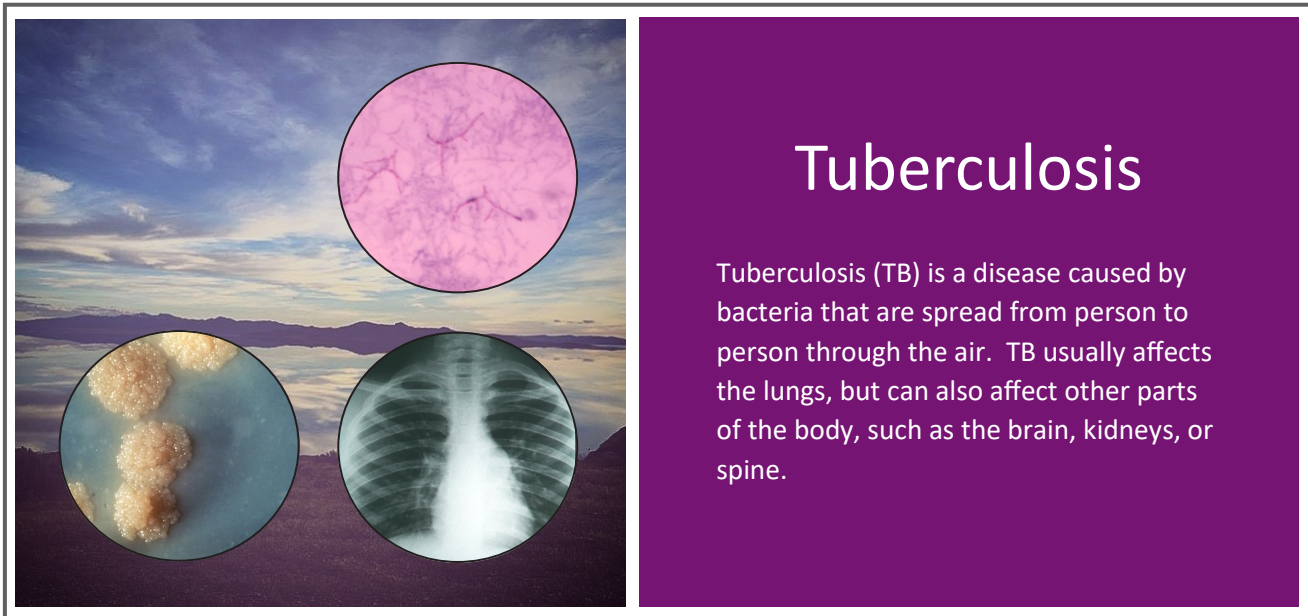
*Utah and United States 2017 data are provisional.

2017 Highlights

A total of **23** cases of syphilis were reported during 2017 in Davis County.

The majority of those infected with any stage of syphilis were men who have sex with men (MSM).

The rate of syphilis has increased in Davis County in recent years.



Tuberculosis

Tuberculosis (TB) is a disease caused by bacteria that are spread from person to person through the air. TB usually affects the lungs, but can also affect other parts of the body, such as the brain, kidneys, or spine.

Approximately one-third of the world’s population and 9 to 14 million people in the United States are infected with *M. tuberculosis*. On average, 10% of infected individuals will develop active tuberculosis at some point in their lives. In 2016, 10.4 million people worldwide became sick with TB disease resulting in approximately 1.7 million TB-related deaths. In the United States, there were 9,272 TB cases in 2016 (2.9 cases per 100,000 persons). This represents a 2.8% decrease compared to cases reported in 2015. This is the lowest case count on record in the United States. Utah had **29** confirmed cases (0.9 cases per 100,000 persons) reported in 2017.

By the early 1980s, TB was considered to be under control and many states redirected TB prevention and control funds to other programs. As a result, the country experienced a resurgence of TB, with a 20% increase in cases reported between 1985 and 1992. Many of these were persons with difficult-to-treat drug-resistant TB. This led to more aggressive control efforts. Since then, the number of TB cases reported annually has decreased. With the introduction of HIV, TB rates remain a constant threat as it is a leading cause of death among those infected with HIV. Also, a new virulent strain of TB, extensively drug-resistant tuberculosis (XDR-TB), has been identified. This strain is resistant to many drugs used to treat tuberculosis and has a high mortality rate.

Davis County had **three new** active tuberculosis disease (ATBD) cases (see Figure 54) and **102** latent tuberculosis infections (LTBI) in 2017 (see Figure 55).

