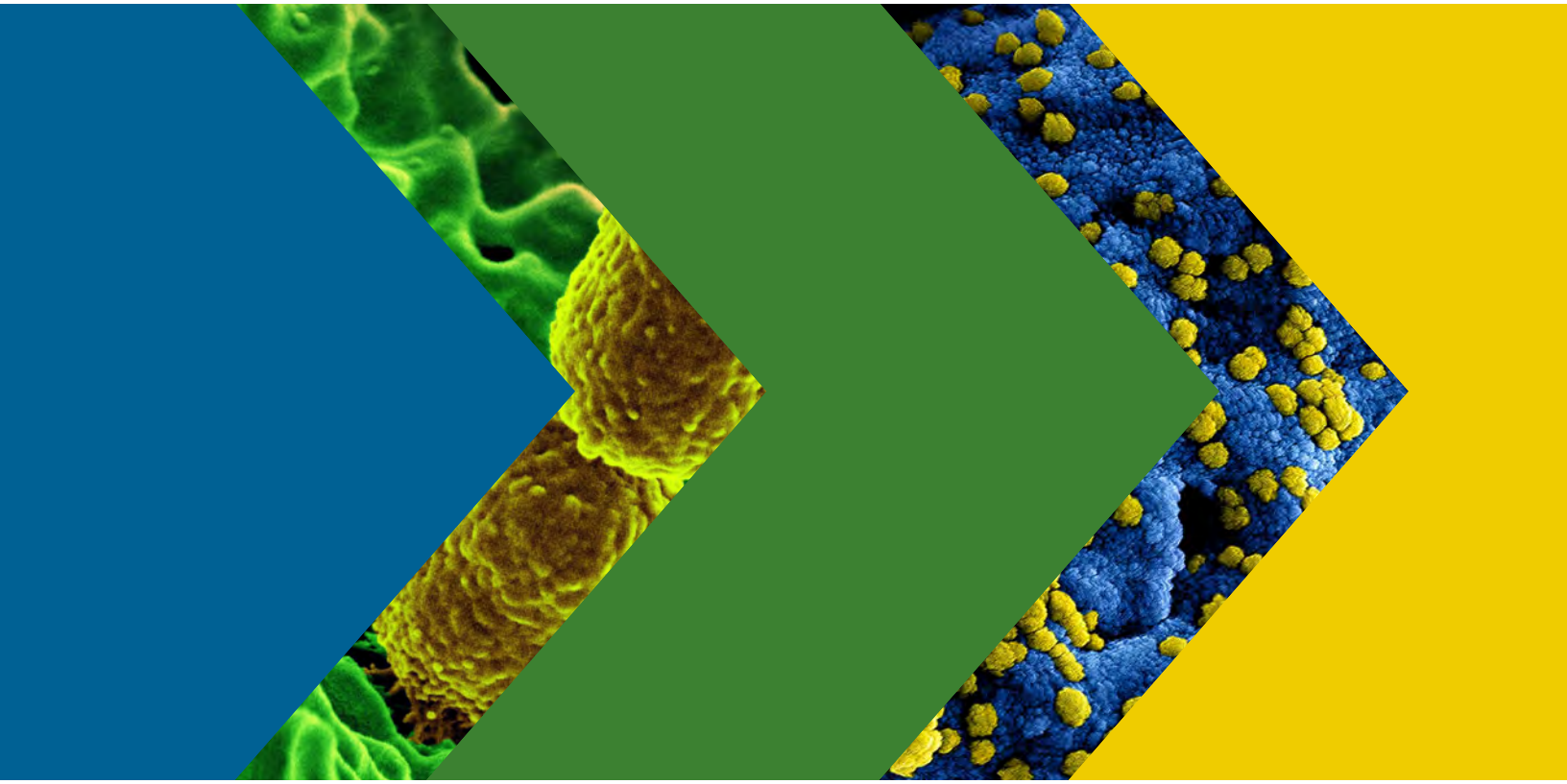
2022 Annual Report

Division of Communicable Disease & Epidemiology



Davis COUNTY HEALTH DEPARTMENT

Mission

Promote and protect the health and well-being of the Davis County community.

Vision

Healthy Choices. Healthy People.

Healthy Communities.

Values

Collaboration and Partnership.

Communication. Health Equity.

Public Health Excellence. Quality Service.

Knowledgeable, Professional, and Friendly Employees.

Prepared by the Division of Communicable Disease & Epidemiology

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2022 Highlights

This report summarizes all communicable diseases reported in Davis County, Utah, during 2022. It provides an overview of the burden and trends of infectious disease in the county and highlights important events. Several notable disease events occurred in Davis County during 2022 and are summarized below.

Outbreak of Mpox

In early May 2022, mpox began to be reported in countries where it is not endemic. On May 17, 2022, the United States (US) reported its first mpox case in the current outbreak. In Utah, 196 cases have been reported to date, 17 of which were in Davis County. The 17 cases in Davis County were reported from early July 2022 through late October 2022. Once the first case was reported in Davis County, Davis County Health Department (DCHD) Communicable Disease and Epidemiology Division (CD/Epi) staff performed the case investigation and contact tracing to prevent further exposure. CD/Epi nurses held individual appointments to administer the vaccine to patients. In addition, DCHD held two mass vaccination clinics on August 20, 2022 and September 17, 2022. As of March 9, 2023, DCHD administered 429 doses of the JYNNEOS vaccine.

Outbreak of *Pseudomonas aeruginosa*

In 2022, a rare strain of *Pseudomonas aeruginosa* (VIM-GES-CRPA), never before seen in the US, caused an outbreak that has spread to 13 states. To date there have been 64 cases, eight reports of vision loss, and one death associated with the outbreak.[1] Utah is one of the 13 states with reported cases, with all cases occurring in Davis County. The first case in Davis County was identified in July 2022, with additional cases found in the ensuing months. These cases have been genetically linked with the larger nationwide outbreak. CD/Epi staff have collaborated with the Utah Department of Health and Human Services (DHHS), the Centers for Disease Control and Prevention (CDC), and the health facility to test patients in an effort to find any unreported cases. This has involved mass testing of all residents, advising on discontinuing certain brands of artificial tears, and assisting with infection prevention procedures.

Changes in the COVID-19 Response

As the coronavirus disease 2019 (COVID-19) pandemic response continued in 2022, the year began with a surge in cases due to the Omicron variant. While symptoms were generally less severe than previous variants, its high transmissibility strained hospitals and healthcare systems across the country. COVID-19 cases in Davis County peaked at 2,467 cases per 100,000 people during the week ending January 15, 2022. The DCHD established priority groups for investigation due to the high volume of cases. By early March 2022, cases had rapidly decreased and the Omicron surge effectively ended.

In August 2022, the CDC streamlined its isolation and quarantine guidance for the general public.[2] These changes ended quarantine and instead recommended mask wearing and testing. For those who test positive, isolation may end after five days if symptoms are improving, followed by another five days of mask wearing.

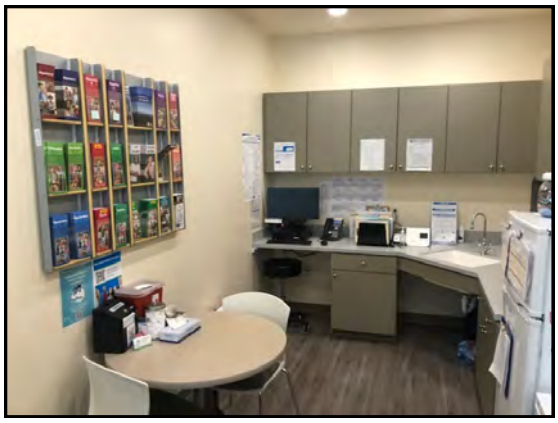
The bivalent mRNA COVID-19 vaccine represented a crucial step in the pandemic response. Whereas the initial monovalent vaccine is based on the original (ancestral) strain of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the bivalent vaccine adds the Omicron BA.4/BA.5 variants as a second strain.[3] These changes were made in response to the rapid dominance of Omicron and are designed to broaden protection against COVID-19 and reduce severe disease.[4]

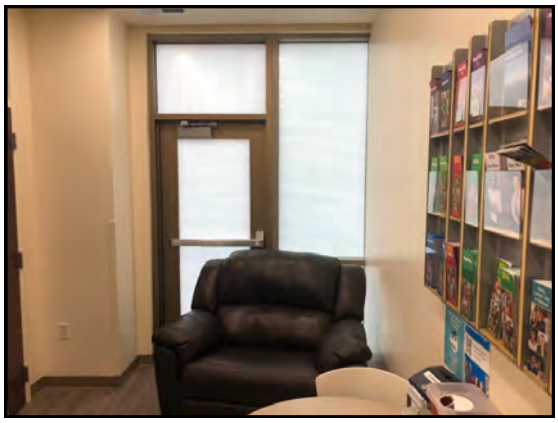
DCHD gradually shifted its COVID-19 response throughout 2022 to helping control and prevent outbreaks in long-term care facilities, such as nursing homes, skilled nursing, and assisted living facilities. These types of facilities provide important care but there is a higher risk of outbreaks and severe disease due to the typically high proportion of older

individuals living in close proximity. This shift is focused on protecting the health of vulnerable members of the community and their caregivers. These guidelines are stricter than the general public guidelines due to vulnerability faced by long-term care facility patients.

New Clinic

DCHD constructed a new clinic room on the first floor of the building, adjacent to the immunization clinic. In previous years, DCHD partnered with Midtown Community Health Center—Davis to provide sexually-transmitted infection (STI) testing and education. With this new clinic, all appointments, testing, treatment, and education are managed and performed solely by DCHD. This includes STI screening appointments, sexual partner testing and treatment appointments, and TB screening and treatment appointments. The two images below show the new clinic room.





Disease Intervention Specialists

DCHD received a grant in 2022 which allowed two disease intervention specialists (DIS) to be hired. These new staff members increase CD/Epi's capacity to control and prevent infectious disease in Davis County. DIS are public health professionals who use contact tracing and case investigation to prevent and control infectious diseases. While they started in the field of STIs, their investigative skills have expanded to include many other types of infectious diseases. DIS possess unique skills designed for disease intervention and investigation. With skills in problem solving, negotiation, and communication, DIS specialize in:

- Public health investigations,
- Case management and analysis,
- Provider and community engagement, and
- Outbreak detection and response.[5]

New Respiratory Illness Report

For many years, CD/Epi released a public report on influenza trends in the county. It was produced weekly through the influenza season (typically beginning in October and continuing through the end of May). With the 2022-2023 season, the Weekly Influenza Report was revamped to include respiratory syncytial virus (RSV) and COVID-19, and was renamed the Respiratory Illness Report. The report follows trends of emergency department visits, hospitalizations, school absenteeism, and outpatient visits due to influenza-like illness. Each report also includes brief summaries of important updates or information pertinent to respiratory illnesses. The report can be found in the Newsletter section of the DCHD website at https://www.daviscountyutah.gov/health.

Division Overview

The Davis County Health Department Communicable Disease and Epidemiology (CD/Epi) Division works in partnership with the medical community and neighboring health jurisdictions to control and prevent the occurrence and spread of communicable diseases in Davis County (see Appendix 1 for county demographics). This is accomplished through disease surveillance, disease investigation, coordination of prevention efforts, treatment, education, training, and policy development. The Division aims to:

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

The CD/Epi Division is organized into four main program areas: sexually-transmitted infections (STI)/human immunodeficiency virus (HIV), tuberculosis (TB) control, infectious disease, and disease surveillance.

STI/HIV Program

STIs affect men and women of all ages, backgrounds, and economic statuses. The US has made progress in identifying cases through better testing procedures, sexual partner testing and treatment, and risk-reduction education. The STI/HIV Program strives to ensure that infected individuals are interviewed by a trained communicable disease nurse or DIS to:

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

TB Control Program

The Davis County 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 TB in Davis County is largely due to the following program activities:

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

Infectious Disease Program

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

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

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

- Enteric Diseases: bacterial, viral, and parasitic diseases involving the gastrointestinal tract
- Invasive Diseases: bacterial or 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)
- Vaccine-Preventable Diseases: diseases that are preventable with vaccines
- Vector-borne/Zoonotic Diseases: diseases transmitted by insects, animals, or birds
- Other reportable diseases/conditions: diseases that do not fall under the above categories

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;
- Monitoring trends of infectious disease activity;
- Using a variety of data sources such a notifiable disease reports, syndromic data, school absenteeism, and sentinel physician reports; and
- 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 Administrative 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. Appendix 2 provides the list of all diseases that are required to be reported in Utah.