Figure 54. Active Tuberculosis Cases by Year, Davis County, 2002-2017

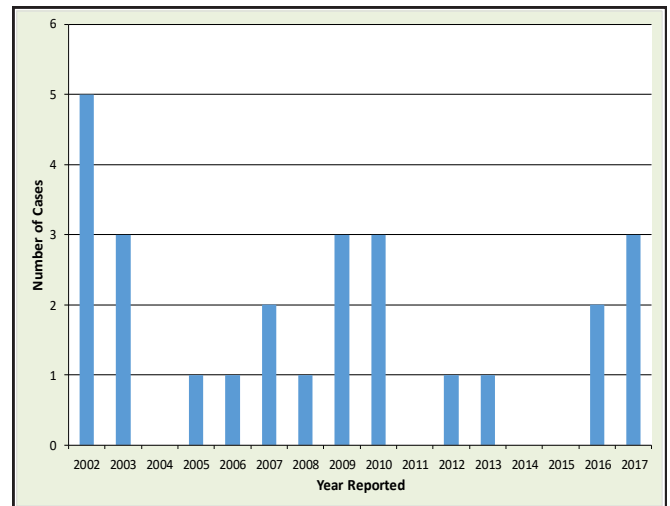
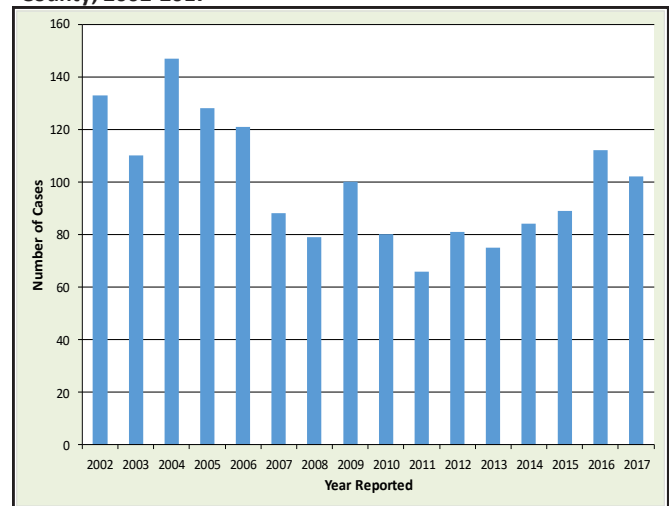
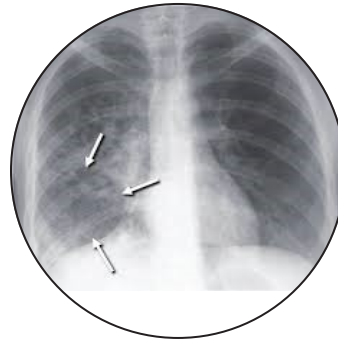


Figure 55. Latent Tuberculosis Infections (LTBI) by Year, Davis County, 2002-2017



Active Tuberculosis Disease (ATBD)

Tuberculosis (TB) is caused by a type of bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs (pulmonary) but may attack any part of the body (extrapulmonary). TB is typically spread through the air when a person with TB disease of the lungs or throat expels tiny airborne particles (droplet nuclei). People nearby may breathe in these particles and become infected. People who have latent TB infection do not feel sick, do not have any symptoms, and cannot spread TB. However, they may develop active TB disease at some time in the future. The United States experienced a resurgence of active tuberculosis disease (ATBD) between 1985 and 1992, when the number of TB cases increased by 20%. Early detection and treatment of ATBD is essential to control the spread of the disease and to prevent outbreaks.



TB is a disease caused by *Mycobacterium tuberculosis*. This bacteria usually attack the lungs, but can attack any part of the body, such as the kidney, spine, and brain.

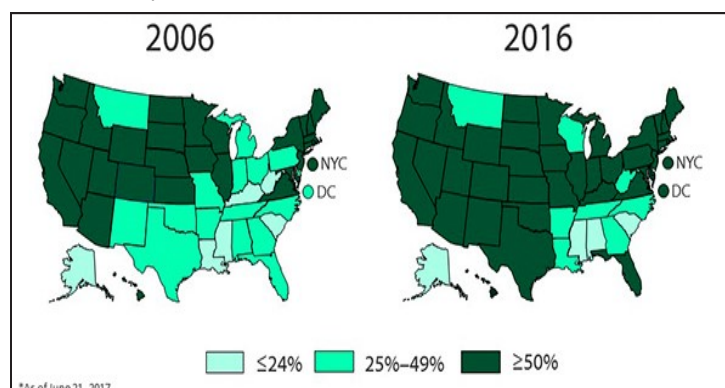
In 2017, Davis County had **three new** cases of active tuberculosis. One case was pulmonary and the two other cases were extra-pulmonary.

Management of active tuberculosis cases requires close collaboration between several agencies including local health departments, medical providers, the Utah Department of Health, the Utah Public Health Laboratory, and a commitment by the infected individual. Both pulmonary and extra-pulmonary TB typically require six months of treatment. Complicated cases of tuberculosis can require treatment to be extended up to two years (e.g. meningeal, multi-drug resistant/extensively-drug resistant (MDR/XDR)).

Patients with infectious pulmonary tuberculosis, which is of most concern for public health, are isolated until sputum sample tests indicate the individual is no longer infectious. To ensure drug treatment compliance, medication is administered under Directly Observed Therapy (DOT). Because DOT can seem personally invasive to the patient, strategies to promote a less intrusive and more flexible schedule are implemented whenever possible. These include bi-weekly/tri-weekly treatments, home visits, and video-conferencing.