Entities required to report confirmed or suspected diseases are physicians, hospitals, healthcare facilities, laboratories, schools, long-term care facilities, skilled nursing facilities, and daycares. All case reports should include basic demographic information to initiate an investigation, if needed.

Disease surveillance data received from hospitals, clinics, and laboratories are used to complete case investigations and minimize the spread of infectious disease. These data are maintained in EpiTrax—a secure, online database that allows epidemiologists, nurses, and DIS to access case information statewide. Appendix 3 shows how data are transferred in the National Notifiable Disease Surveillance System.

Social Determinants of Health

Overview

Social determinants of health (SDOH) are the nonmedical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life.[6] These conditions can play an important role in the incidence and transmission of disease. When looking at population health, communities with higher income and education are healthier, as is the case in Davis County. When compared to Utah and the US, Davis County is more educated, has less unemployment, less poverty, more homeowners, more social support, and less violent crime.[7]

However, this does not mean that these factors are distributed evenly across the county. To see how SDOH impact infectious disease, we must look at smaller areas like neighborhoods. To help with this, the DHHS partnered with the Public Health Alliance of Southern California to create the Utah Healthy Places Index (HPI).[8] The complete Utah HPI may be accessed at https://dhhs.utah.gov/utahhpi/.

Utah Healthy Places Index

In short, the Utah HPI tool evaluates the relationship between 20 identified key drivers of health and life expectancy at birth — which can vary dramatically by neighborhood. Based on that analysis, it produces a score ranking from 1 to 99 that shows the relative impact of conditions in a selected area compared to all other such places in the state. The Utah HPI scores and compares geographies across the state with the ability to view data neighborhood-by-neighborhood in order to provide a granular view of community well-being.[9] The 20 indicators can be organized into eight thematic groups: education, transportation, housing, social, clean environment, neighborhood, healthcare access, and economics.[8] In this report, we evaluated the HPI score ranking for each census tract in Davis County.

Methodology

Each census tract in Davis County was grouped into quartiles based on their HPI score and given a rank based on the community health conditions: least, less, moderately, and most healthy. Figure 1 presents a map of Davis County census tracts with the respective HPI ranking. Census tract rankings were only compared to other census tracts in Davis County. City boundaries are included as a visual aid.

All Davis County disease reports from 2022 were geocoded using the patient's address at diagnosis. They were then assigned to the respective census tract and corresponding HPI rank based on the results of geocoding. There was a total of 53,846 disease reports in 2022. Of these, 51,010 had sufficient address information to properly geocode (94.7%). Of the records that had sufficient address information, 50,415 were successfully geocoded (98.9%). Overall, 93.6% of the 2022 disease reports were geocoded. Table 1 shows the population of each HPI rank area along with its percent of the total county population.[10]

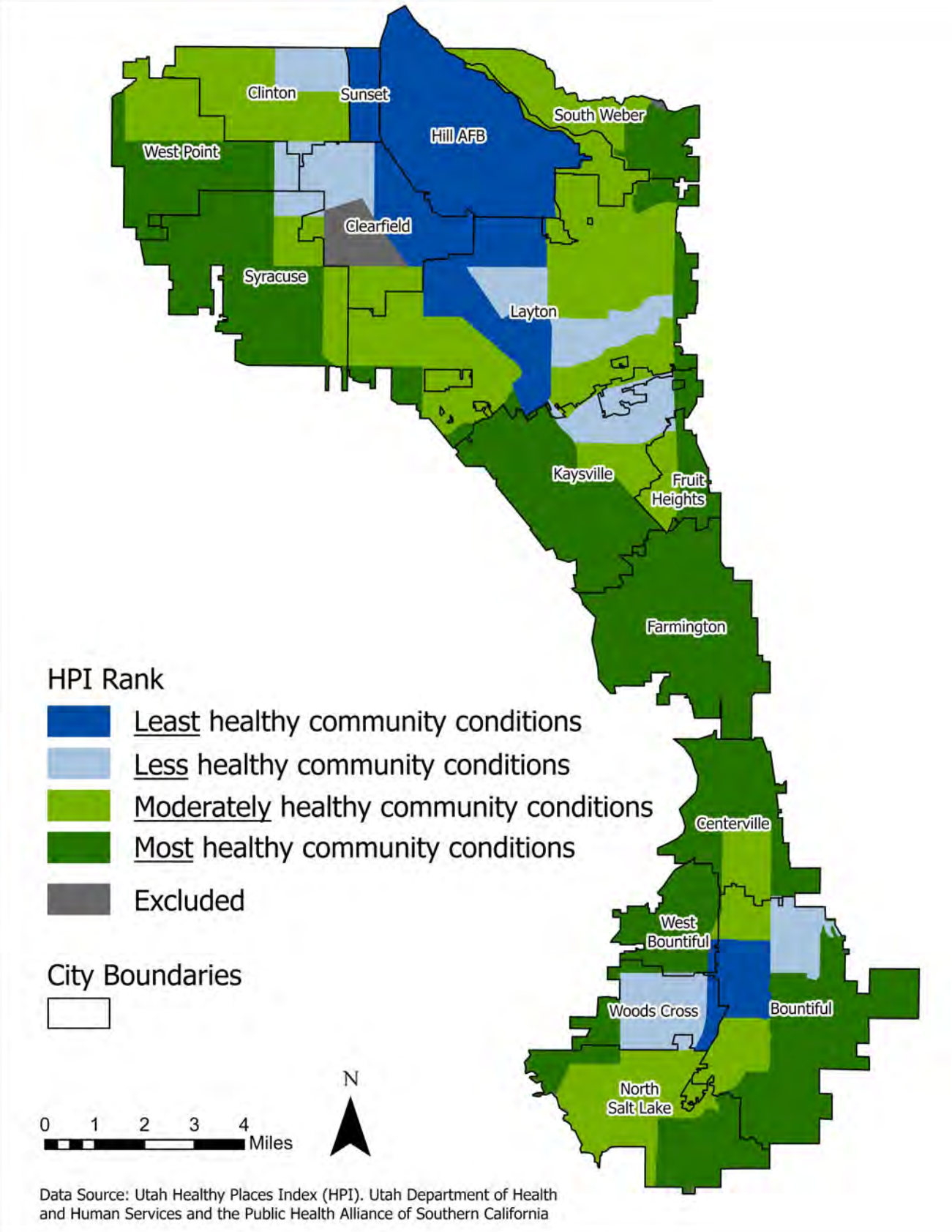
Table 1. Population of HPI Rank Areas, Davis County

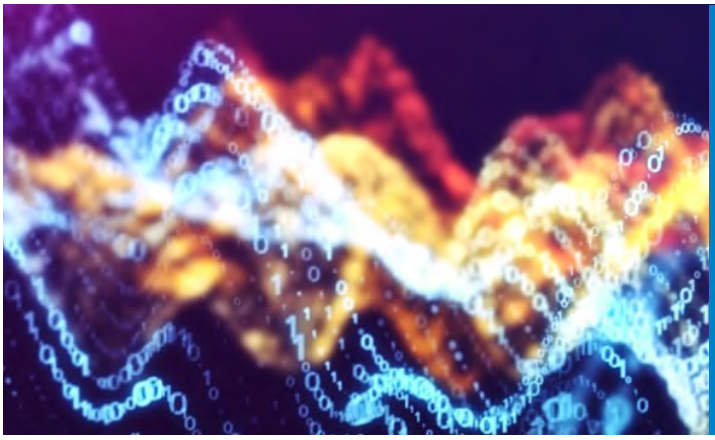
HPI Rank	Population	Percent of County Population
Least healthy	51,403	14.9%
Less healthy	51,158	14.8%
Moderately healthy	116,941	33.8%
Most healthy	125,983	36.5%

Analysis

This 2022 annual report will begin to present analyses using the HPI. Throughout this report, incidence rates of major disease categories will be stratified by the four HPI rank areas. Further uses of the HPI will be evaluated for future analyses as well.

Figure 1. Utah Healthy Places Index Ranking of Census Tracts, Davis County, 2022





Reportable Disease Summary

This section presents an overview of this year's infectious disease reporting in Davis County. In 2022, there was a total of **53,860** reported illnesses. However, 51,696 (96.0%) of these can be attributed to COVID-19 due to the high volume of reporting. For the purposes of this Reportable Disease Summary, all other diseases except COVID-19 are considered. As such, there were **2,164** non-COVID-19 reported illnesses. COVID-19-specific data and information are presented on pages 47-50. Figure 2 displays the percentage of disease reports that fall into one of seven major categories. STIs constituted 59.1% of all disease reports. This is a pattern that has been observed for many years.

Figure 2. Percent of All Diseases Reported, by Category, Davis County, 2022

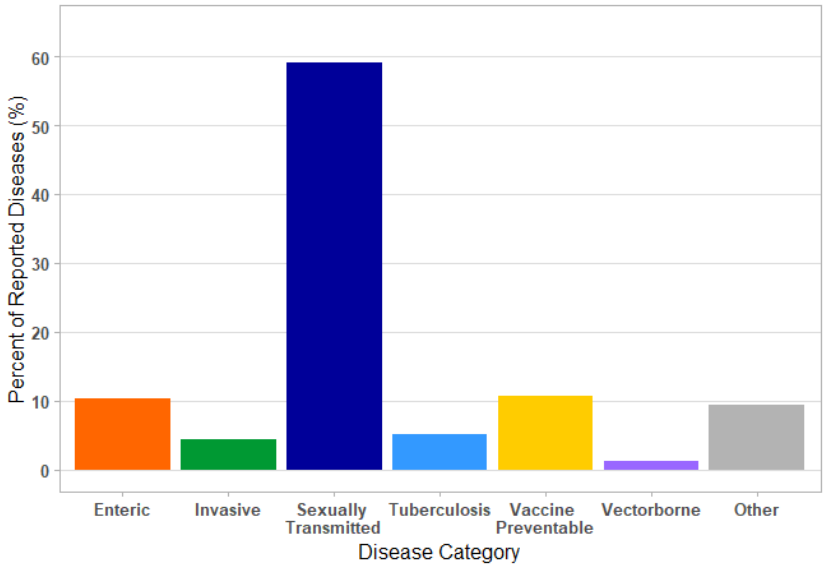


Figure 3 shows the rate of disease reports by age and sex. The high rates observed in the 15 -24 age group are primarily driven by STIs; 54.5% of all STIs reported in 2022 were in this age group.

Despite the high rates of disease reporting in this age group, a disparity is seen between males and females. While the exact reason is not known, one plausible explanation is that more STIs may be found among women due to regular female health checkups and prenatal exams. Given this, it is likely that disease reporting (particularly STIs) among males ages 15-24 is underreported.

Figure 3. Rate of Disease Reports by Age Group and Sex, Davis County, 2022

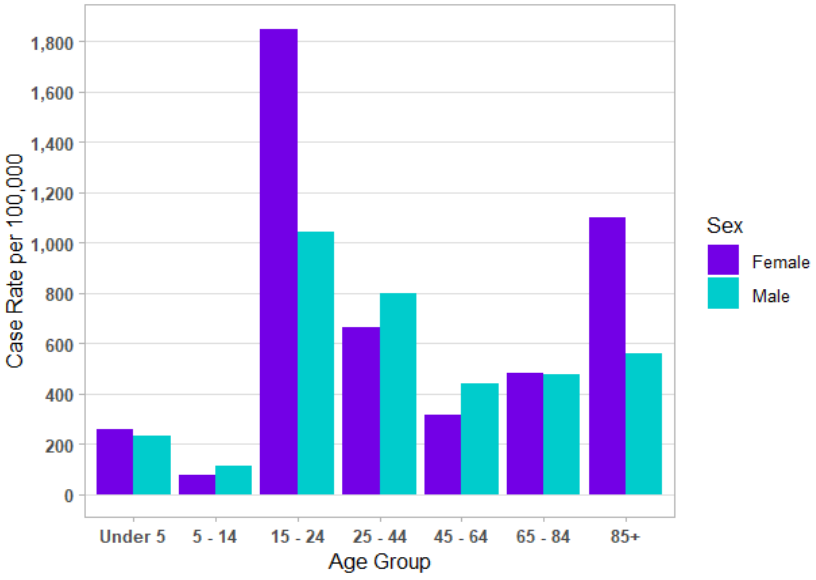


Figure 4. Rate of Disease Reports, by City, Davis County, 2022

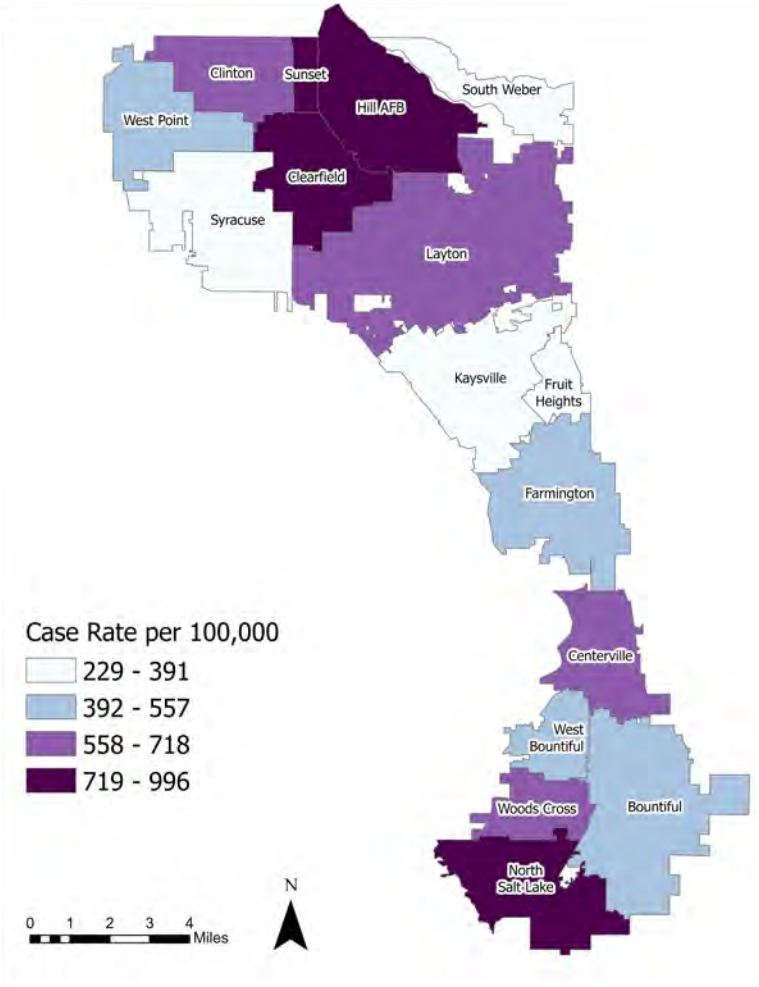


Figure 5. Rate of Disease Reports, by HPI Rank, Davis County, 2022

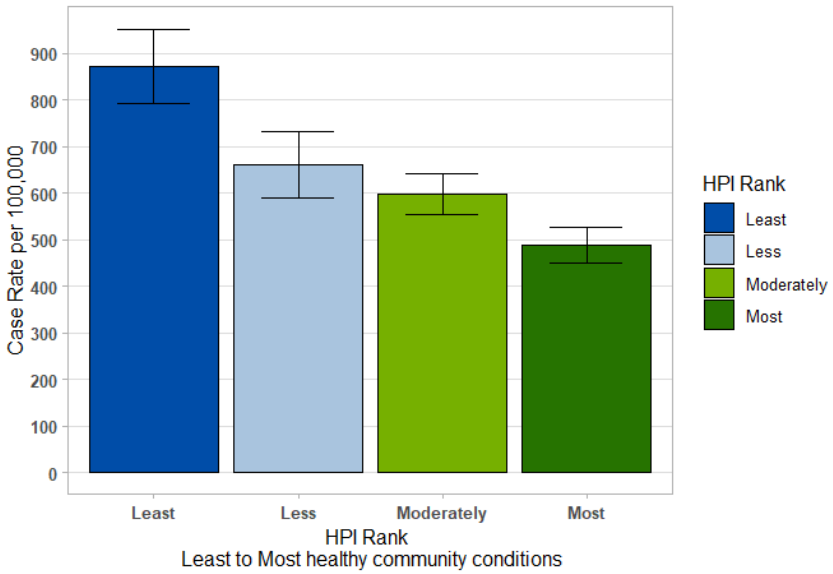


Figure 4 presents rates of disease reporting for each of the 15 cities in Davis County and Hill Air Force Base (AFB). Disease rates by city are identified by the affected individual's address of residence at the time of diagnosis. In addition to excluding COVID-19 (as previously mentioned), TB data are not included either because most infections are acquired outside of Davis County.

Clearfield, Sunset, North Salt Lake, and Hill AFB had the highest rates of reportable diseases, while Kaysville, Syracuse, South Weber, and Fruit Heights had the lowest rates.

These rates do not suggest that one city is better or worse than another, but simply describe the disease burden in each city. As described in the previous section ("Social Determinants of Health," page 5), many factors can influence the transmission and identification of disease.

Figure 5 shows the rate of reportable diseases by HPI rank. When the data are viewed this way, a clear pattern emerges: as healthy community conditions improve, disease rates decrease. In the least healthy area, the rate was 871.5 cases per 100,000 people. This is 55% higher compared to the rest of the county. Conversely, the most healthy area had a rate of 488.2 cases per 100,000 people, which is 27.9% lower compared to the rest of the county. While this may seem intuitive, the Utah HPI helps to paint a clearer picture of infectious disease burden in Davis County.

On the following pages, Table 2 shows case counts and incidence rates per 100,000 people of reportable disease in Davis County from 2017 to 2022.

Reportable Disease Summary

Table 2. Disease Report Summary, Counts and Rates per 100,000 People, by Year, Davis County, 2017 - 2022

Disease	2017 Count Rate	2018 Count Rate	2019 Count Rate	2020 Count Rate	2021 Count Rate	2022 Count Rate
Amebiasis	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Botulism, infant	0 0.0	0 0.0	0 0.0	1 0.3	1 0.3	0 0.0
Botulism, wound	0 0.0	0 0.0	0 0.0	0 0.0	1 0.3	0 0.0
Brucellosis	0 0.0	0 0.0	1 0.3	0 0.0	0 0.0	0 0.0
Campylobacteriosis	59 17.0	46 13.1	50 14.1	46 12.7	48 13.1	52 14.2
Carbapenem-Resistant Organisms (CRO)	19 5.5	12 3.4	86 24.2	73 20.1	104 28.3	67 18.2
Chickenpox (Varicella)	26 7.5	24 6.8	13 3.7	9 2.5	9 2.5	17 4.6
Chikungunya	0 0.0	1 0.3	0 0.0	0 0.0	0 0.0	0 0.0
Chlamydia	1,094 314.7	1,158 329.2	1,160 326.3	954 263.0	940 255.9	986 268.5
Coccidioidomycosis	5 1.4	3 0.9	15 4.2	6 1.7	10 2.7	8 2.2
Colorado Tick Fever	0 0.0	0 0.0	0 0.0	0 0.0	1 0.3	0 0.0
Coronavirus Disease 2019 (COVID-19)	0 0.0	0 0.0	0 0.0	25,326 6,983.0	41,100 11,190.2	51,696 14,075.2
Creutzfeldt-Jakob Disease (CJD)	1 0.3	1 0.3	0 0.0	0 0.0	0 0.0	2 0.5
Cryptosporidiosis	11 3.2	9 2.6	15 4.2	14 3.9	20 5.4	21 5.7
Cyclosporiasis	3 0.9	2 0.6	2 0.6	1 0.3	1 0.3	1 0.3
Dengue Fever	2 0.6	1 0.3	1 0.3	0 0.0	0 0.0	0 0.0
E-cigarette or vaping use-associated lung injury (EVALI)	0 0.0	0 0.0	13 3.7	0 0.0	0 0.0	0 0.0
Encephalitis	0 0.0	1 0.3	1 0.3	3 0.8	0 0.0	0 0.0
Giardiasis	18 5.2	22 6.3	20 5.6	15 4.1	20 5.4	16 4.4
Gonorrhea	171 49.2	223 63.4	229 64.4	238 65.6	260 70.8	237 64.5
H. influenzae, invasive disease	5 1.4	4 1.1	7 2.0	4 1.1	3 0.8	4 1.1
Hansen's Disease (Leprosy)	1 0.3	0 0.0	0 0.0	0 0.0	1 0.3	1 0.3
Hantavirus Pulmonary Syndrome (HPS)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Hepatitis A	4 1.2	6 1.7	1 0.3	0 0.0	1 0.3	1 0.3
Hepatitis B, acute and chronic	34 9.8	23 6.5	22 6.2	19 5.2	11 3.0	15 4.1
Hepatitis C, acute and chronic	130 37.4	118 33.6	97 27.3	101 27.8	127 34.6	120 32.7
Hepatitis C, perinatal	0 0.0	0 0.0	0 0.0	0 0.0	1 0.3	0 0.0
Hepatitis E	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Highly Pathogenic Avian Influenza	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	1 0.3

Table 2. Disease Report Summary, Counts and Rates per 100,000 People, by Year, Davis County, 2017 - 2022 (continued)

Disease	2017 Count	2017 Rate	2018 Count	2018 Rate	2019 Count	2019 Rate	2020 Count	2020 Rate	2021 Count	2021 Rate	2022 Count	2022 Rate
Human immunodeficiency virus (HIV)	14	4.0	12	3.4	11	3.1	8	2.2	12	3.3	13	3.5
Influenza-associated hospitalization	122	35.1	178	50.6	171	48.1	115	31.7	3	0.8	188	51.2
Legionellosis	4	1.2	3	0.9	3	0.8	3	0.8	1	0.3	7	1.9
Leptospirosis	0	0.0	1	0.3	1	0.3	0	0.0	0	0.0	0	0.0
Listeriosis	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0	0	0.0
Lyme disease	9	2.6	1	0.3	7	2.0	3	0.8	0	0.0	3	0.8
Malaria	0	0.0	2	0.6	0	0.0	0	0.0	1	0.3	1	0.3
Meningitis, bacterial and other	6	1.7	4	1.1	6	1.7	1	0.3	3	0.8	5	1.4
Meningitis, viral (aseptic meningitis)	24	6.9	30	8.5	19	5.3	1	0.3	5	1.4	7	1.9
Meningococcal disease	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Mpox (Monkeypox)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	17	4.6
Mumps	2	0.6	3	0.9	3	0.8	0	0.0	0	0.0	0	0.0
Norovirus	26	7.5	35	10.0	157	44.2	7	1.9	36	9.8	73	19.9
Pertussis	37	10.6	37	10.5	22	6.2	16	4.4	7	1.9	9	2.5
Q fever, chronic	0	0.0	1	0.3	1	0.3	0	0.0	0	0.0	0	0.0
Salmonellosis	41	11.8	40	11.4	36	10.1	38	10.5	31	8.4	41	11.2
Shiga toxin-producing E. coli (STEC)	13	3.7	18	5.1	12	3.4	17	4.7	33	9.0	17	4.6
Shigellosis	3	0.9	4	1.1	7	2.0	3	0.8	6	1.6	2	0.5
Spotted Fever Rickettsiosis	2	0.6	3	0.9	1	0.3	1	0.3	0	0.0	1	0.3
Streptococcal disease, invasive	103	29.6	92	26.2	84	23.6	86	23.7	107	29.1	77	21.0
Syphilis – all stages	23	6.6	36	10.2	42	11.8	24	6.6	36	9.8	44	12.0
Tuberculosis, active	3	0.9	0	0.0	3	0.8	6	1.7	1	0.3	4	1.1
Tuberculosis, latent	102	29.3	163	46.3	91	25.6	51	14.1	74	20.1	104	28.3
Tularemia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3
Vibriosis	2	0.6	1	0.3	2	0.6	0	0.0	2	0.5	0	0.0
West Nile virus disease	8	2.3	0	0.0	5	1.4	2	0.6	9	2.5	1	0.3
Zika virus	1	0.3	1	0.3	1	0.3	1	0.3	0	0.0	0	0.0