In the United States, tuberculosis is primarily seen in individuals who are foreign-born or have traveled/lived in endemic countries (see Figure 56).

Figure 56. Percentage of TB Cases Among Foreign-born Persons, United States, 2006 & 2016



2017 Highlights

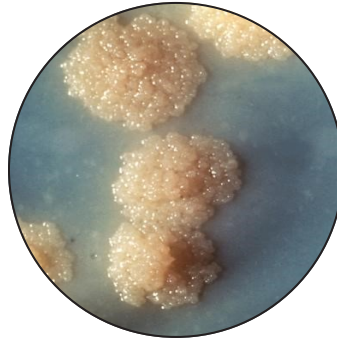
Three new cases of active tuberculosis were reported in Davis County in 2017.

On average, Davis County investigates about one case of active tuberculosis each year.

In the United States, tuberculosis is primarily seen in individuals who are foreign-born or traveled/lived in endemic countries.

Latent Tuberculosis Infection (LTBI)

Latent tuberculosis infection (LTBI) is a condition in which tuberculosis (TB) bacteria are alive, but inactive in the body. People with LTBI have no symptoms, cannot spread TB to others, and usually have a positive skin test reaction or interferon gamma release assay (IGRA) blood test. Development into active disease occurs in about 10% of those who do not receive treatment for LTBI.



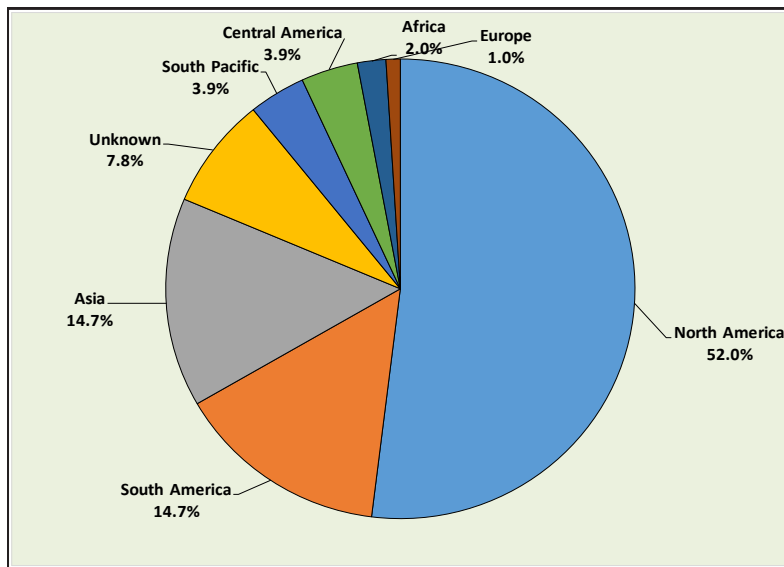
Persons with LTBI do not feel sick and do not have any symptoms. They are infected with *M. tuberculosis*, but do not have TB disease.

Approximately 200 clients are referred to Davis County Health Department (DCHD) annually for tuberculosis evaluation. These evaluations can include interviews, repeat skin testing/blood screening tests, chest x-rays, sputum testing, and physical exams in order to provide an accurate diagnosis.

With the low incidence of active tuberculosis disease in Davis County and Utah as a whole, the largest disease burden for tuberculosis falls under LTBI. During 2017, Davis County managed **102** clients with LTBI, with an average of **23** LTBI patients per month. Treatment reduces the risk that latent TB will progress to active disease and is essential to the control and elimination of tuberculosis disease. Case management includes initial testing to rule out active disease and ensuring appropriate treatment of the infection. The majority of individuals who receive LTBI treatment in Davis County are foreign-born or returning LDS missionaries who traveled to endemic countries (see Figure 57).

Typically, treatment for LTBI consists of daily antibiotic therapy for nine months. Individuals are monitored throughout therapy, but DOT is not necessary. In October 2012, use of a new LTBI treatment recommended by CDC was implemented in Utah. This new regimen is a combination of two drugs, administered by DOT once weekly for 12 doses. It is recommended for persons age 12 or older who are otherwise healthy, but also meet a certain set of criteria.

Figure 57. LTBI by Place of Birth, Davis County, 2017



2017 Highlights

During 2017, Davis County managed **102** patients with LTBI.

The majority of individuals who receive LTBI treatment in Davis County are foreign-born or traveled/lived in endemic countries.

DCHD provided **1,042** tuberculin skin tests to the public in 2017.

Latent Tuberculosis Infection (LTBI)

Davis County receives referrals for suspect active/latent tuberculosis from various medical facilities and providers. Screening tests consist of a tuberculin skin test (TST) or IGRA (e.g. Quantiferon-Gold). Those with positive test results are often referred to the health department for evaluation and treatment. LTBI is not a reportable condition, but free or low-cost services are available for the community.

Davis County managed LTBI patients of almost all ages (see Figure 58). The age group with the highest frequency of cases was 60+ years.

Davis County Health Department (DCHD) provided **1,042** tuberculin skin tests to the public in 2017 (see Figure 59). However, these numbers only account for a small percentage of all TB tests performed in the community. Most often, those who sought TB testing did so for a job or school requirement (81.9%). Other reasons included pre- and post-mission requirements (8.8%), refugee or immigrant requirements (4.8%), unknown (2.3%), personal choice (1.0%), exposure to TB (0.9%), immunocompromised (0.2%), substance abuse (0.1%), and migrant work requirements (0.1%) (see Figure 59).

Figure 58. LTBI by Age Group, Davis County, 2017

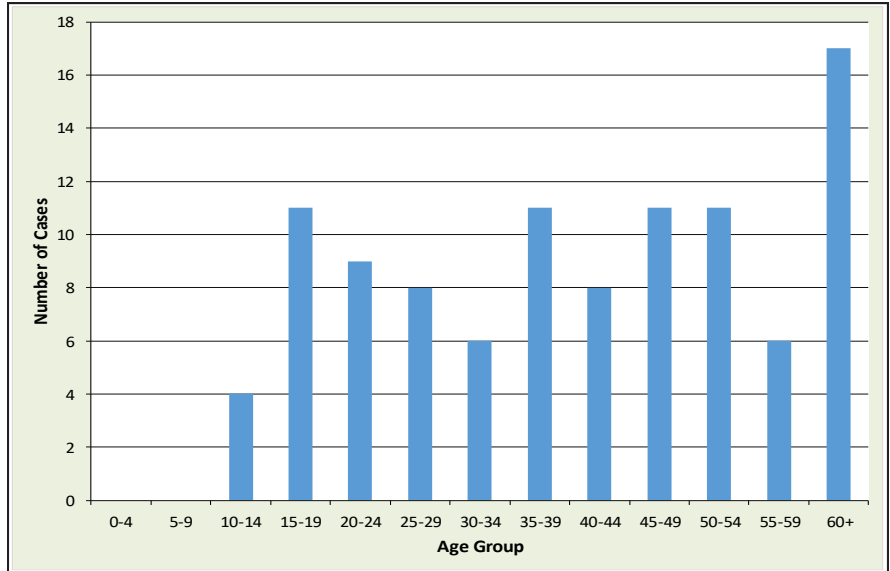
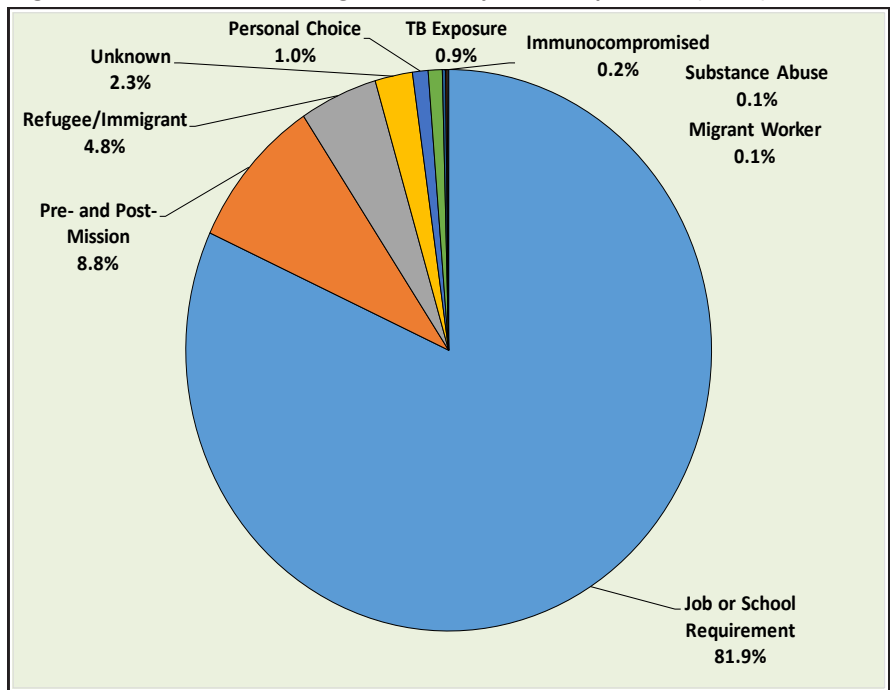


Figure 59. Reasons for TB Testing, Davis County Health Department (DCHD), 2017



Program Highlights

During 2017, several program activities were implemented to address disease trends and enhance community education.