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 6. Percent of Enteric Diseases Reported, by Category, Davis County, 2022

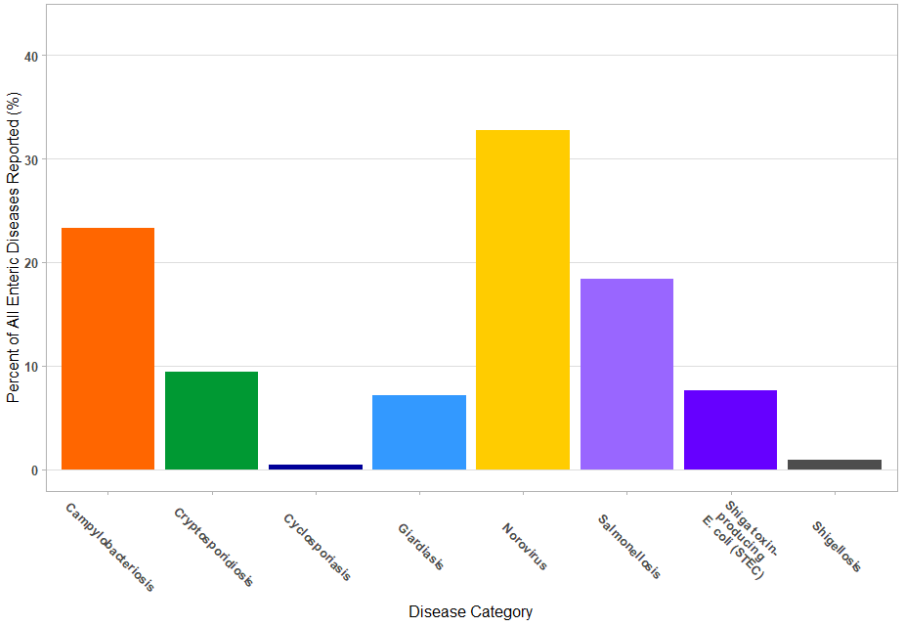
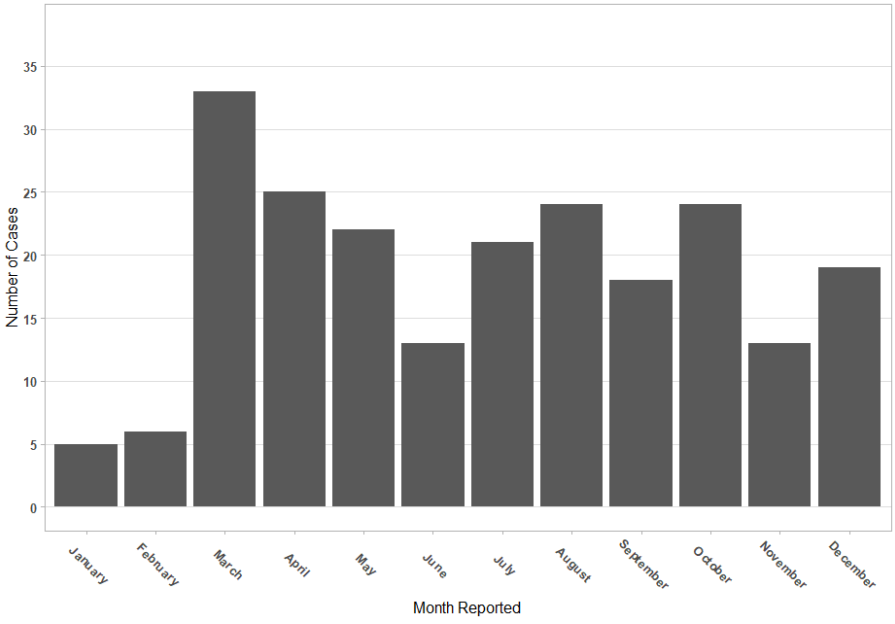


Figure 7. Number of Enteric Diseases Reported, by Month, Davis County, 2022

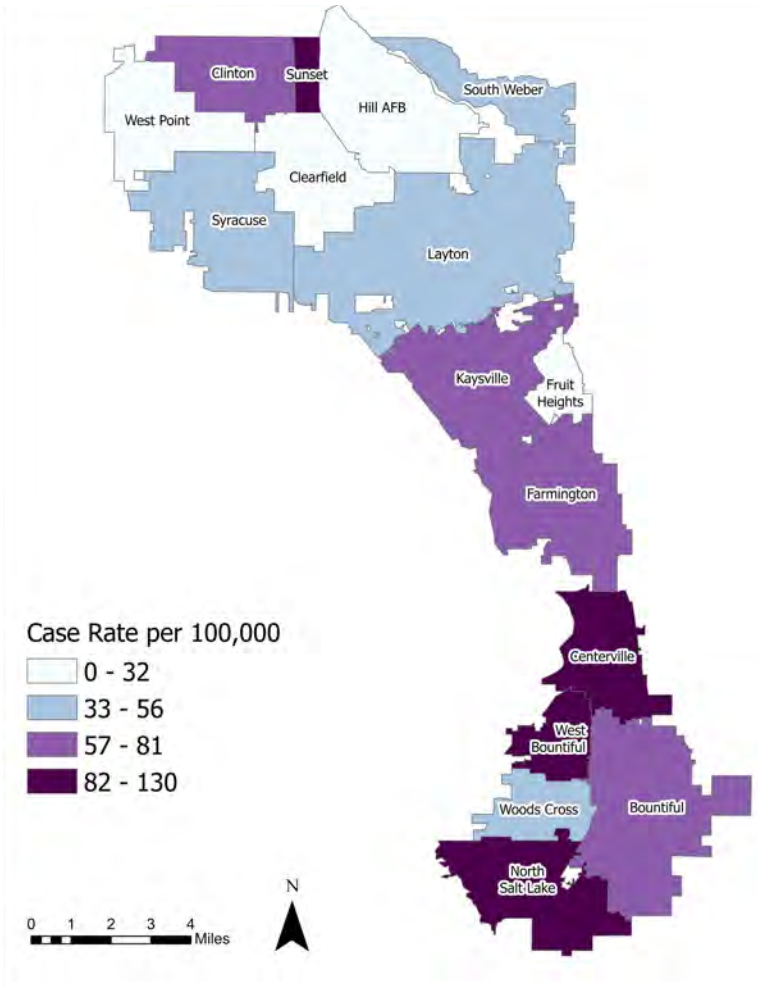


Enteric diseases are caused by bacterial, viral, or parasitic organisms that are shed in feces and can be spread person-to-person or through contaminated food and water. Enteric diseases are generally characterized by gastrointestinal symptoms such as nausea, vomiting, and diarrhea.

There were **223** enteric disease cases reported during 2022. Figure 6 presents the percentage of all enteric disease reports attributed to each specific disease. Norovirus was the most frequently reported enteric disease with **73** cases (32.7%), followed by campylobacteriosis with **52** cases (23.3%), salmonellosis with **41** cases (18.4%), cryptosporidiosis with **21** cases (9.4%), Shiga-toxin producing *E. coli* (STEC) with **17** cases (7.6%), giardiasis with **16** cases (7.2%), shigellosis with **two** cases (0.9%), and cyclosporiasis with **one** case (0.4%).

Enteric diseases are reported year-round, but higher rates usually occur in the summer months. However, this year Davis County saw an earlier-than-usual increase in enteric diseases that began in March. Figure 7 presents the number of enteric diseases reported by month.

Figure 8. Rate of Enteric Diseases by City, Davis County, 2022



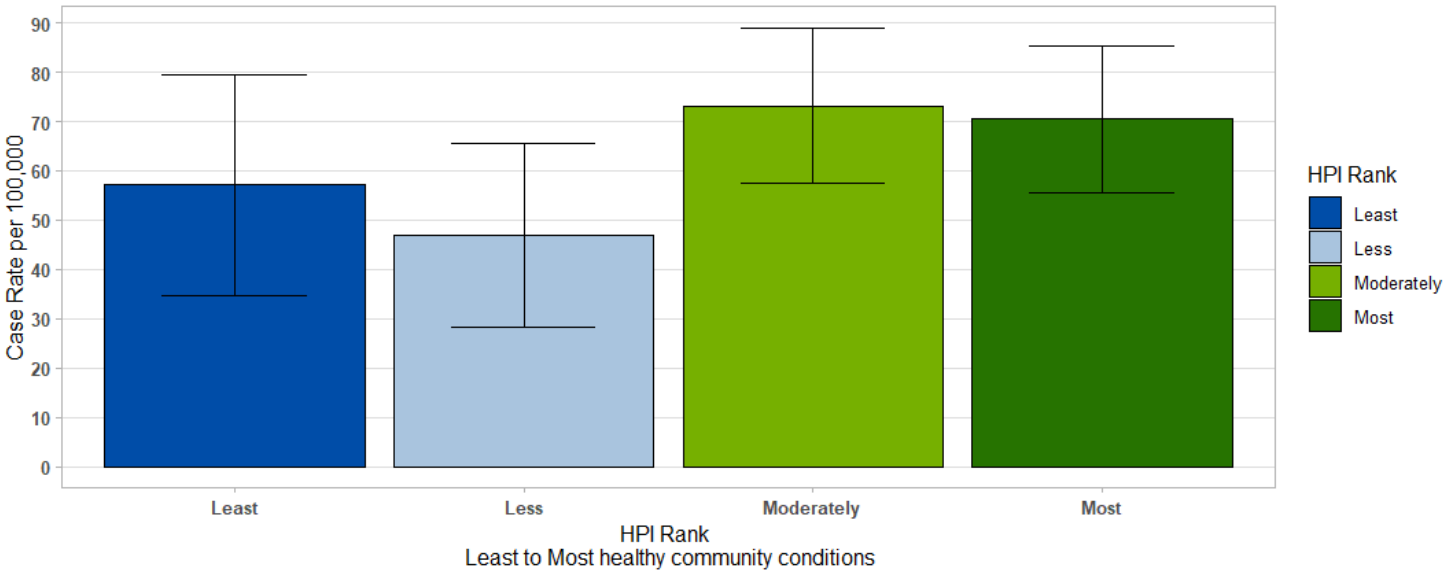
In 2022, enteric diseases were reported within every locality in Davis County except for Hill AFB. Figure 8 presents the incidence rate of enteric diseases reported by city per 100,000 people.

Centerville, North Salt Lake, Sunset, and West Bountiful had the highest rates of enteric disease, while Hill AFB, West Point, Clearfield, and Fruit Heights had the lowest rates.

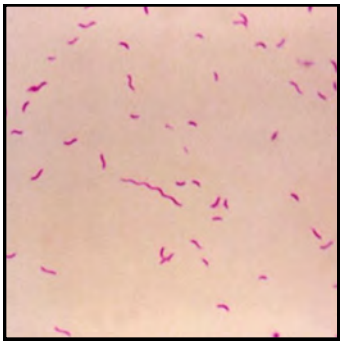
Figure 9 displays the rates of enteric disease stratified by HPI rank area. While there is no clear pattern between HPI rank and incidence rates, the data suggest higher rates of enteric disease in the moderately and most healthy areas.

The exact reason for this pattern is unknown. Possible explanations could include access to healthcare, healthcare seeking behavior, and travel (international travel in particular).