STD/HIV Program Highlights:

School District STD Education

To help address the sexually transmitted disease (STD) burden among adolescents, Davis County Health Department (DCHD) continues a partnership with Davis School District (DSD) to provide STD/human immunodeficiency virus (HIV) education in the secondary schools. Davis County is one of the few local health departments to offer this service. The presentation was created in collaboration with the curriculum department at DSD and was approved by the board for teaching within the junior high and high school settings. Teachers have been offered trainings on the approved STD/HIV presentation in an effort to standardize the presented materials, update and increase the knowledge base of district educators, and expand the pool of trained professionals. In 2017, **24** presentations by health department staff were provided, reaching approximately **1,110** students in grades 8, 10, and 11. For high school students, abstinence pamphlets, along with STD/HIV facts and locations for testing, were provided by DCHD. A modified version of the presentation is offered to the junior high age group. Students are given information on how to access DCHD's STD Hotline number—which is staffed by a nurse Monday through Friday (8:00am - 5:00pm).

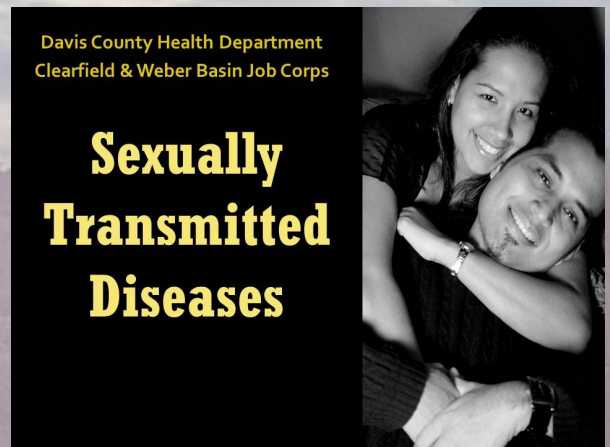


Community Outreach Education

DCHD partners with the two local Job Corps Centers (Clearfield and Weber Basin) to provide STD/HIV education to students in their facilities. Classes are taught weekly at the Clearfield Job Corps Center and as requested at the Weber Basin location. For 2017, the following results were noted:

- **23** presentations were given
- **604** students participated in the presentations
- **344** (57%) of the students who participated were of various ethnic minorities

Due to core public health work demands, these classes were turned over to the Job Corps medical staff in July 2017. The STD/HIV power point presentation was made available to the Job Corps staff to help in this transition. Davis County will continue to work with both centers to assist them in their STD/HIV education needs.



Program Highlights

Low-Cost STD/HIV Screening Clinic

Access to STD testing has been noted as a barrier by those who are sexually active and at-risk. As a result, DCHD partners with Midtown Community Health Center - Davis to offer low-cost screening to residents through their clinic. Two options are available to the community:



- **Low-Cost Screening Clinic:** This is a walk-in clinic where individuals can access STD screening Monday through Friday (8:00am - 5:00pm). Individuals are provided educational materials on STD/HIV and offered testing—a physical exam is not performed. DCHD provides the results of the testing and conducts further investigation and treatment. Testing supplies and medications are provided by the health department. Midtown Clinic provides a medical assistant who is responsible for collecting the specimens.

During 2017, approximately 296 clients received testing through the low-cost clinic. Davis County identified 24 positive chlamydial, eight gonococcal, four syphilis, and two HIV infections—an STD infectivity rate of 13%.

- **Provider Exam STD Testing:** Individuals who are symptomatic can receive STD services through Midtown Clinic. Clients make an appointment to see a medical provider, obtain a physical examination, and are tested for chlamydia, gonorrhea, and HIV (syphilis testing is performed if the individual is at-risk). Additional tests are available for an added fee. Testing is provided by Midtown Clinic. If test results are positive, Midtown Clinic treats the patient with medication provided by DCHD and refers the case to DCHD for risk-reduction counseling and investigation. In 2017, **217** clients were tested by Midtown Clinic through this program.

STD/HIV Contact Clinic

Individuals who test positive for any of the reportable STDs (chlamydia, gonorrhea, syphilis, HIV, and chancroid) are interviewed to identify exposed sexual contacts. Contacts are located, tested, and treated by DCHD at no charge. In 2017, **169** individuals were seen in the STD/HIV contact clinic. Of those, **61** tested positive for chlamydia (36%) and **nine** tested positive for gonorrhea (5%). Of the **16** who were tested for syphilis, **seven** (44%) tested positive. In addition, **two** (18%) of the **11** who were tested for HIV were confirmed positive through conventional testing. Overall, this represents an infectivity rate of 42%. Contacts to positive cases are at high risk of acquiring infection and the data reiterates the importance of contact tracing in the control of STDs.

Rapid HIV Testing

Traditional HIV testing may take up to 10 days for results. To decrease the wait time, DCHD conducts free rapid HIV clinics throughout the year, often in conjunction with national HIV and STD events. Results are available in 20 minutes. Rapid testing is also performed in the STD/HIV contact clinic. In 2017, **66** rapid HIV tests were administered. Those that are positive by rapid test receive follow-up confirmatory testing performed at the Utah Public Health Laboratory. DCHD staff administering the tests are trained to give positive test results and provide important resources to infected clients. In 2016, a new 4th generation rapid HIV test was made available and tested not only for HIV antibodies, but also for antigen. This test is capable of detecting infection two to four weeks after exposure. This is a valuable resource to assist in an earlier identification of infection and prevention of transmission to others.