Figure 9. Rate of Enteric Diseases, by HPI Rank, Davis County, 2022



Campylobacteriosis



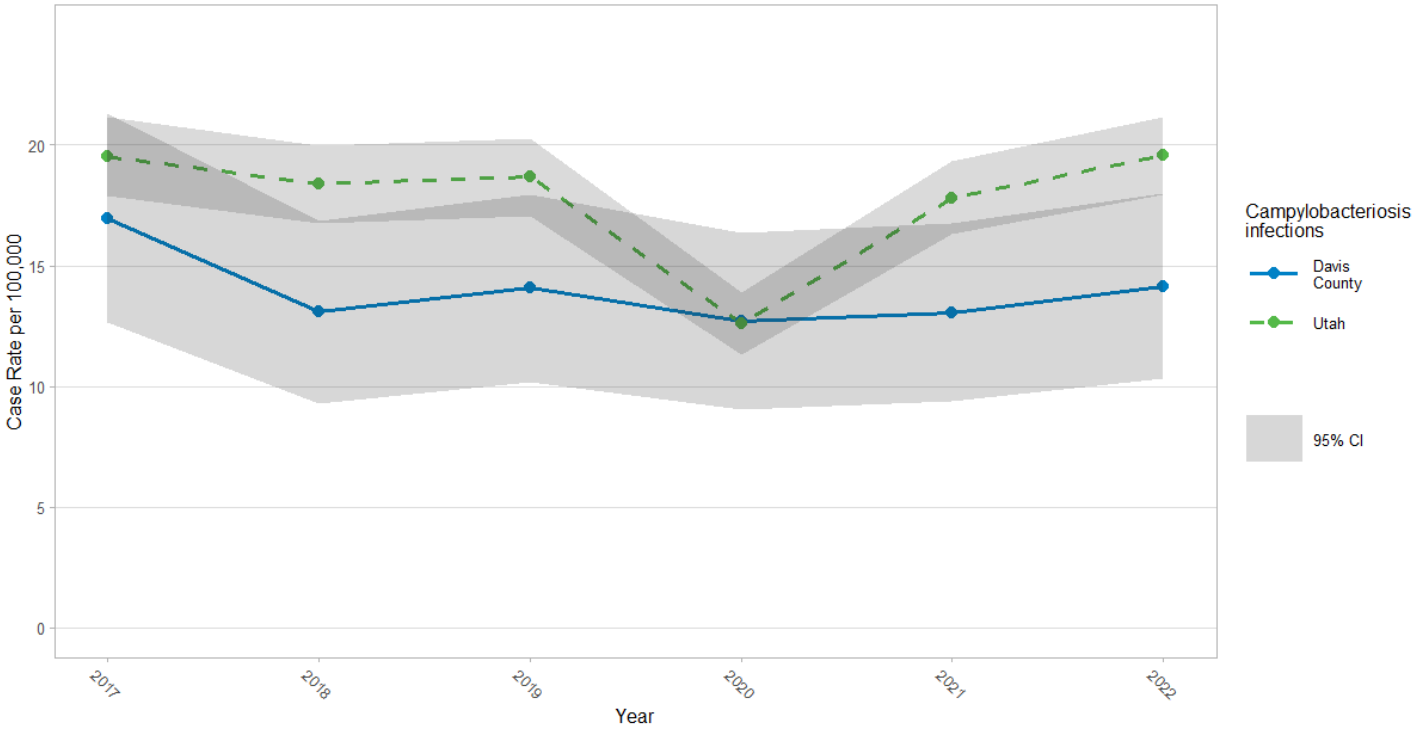
Campylobacter is one of the most common bacterial causes of diarrheal illness in the US.

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 most common sources of infection. *Campylobacter* is one of the most common bacterial causes of diarrheal illness in the US.[11] Virtually all cases occur as isolated or sporadic events and are not usually associated with an outbreak. Active surveillance through the CDC indicates that about 20 cases are diagnosed each year per 100,000 people. Many more cases go undiagnosed or unreported. Campylobacteriosis is estimated to affect over 1.5 million people every year.[11]

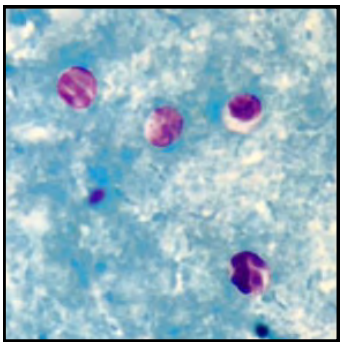
Occasionally, secondary infections occur from campylobacteriosis. One of these is Guillain-Barre Syndrome (GBS).[11] GBS occurs when an immune response is triggered by an infection. People with GBS often require intensive medical attention due to muscle weakness and sometimes paralysis that often lasts for weeks. While most people with GBS recover completely, some experience permanent nerve damage. The CDC estimates that about one in every 1,000 people with *Campylobacter* infections in the US gets GBS.[12]

During 2022, there were **52** cases of campylobacteriosis reported in Davis County. Figure 10 presents the incidence rates per 100,000 people of campylobacteriosis in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, Davis County's rate has remained relatively constant. These data also suggest that Davis County typically has lower rates of campylobacteriosis when compared to the rest of the state.

Figure 10. Rate of Campylobacteriosis Infections, by Year, Davis County and Utah, 2017-2022



Cryptosporidiosis



Cryptosporidium sp. oocysts stained with modified acid-fast.

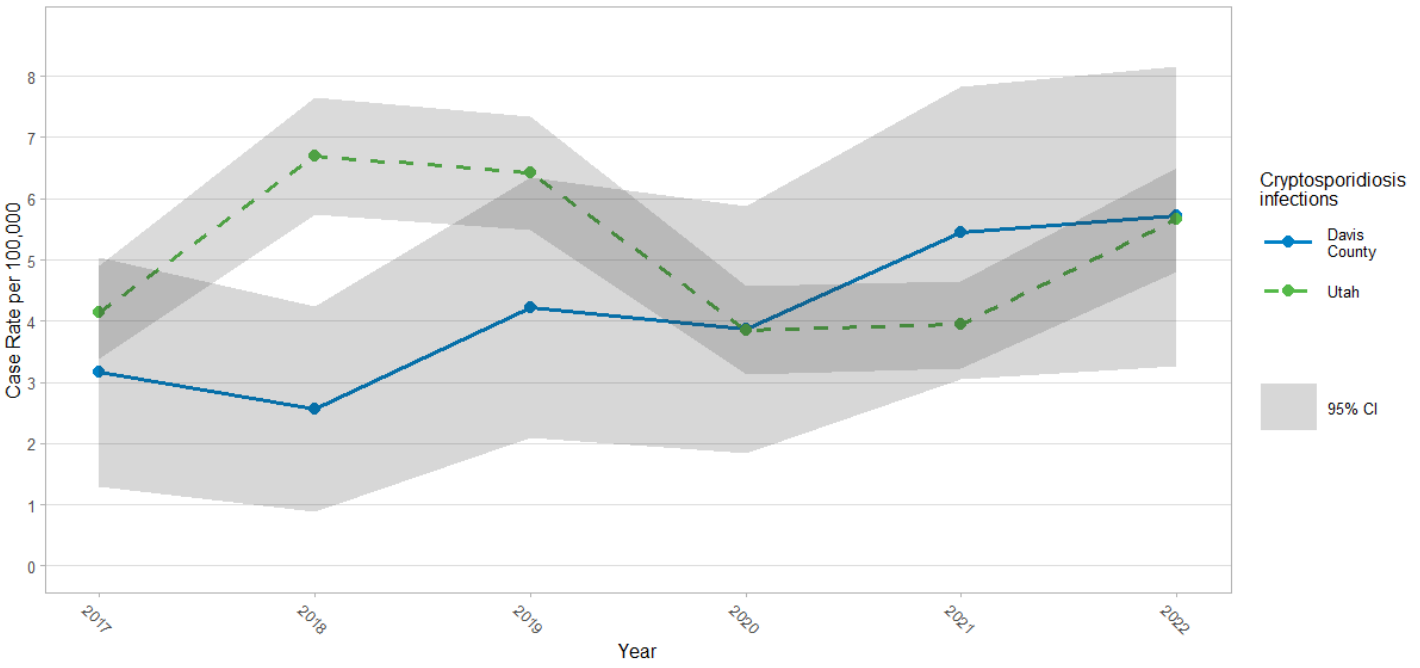
Cryptosporidiosis is an infection caused by the protozoan organism *Cryptosporidium parvum. Cryptosporidia* have been found in many hosts, including humans, cattle and other domestic mammals.[13] Infections may occur via person-to-person, fecal-oral, animal-to-person, or waterborne transmission. The parasite may be found in drinking water and recreational water in every region of the US and throughout the world.[13]

Cryptosporidiosis parasites are shed in the host's feces. As many as 10 million to 100 million germs are shed in a single bowel movement. A person may become infected with cryptosporidiosis by swallowing as few as 10 *Crypto* germs.[14] *Cryptosporidium parvum* have high tolerance to chlorine and can therefore survive for long periods of time in chlorinated drinking water or swimming pools.[14] Swallowing contaminated water can make people become ill. While cryptosporidiosis can infect people of all ages, young children, the elderly, those with severely weakened immune systems, and pregnant women are at greater risk for serious illness.[14]

After a significant outbreak of cryptosporidiosis across the US in 2007, associated with contaminated public swimming pools, control measures were implemented. These measures included installation of ultraviolet (UV) light filters in several Davis County pool systems and effective public service announcements. Since that time, cases have greatly diminished.

During 2022, there were **21** cases of cryptosporidiosis reported in Davis County. Figure 11 presents the incidence rates per 100,000 people of cryptosporidiosis in Davis County compared to the rest of Utah from 2017 to 2022. These data show a slight increase in cases in Davis County over this timeframe. When compared with the rest of the state, Davis County has been generally comparable over the past three years.

Figure 11. Rate of Cryptosporidiosis Infections, by Year, Davis County and Utah, 2017-2022



Giardiasis

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

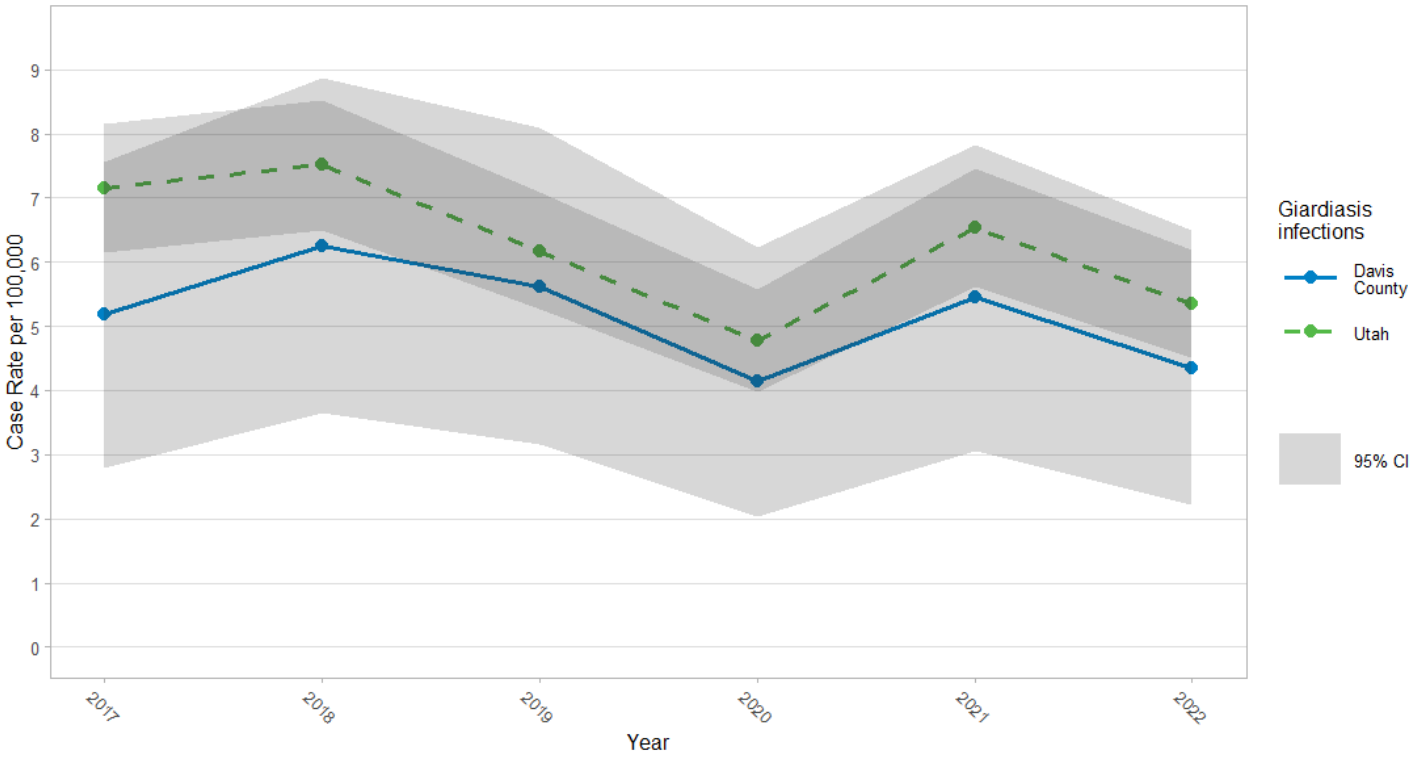
Giardiasis is caused by *Giardia duodenalis,* a microscopic parasite that causes diarrheal illness. *Giardia* is found on surfaces or in soil, food, or water that has been contaminated with fecal matter from infected humans or animals.[15] Humans and other mammals are reservoirs and shed the organism in their stool.[15] Yet, the chances of being infected from a dog or a cat is small since the type of *Giardia* that infects humans is not the same type that infects dogs and cats.[16] Some strains may be shared between humans and exotic pets, such as beavers, monkeys, birds, chinchillas, and opossums.[16]