Program Highlights

To accurately diagnose HIV, additional diagnostic testing is needed. In an effort to help the medical community understand the HIV testing process, DCHD collaborated with the Utah Department of Health (UDOH) to clarify CDC testing guidelines. In 2017, one-on-one discussions with medical providers and laboratorians took place to ensure that appropriate testing and interpretation was accomplished.



Community Involvement

In order to better serve and care for HIV positive residents and their partners, DCHD participates in the statewide Utah HIV Planning Group (UHPG). This group is comprised of local health department representatives, UDOH staff, infectious disease physicians, community partners, and HIV-infected individuals. Together the group discusses updates on HIV issues, best-care practices, how to motivate clients to stay in care, service gaps, and how to incorporate support systems into various agency program activities.

HIV PrEP Education

HIV pre-exposure prophylaxis (PrEP) helps prevent an HIV-negative person from getting HIV from a sexual or injection-drug-using (IDU) partner who is positive. PrEP, when used with other safer sex practices (e.g. condoms), can provide even greater protection. The Centers for Disease Control and Prevention (CDC) reports that PrEP reduces the risk of getting HIV sexually in high-risk individuals by up to 92%, when used consistently. PrEP can also reduce the risk of getting HIV by 49-74% among people who inject drugs. With the availability of this new intervention tool, DCHD is now providing education on PrEP to men who have sex with men (MSM), IDUs, and women with high-risk partners (e.g. MSM, IDUs, and those infected with HIV and/or syphilis).

Tuberculosis Program Highlights:

Residents who have developed active TB need to receive appropriate treatment for their disease. Failure to comply with the established treatment regimen can result in the development of drug resistance. To prevent this from occurring, treatment must be administered under directly observed therapy (DOT). This requires a health department staff member to observe the patient taking their medication daily or (when possible) three times a week. This process can make it difficult for clients to maintain normal day-to-day activities and can incur travel costs to the patient and/or health department staff. To address this issue, DCHD offers clients a video-conferencing option where those with a history of compliancy can be observed taking their medication through applications such as Skype or FaceTime. The TB nurse conducts periodic face-to-face encounters to ensure that any possible treatment side effects are recognized. This option is only considered for individuals who display responsible behaviors and are low-risk for complications.

Salt Lake County Health Department has a specialized clinic that is staffed with contracted providers who are experts on TB and Hansen's disease. This clinic is made available to all local health departments free of charge. DCHD uses this clinic to assist with diagnosis, treatment, and case management of unique/difficult cases of TB and Hansen's disease. For all other active TB cases, UDOH and DCHD partner with Dr. Gary Alexander, MD (pulmonologist) for consultation, evaluation, and treatment management. Dr. Alexander has been a valuable resource to DCHD's TB program. His expertise in tuberculosis continues to play a vital role in the successful treatment and care of clients. Dr. Alexander also serves on DCHD's Board of Health.



Gary Alexander, MD

Program Highlights

DCHD has also partnered with Midtown Community Health Center - Davis to conduct physicals/evaluations and prescription management for Davis County residents who have Latent Tuberculosis Infection (LTBI). Clients receive a full medical exam from a Midtown healthcare provider to determine capability and appropriateness of LTBI treatment. Throughout the course of treatment, which typically is nine months, the Midtown providers are available for consultation and other needed workups.

Hansen's disease (leprosy) also falls under the Tuberculosis program. Every few years a Hansen's disease is reported to the health department. Treatment and case management for Hansen's disease can be anywhere from 6 months to two years, depending on the type of infection and treatment regimen. In 2014, DCHD received report of a Hansen's disease case. This patient followed a two-year treatment plan and completed treatment in October 2016. In 2017, this individual encountered a relapse of infection and is currently undergoing re-treatment. A second case of Hansen's disease (unrelated to the first case) was also diagnosed in 2017. This patient is also undergoing a two-year treatment regimen which included daily directly observed therapy (DOT) for the first several weeks of treatment, but will be monitored monthly for the remainder of the treatment. Those being treated for Hansen's disease take daily medication provided by the National Hansen's Disease Program in Baton Rouge, Louisiana.



Overall Division Highlights:

Davis County Health Department Website

The Communicable Disease and Epidemiology Division (CD/Epi) website remains a valuable resource for the community. Visitors to the website can access program specific information, as well as links to other important websites. Materials are available for each of the programs within the CD/Epi Bureau. It also offers information specific to healthcare professionals and medical providers—including reporting guidelines, current disease data for Davis County, and links to Utah's Communicable Disease Rule. The website is available at: <http://www.daviscountyutah.gov/health>.



Ask-A-Nurse Email

The Ask-A-Nurse Email is routinely utilized by the public for answers to communicable disease issues. This system is monitored daily by DCHD nurses who provide information on health issues pertaining to infectious diseases or other reportable conditions. An email link is found on each page of the CD/Epi web pages or can be accessed at: ask-a-nurse@daviscountyutah.gov.