Giardia is hard to eliminate from the environment and can survive for several months in cold water or soil.[16] While the parasite can be spread in different ways, water (either drinking or recreational) is the most common mode of transmission.[15]

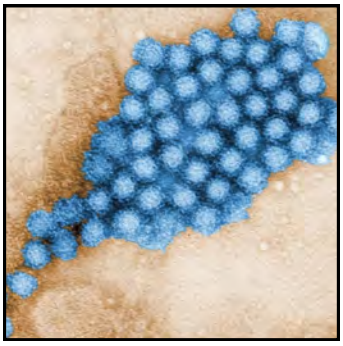
People with giardiasis are infectious to others for the entire period of their illness, which can be weeks or months. Severity of disease varies from no symptoms to chronic diarrhea. Giardiasis tends to have intermittent symptoms, thus individuals may seek medical attention months after the initial infection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

During 2022, there were **16** cases of giardiasis reported in Davis County and no outbreaks of giardiasis were investigated. Common exposures reported by cases included recreational water, outdoor activities, and international travel. Figure 12 presents the incidence rates per 100,000 people of giardiasis in Davis County compared to the rest of Utah from 2017 to 2022. These data suggest that rates in Davis County are slightly lower than the rest of the state, but follow the overall trend year to year.

Figure 12. Rate of Giardiasis Infections, by Year, Davis County and Utah, 2017-2022



Noroviruses are named after the original strain "Norwalk virus," which caused an outbreak of gastroenteritis in a school in Norwalk, Ohio, in 1968.[17, 18] There are at least ten known norovirus geno-groups, which in turn are divided into at least 48 genetic clusters.[18] Noroviruses are transmitted primarily through the fecal-oral route, by consumption of fecal-contaminated food or water or by direct person-to-person contact. Environmental and fomite contamination, such as contaminants found on door knobs and light switches, are also sources of infection.[19] Evidence exists of transmission via aerosolization of vomitus resulting in droplets contaminating surfaces or entering the oral mucosa and then swallowed.[19] No evidence suggests that infection occurs through the respiratory route. The CDC estimates that 19-21 million cases of acute gastroenteritis due to norovirus infection occur each year.[20] Norovirus is the leading cause of foodborne illness in the US, accounting for 58% of foodborne illness.[20]

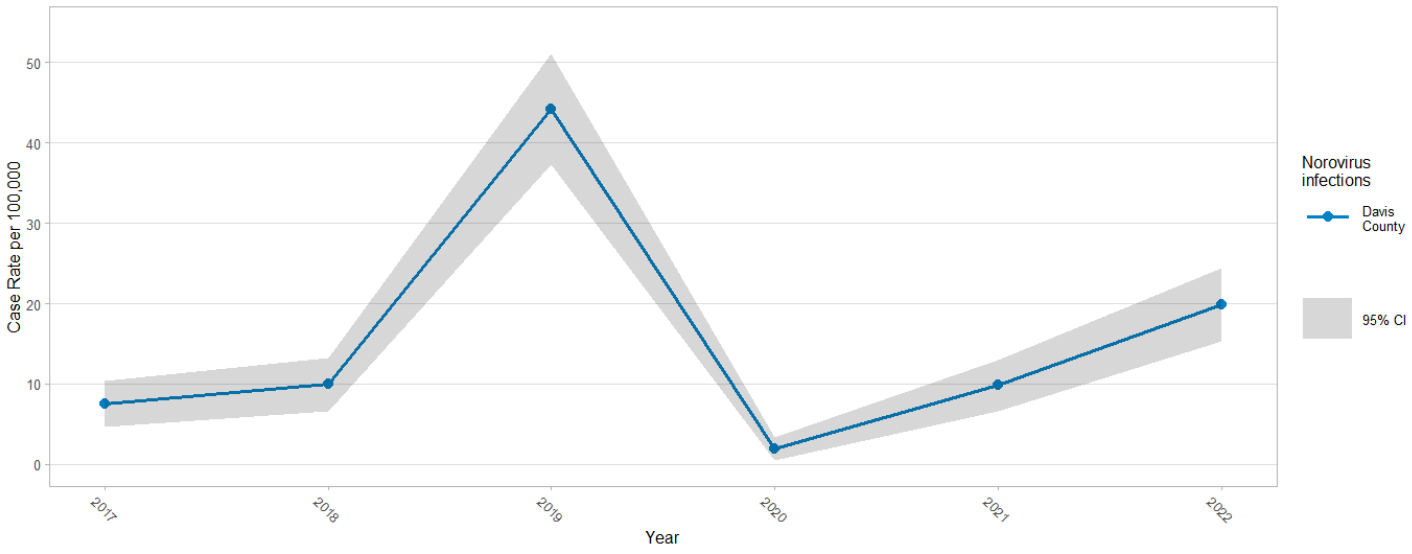


Norovirus is a very contagious virus. It can spread from an infected person, contaminated food or water, or by touching contaminated surfaces.

Norovirus is often confused for influenza, which is caused by a different virus. Due to the short duration of illness (typically 24 hours) and the self-limited, mild-to-moderate manifestation, people infected with norovirus often do not seek medical care. Those who do are rarely tested because testing is not widely available. As a result, many outbreaks are not identified. Also, it is not a disease that is required to be reported.[21] 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. Occasionally, some individuals encounter symptoms of extreme illness with diarrhea, vomiting, stomach pain and nausea. Dehydration is a common secondary condition, especially among children.[22] The CDC reports one multistate outbreak of norovirus illness in 2022 linked to consuming raw oysters from Texas.[21] It is unknown if Davis County had cases linked to this outbreak.

During 2022, there were **73** cases of norovirus reported in Davis County residents. Figure 13 presents the incidence rates per 100,000 people of norovirus in Davis County from 2017 to 2022. During this timeframe, norovirus rates peaked in 2019 due to a large outbreak at a wedding event and multiple outbreaks identified in congregate living facilities. Rates then decreased in 2020 (most likely due to the COVID-19 pandemic) and have been increasing since then.

Figure 13. Rate of Norovirus Infections, by Year, Davis County, 2017-2022



Salmonellosis

Infections caused by *Salmonella* result in more hospitalizations and deaths than any other foodborne illness in the United States.

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 CDC estimates that approximately 1.35 million cases of *Salmonella* infections occur in the US each year, causing 1.2 million illnesses, 23,000 hospitalizations, and 450 deaths.[23, 24] Salmonellosis is the most frequent bacterial source of foodborne illness. For every one confirmed *Salmonella* infection test, the CDC estimates that there are as many as 30 cases that are not treated or tested because those individuals do not seek medical attention.[25]

When a *Salmonella* case is identified, it is critical to determine its serotype and whole genome sequencing (WGS) pattern to identify sources and epidemiological links among cases. Serotypes are conventionally named after the city where they were discovered (see Table 3). Private laboratories are required to submit *Salmonella* isolates to the Utah Public Health Laboratory (UPHL) for serotyping and WGS analysis. WGS patterns are then compared with Utah and US *Salmonella* isolates to identify possible clusters and suspect sources.

During 2022, there were **41** cases of salmonellosis reported in Davis County. Figure 14 presents the incidence rates per 100,000 people of salmonellosis in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, the rate of salmonellosis in Davis County was comparable with the rest of the state.

Figure 14. Rate of Salmonellosis Infections, by Year, Davis County and Utah, 2017-2022

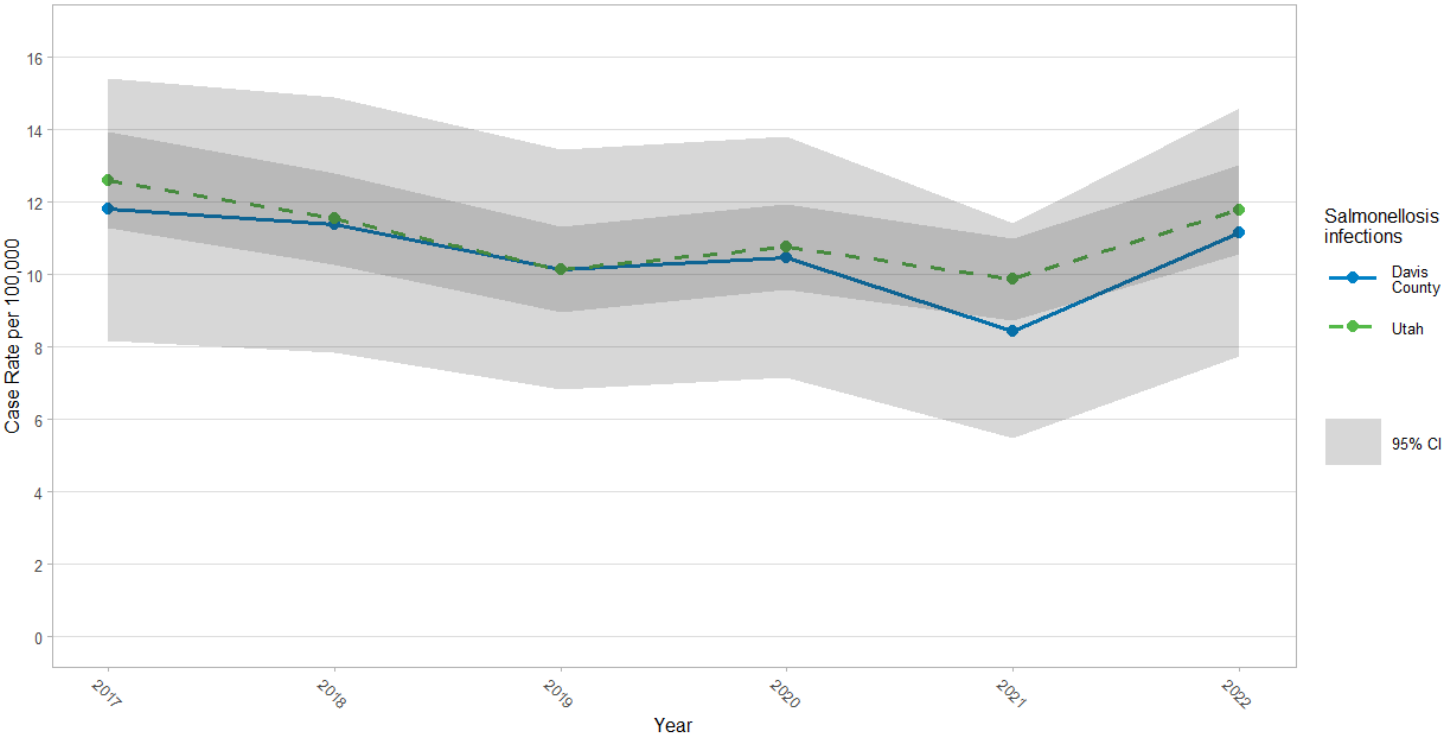
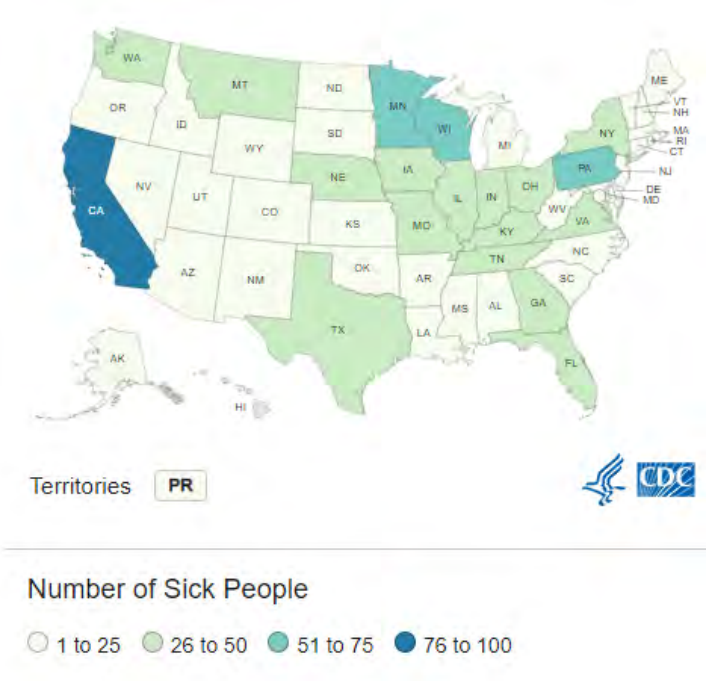