Program Highlights

Healthcare Associated Infections (HAI) Grant

Davis County continued to receive funding to assist in the identification and control of healthcare associated infections. In 2017, HAI outbreaks were detected and control efforts were implemented smoothly, due in part to a collaboration between public health and private healthcare systems. Infection control assessments were conducted at several long-term care (LTC) facilities and dialysis centers to review infection control practices and identify any potential gaps. Resources were provided to these agencies, including the *Infection Preventionist's Guide to Long-Term Care* manual, written by the Association for Professionals in Infection Control and Epidemiology (APIC). This book addresses the unique needs of long-term care facilities and provides tools to help implement policies and procedures for infection control. A CD is also included which allows the facilities to modify documents to their specific agency's needs.



DCHD continues to work closely with the medical community on HAI issues and provide healthcare partners with updated information on new and emerging infections. Each year, drug-resistant organisms are identified through enhanced drug susceptibility testing, which in turn facilitates better outcomes for the patient and the facilities where they reside.

EMS Program

OSHA Standard - 29 CFR 1910.1030 mandates that all employees considered at risk for bloodborne pathogen (BBP) exposure receive exposure training and have annual updates. In an effort to assist Davis County Sheriff's Office (DCSO) and other Emergency Medical Services (EMS) agencies within Davis County, DCHD provides bloodborne pathogen training once a month. This class is free of charge. It is also available off-site for a nominal fee.

Senate Bill 19: "Disease Testing of Individuals Exposed to Bloodborne Pathogens" is a law to protect Workers Compensation benefits for EMS workers who contract HIV, hepatitis B, or hepatitis C from an on-the-job exposure. In conjunction with the BBP training, DCHD also provides baseline testing for the DCSO and other EMS agencies within Davis County. To be protected under the EMS law, employees must be tested at start of employment, again in 3-6 months, and at termination.

Davis County has provided EMS/public safety employee services to the community for well-over 26 years. As the burden of disease has increased, the ability to continue this service has declined. Starting January 2018, the program closed to outside EMS/public safety agencies and will focus on Davis County Sheriff Office employees and the Davis County's Search and Rescue program. It has been a privilege to serve our outside EMS/public safety personnel throughout these years. DCHD will continue to provide guidance for these outside agencies, as needed.

Internship Program

The Communicable Disease and Epidemiology Bureau (CD/Epi) maintains an internship program for public health interns to gain work experience in the public health field. This is an ongoing partnership that the CD/Epi Bureau continues with several universities in the area. During 2017, the CD/Epi Bureau received a student intern from the University of Utah.

Program Highlights

National Syndromic Surveillance Program (NSSP)

DCHD continues to actively participate in the National Syndromic Surveillance Program (NSSP). Late in 2016, the BioSense surveillance system was replaced with ESSENCE, a more robust syndromic surveillance platform that allows public health professionals to capture, analyze, store, and share syndromic surveillance data. Syndromic surveillance continues to provide public health with real-time data regarding the health status of the community as it captures information regarding emergency department visits and hospitalizations from multiple sources.



In 2017, ESSENCE was used to track the presence of influenza-like illness, acute gastrointestinal illnesses, measles, mumps, animal bites, hepatitis A, and respiratory illnesses. The epidemiologist is alerted by ESSENCE when emergency department and clinic visits for identified symptoms reach a pre-determined threshold. Data from these alerts are analyzed to identify clusters of illness or diseases of concern.

DCHD participates in the Intermountain Collaborative for Syndromic Surveillance, which is a regional workgroup consisting of other health departments in Utah, Idaho, and Nevada. This group meets quarterly to discuss any syndromic surveillance concerns and to identify syndromes that may be of value to share regionally.

igotsick.health.utah.gov Website

DCHD monitors a statewide website for reporting suspect foodborne illnesses. This system allows the general public to report illnesses that may be related to food consumed at home, in a restaurant, or in a group setting. Once a report is submitted, it is routed to the appropriate jurisdiction for review. DCHD has been able to utilize these reports to identify outbreaks that were occurring in the community. This system helps to identify outbreaks earlier, making the implementation of control measures more timely and limiting the number of people affected.



Zika Virus Preparedness Efforts

DCHD developed a Zika Virus Preparedness Plan and worked on public education and awareness in 2017. As Zika virus continued to be an issue throughout the world, those who traveled to areas with active transmission and were pregnant or returned with illness qualified for free testing through DCHD and the Utah Public Health Laboratory (UPHL). This free testing was also made available to the medical community. Throughout 2017, laboratories in Davis County established capabilities for Zika virus testing, which lessened the burden on UPHL.

In 2017, Davis County provided testing and/or facilitated testing for 49 female and 8 male residents. Public education was continued through social media postings and fax/email updates to medical providers.