Table 3. *Salmonella* Serotypes Identified, Davis County, 2022

Serotype	Number of Cases (%)
Agbeni	2 (4.9%)
Agona	1 (2.4%)
Blockley 6,8:k:1,5	1 (2.4%)
Bovis-Morbificans (6,8:r,i:1,5)	1 (2.4%)
Branderup	1 (2.4%)
Enteritidis	10 (24.4%)
Hadar	1 (2.4%)
Heidelberg	1 (2.4%)
I 4,[5],12:i:-	1 (2.4%)
Infantis	1 (2.4%)
Javiana	1 (2.4%)
Newport	2 (4.9%)
Oranienburg	1 (2.4%)
Poona	1 (2.4%)
Saintpaul	1 (2.4%)
Typhimurium	3 (7.3%)
Unknown	12 (29.3%)
Total	**41 (100%)**

Figure 15. *Salmonella* Cases Linked to Backyard Poultry, United States, 2022



Outbreaks

When two or more people get the same illness from the same contaminated food or drink, the event is called a foodborne disease outbreak. Similarly, when two or more people get the same illness from contact with the same animal or animal environment, the event is called a zoonotic outbreak. Multiple outbreaks occurred in 2022, some of which involved Davis County residents.

Salmonella Newport outbreak, originating in Mexico

This outbreak was a multidrug resistant (MDR) strain that developed the ability to defeat the drugs which are designed to kill them.[26] Within this outbreak, *Salmonella* Newport bacterial infections were reported after consumption of beef and cheese products, which included queso fresco and beef jerky.[26] One of the two *Salmonella* Newport cases identified in Davis County was linked with this outbreak.

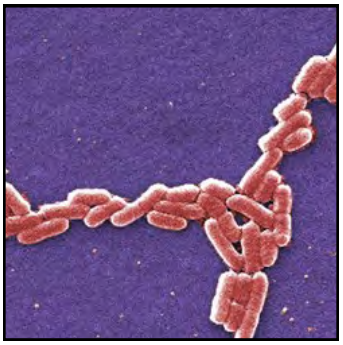
Salmonella infections linked with backyard poultry

In 2022, CDC and public health officials in many states investigated 13 multistate outbreaks involving backyard poultry.[27] CD/Epi investigated two confirmed *Salmonella* cases associated with this outbreak. One case was identified as *Salmonella* Hadar and the other as *Salmonella* Typhimurium. The CDC received reports of a total of 1,230 illnesses, 225 hospitalizations, and two deaths. Utah had 17 confirmed cases linked to the backyard poultry outbreak. Figure 15 shows US case counts by state linked to the backyard poultry outbreak.[28]

Salmonella Enteritidis

Salmonella Enteritidis (SE) is the most common serotype in the US and in many other countries.[24] CD/Epi investigated 11 cases within Davis County. SE was considered a "stealth invader" because seemingly healthy, but infected, chickens lay eggs which are also contaminated; therefore, SE is often linked to consumed raw or undercooked eggs.[24] Other common foods known to cause infection with SE include fresh or frozen poultry, fresh fruits and vegetables, undercooked beef, and sprouts.[25]

Shiga Toxin-Producing *Escherichia coli* Infection



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.

Escherichia coli (E. coli) are bacteria that normally live in the intestines of humans and animals, especially cattle.[29, 30] Certain strains of *E. coli*, including O121, O111, 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 is a type of kidney failure.[30]

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.[30] Person-to-person transmission can easily occur within households, childcare centers, and long-term care 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.

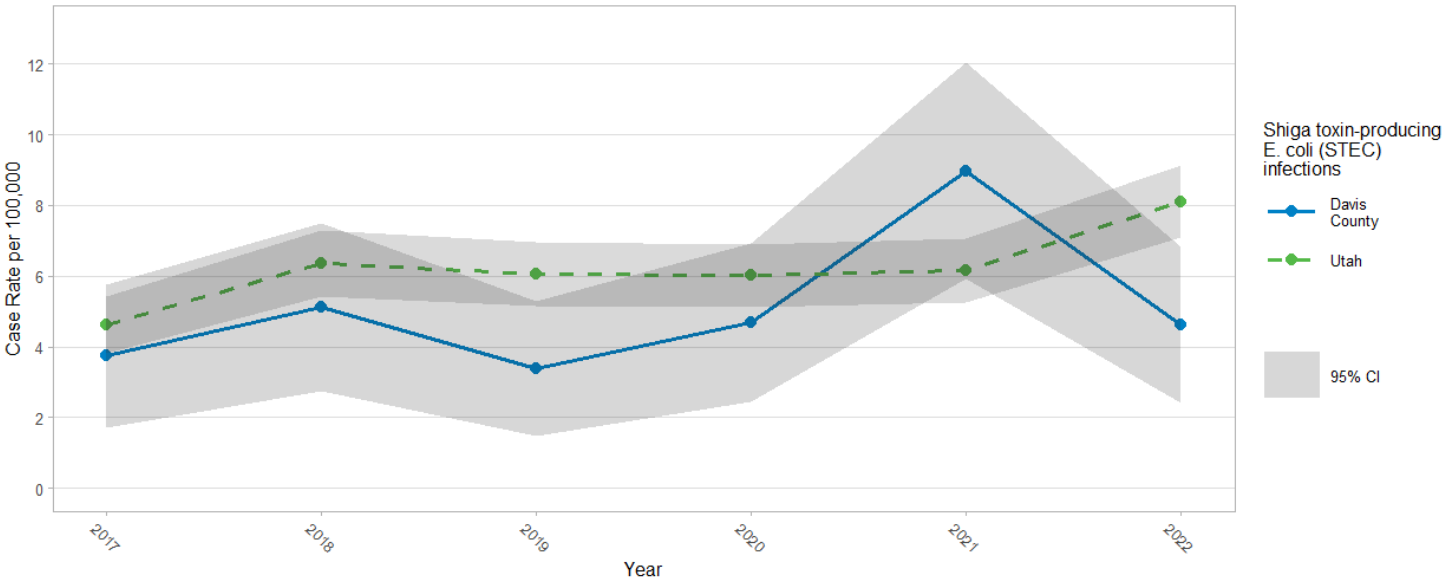
During 2022, there were **17** cases of STEC infection reported in Davis County. Figure 16 presents the incidence rates of STEC infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. Despite an increase in 2021, these data suggest that STEC rates in Davis County have generally been lower than the rest of Utah. Table 4 shows which serotype was identified in the 17 Davis County cases.

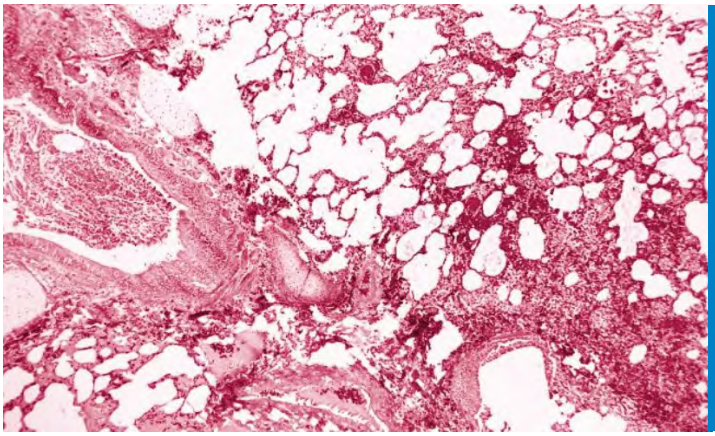
There were three multistate outbreaks in 2022 linked to STEC. The identified food sources included frozen falafel, ground beef, and other unknown sources.[31] Two outbreaks were linked to the STEC serotype O157:H7, and one linked to the serotype O121.[31] Davis County had no known cases linked with these outbreaks.

Table 4. Shiga Toxin-Producing *E. coli* Serotypes Identified, Davis County, 2022

Serotype	Number of Cases (%)
O123:H11	1 (5.9%)
O151:H16	1 (5.9%)
O151:H2	1 (5.9%)
O157:H7	7 (41.2%)
O26:H11	2 (11.8%)
O5:H9	1 (5.9%)
Unknown	4 (23.5%)
Total	**17 (100%)**

Figure 16. Rate of STEC Infections, by Year, Davis County and Utah, 2017-2022





Invasive Diseases

An invasive disease includes infections of the bloodstream, as well as meningitis and encephalitis.