Program Highlights

Animal Control Collaboration

The CD/Epi Bureau, in collaboration with Davis County Animal Care & Control, developed a human rabies exposure reporting system which has facilitated a more timely and efficient process for both agencies. The health department evaluates and monitors all reported human exposures and assists in the facilitation of post-exposure prophylaxis, when recommended. In 2017, DCHD evaluated **530** incidents where a human exposure occurred. This collaboration is an example of a successful partnership between animal control and public health that other counties in Utah may consider implementing.

New guidance was made available in 2017 that made changes to the quarantine recommendations for unvaccinated animals exposed to a rabid animal. In previous years, the recommendation to quarantine dogs, cats, and ferrets was for six months post-exposure. The new recommendations reduced the time of quarantine for dogs and cats to four months (with ferrets remaining at six months). The new guidance was implemented by Davis County Animal Care & Control and is anticipated to be a benefit to animal owners in the county.

School Absenteeism Project

DCHD continued their partnership with Davis School District (DSD) and the University of Utah Division of Public Health to develop an online platform for school absenteeism analysis. The School Absenteeism Surveillance System (SASS) generates automatic daily uploads of absenteeism data from DSD to the platform, analyzing and displaying data at district-, school-, and classroom-levels. DCHD continues to use the platform to monitor aberrations in absenteeism while minimizing the amount of time required to do so. The platform has the potential to inform DCHD and DSD of potential developments in minimal time, such that public health interventions can be initiated more efficiently.

SASS

School Absentee Surveillance System

Sign In

District Absentee Data for Tuesday, February 9, 2016

School Status by Color: Normal, 1 Sigma Warning, Sustained 1-3 Sigma Watch, Consistently Above Mean Watch, 2 Sigma Alert, Sustained Above 1 Sigma Alert, Sustained Increase Alert

District Rates: District Daily Absentee Rate, District Moving Average Absentee Rate

Student Absentee Surveillance System (SASS)

Introduction

SASS is an online absentee surveillance system designed for use by school districts and public health agencies. The system is optimized to process, analyze and display daily absentee data for a school district. The system not only displays absentee trends but also generates a range of different absentee warnings based on complex rules. **The SASS platform is completely free to anyone who wants to download and run the software.**

SASS Partners include: University of Utah Division of Public Health and Davis County, Utah (School District and Department of Public Health).

Credits: The development of this software solution was supported by the Cooperative Agreement Number 3P01TP000303-0451 from The Centers for Disease Control and

Davis County Demographics—2017

Table 7. Davis County Population, by Age Group*

Age Group	Population
<1 year	5,794
1-14 years	88,610
15-24 years	49,458
25-44 years	97,735
45-64 years	68,042
65-84 years	28,756
85+ years	3,886
Total	342,281

Table 8. Davis County Population, by Gender*

Gender	Population
Male	172,589
Female	169,692
Total	342,281

Table 9. Davis County Population, by Race*

Race	Population
White	316,629
Black	4,864
American Indian or Alaskan Native	2,421
Asian	6,890
Native American or Pacific Islander	2,701
2 or More Races	8,776
Total	342,281

Table 10. Davis County Population, by Ethnicity*

Ethnicity	Population
Hispanic or Latino (of any race)	32,296

*Population estimates for 2017 are not yet available. These figures represent the estimates for 2016.

Source: Retrieved January 2018 from Utah Department of Health, Center for Health Data and Informatics, Indicator-Based Information System for Public Health. Available at: <https://ibis.health.utah.gov/>

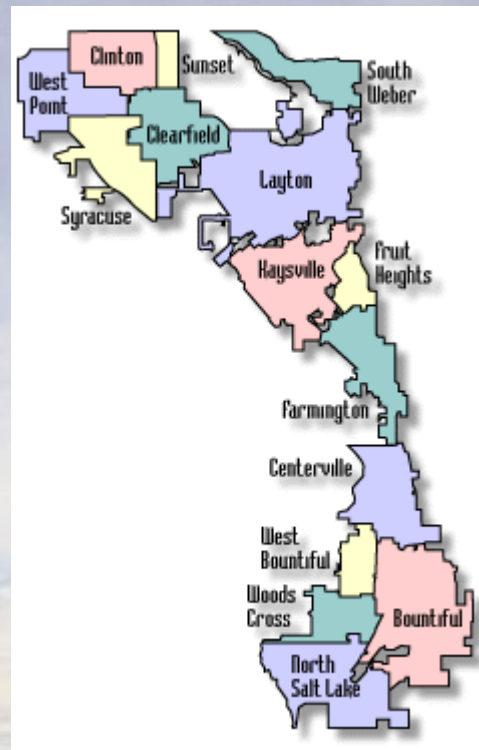


Table 11. Davis County Population, by City*

City	Population
Bountiful	44,078
Centerville	17,286
Clearfield	30,855
Clinton	21,672
Farmington	23,140
Fruit Heights	6,161
Hill Air Force Base	3,354
Kaysville	31,243
Layton	75,655
North Salt Lake	20,301
South Weber	7,196
Sunset	5,234
Syracuse	28,407
Unincorporated County	226
West Bountiful	5,574
West Point	10,548
Woods Cross	11,351
Total	342,281