Figure 17. Percent of Invasive Diseases Reported, by Category, Davis County, 2022

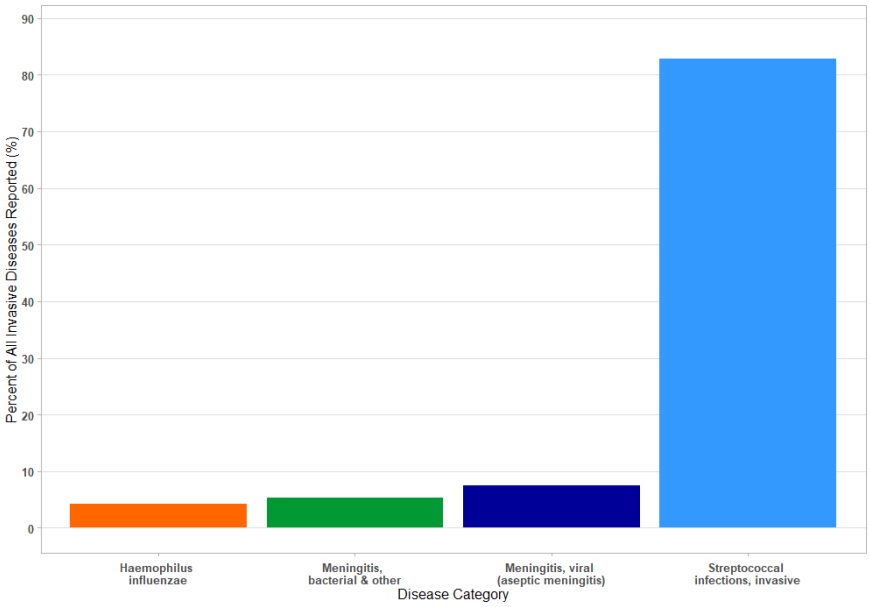
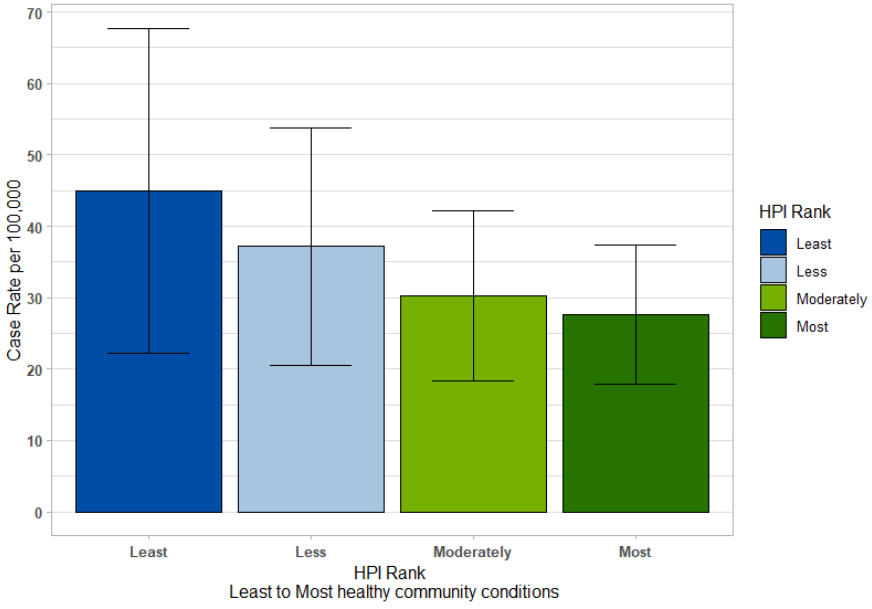


Figure 18. Rate of Invasive Diseases, by HPI Area, Davis County, 2022



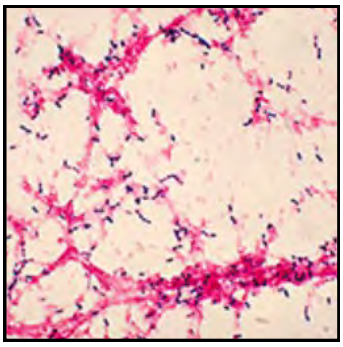
Invasive diseases include infections of the bloodstream, as well as meningitis and encephalitis. All cases of meningitis, encephalitis, and toxic shock syndrome are reportable to the health department, regardless of the causative organism. In addition, all cases of invasive streptococcal disease (isolation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

There were **93** invasive disease cases reported during 2022. Figure 17 presents the percentage of all invasive disease reports attributed to each specific disease. The most common invasive disease reported was invasive streptococcal infections with **77** (82.8%). These included Group A *Streptococcus*, Group B *Streptococcus,* Group C & G *Streptococcus*, *Streptococcus pneumoniae*, streptococcal toxic shock syndrome (STSS), and other streptococcal infections.

Others reported include aseptic/viral meningitis with **seven** (7.5%) cases, bacterial/other meningitis with **five** cases (5.4%), and *Haemophilus influenzae* with **four** (4.3%) cases.

Figure 18 displays the rates of invasive disease stratified by HPI rank area. The data suggest a decrease in rates as HPI rank increases. However, further analysis would be needed to confirm this.

Invasive Streptococcal Infections



There are 100 known serotypes of *Streptococcus pneumoniae*, the bacteria that cause pneumococcal disease.

The primary invasive streptococcal diseases of public health concern are Group A, Group B, and *Streptococcus pneumoniae.* Each subheading in this section provides a brief overview of the major types of invasive streptococcal diseases that are tracked and investigated. Table 5 shows the types of streptococcal disease identified in Davis County.

Group A *Streptococcus* invasive disease manifests as necrotizing fasciitis, streptococcal toxic shock syndrome (STSS), bacteremia, and pneumonia.[32] 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 between the age of five and 15 years.[33]

Group B *Streptococcus* invasive disease in neonates manifests as sepsis, pneumonia, and meningitis. Infection in the first week of life is called early-onset. 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 colonization occurs. The mode of transmission in nonpregnant adults and older infants (greater than one week old) is unknown.[34]

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 these organisms 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.[35]

Group G *Streptococcus* is a normal human flora and individuals infected with this organism usually have underlying health problems, especially cancer.[35]

Streptococcus pneumoniae is a bacteria that can cause severe pneumococcal disease, an invasive disease that manifests as pneumonia, bacteremia, meningitis, and infections of the sinus and ear.[36] Within the *Streptococcus pneumoniae* family, there are 100 known serotypes that cause disease.[37] Serotypes are groups within a single species of microorganisms, such as bacteria or viruses, which share distinctive surface structures.[38] Not all *Streptococcus pneumoniae* serotypes are considered invasive.

There are vaccines that can help prevent pneumococcal disease. First, the pneumococcal conjugate vaccine (PCV7) was introduced in 2000.[36] The seven serotypes it prevented were responsible or over 80% of severe pneumococcal infections among children. Since then, the number of new cases due to the invasive pneumococcal infections that stemmed from those seven serotypes dropped by 99%.[36] An updated PCV13 vaccine includes the original seven serotypes of PCV7 plus six additional serotypes. Since the introduction of PCV13, pneumococcal disease among children has occurred.[36] Figure 19 shows rates of invasive pneumococcal disease among children under five years old. Of note is how case rates decreased following the introduction of PCV7 and PCV13.

Table 5. Types of Invasive *Streptococcus* Infections, Davis County, 2022

Type	Number of Cases (%)
Group A *Streptococcus*	15 (19.5%)
Group B *Streptococcus*	13 (16.9%)
Groups C, F, and G *Streptococcus*	8 (10.4%)
Other *Streptococcus* (*intermedius*, *mitis*, *parasanguinis*, etc.)	20 (26.0%)
Streptococcus pneumoniae	16 (20.8%)
Toxic-shock syndrome, Streptococcal	5 (6.5%)
Total	**77 (100%)**

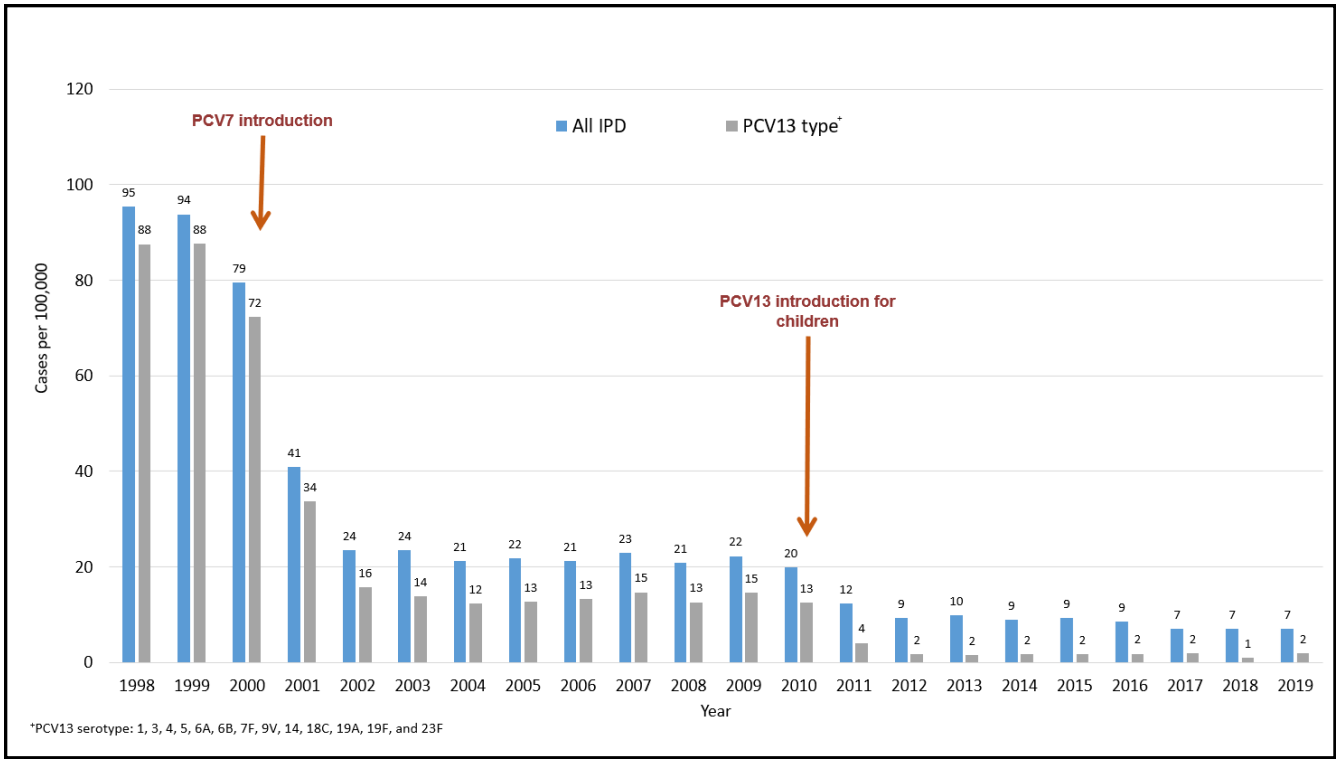
Streptococcal Toxic Shock Syndrome

STSS is a serious and life threatening bacterial infection caused by the Group A *Streptococcus* bacteria.[39] STSS is rare and not commonly spread from person to person. However, Group A strep is very contagious and can easily develop into STSS if the bacteria spreads into the bloodstream. Other common sources of STSS infection occur when the bacteria enter the body through open sores, surgical wounds, or the mucous membranes, such as the mouth and nose.[39]

Indications of STSS include muscle aches and pain, fever and chills, and nausea and vomiting.[39] Within 24 to 48 hours, the illness becomes much more severe as symptoms progress to low blood pressure, rapid breathing, and a fast heart beat. Other critical outward signs demonstrate organ failures, such as a lack of urine production, yellow skin or eyes, and easily bruising.[39] Any person showing signs of STSS should seek immediate medical attention. Treatment includes strong antibiotics, intravenous fluid, and possible surgery to remove the infection from the tissue. The complications of STSS are serious; as many as three out of 10 people die, even with medical treatment.[39]

While anyone can get STSS, people with increased risk include individuals who are 65 years and older, experience alcohol use disorder, are recovering from an infection with open sores, or who recently underwent surgery.[39] It is important for these individuals to adhere to preventative guidelines, such as washing hands often with soap and water; cleaning wounds with soap and water and wrapping them in fresh, dry bandages regularly; and avoid swimming in lakes, pools, or hot tubs with skin infections or open wounds or sores.[39]

Figure 19. Trends in Invasive Pneumococcal Disease Among Children Aged <5, United States, 1998-2016



Sexually-Transmitted Infections

Diseases that are caused by bacteria, viruses, and other organisms transmitted from one person to another through sexual activity.

Sexually-transmitted infections (STIs) are caused by bacteria, viruses, and other organisms transmitted from one person to another through sexual activity. Bacterial STIs, such as chlamydia, gonorrhea, and syphilis, are curable by using appropriate antibiotic therapy. However, permanent damage may occur (e.g. pelvic inflammatory disease, sterility, organ damage, meningitis) especially if treatment is delayed. Viral STIs such as herpes simplex virus (HSV) and HIV are not curable, but treatment can slow disease progression by reducing viral load (contagiousness) and improving quality of life. Complications from STIs 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 practical and convenient.

There were **1,280** STIs reported in 2022. Figure 20 presents the percentage of all STI reports attributed to each specific disease. Chlamydia was the most commonly reported STI with **986** (77.0%) cases, followed by gonorrhea with **237** (18.5%) cases, all stages of syphilis with **44** (3.4%) cases, and HIV with **13** (1.0%) cases.

Figure 20. Percent of STIs Reported, by Category, Davis County, 2022

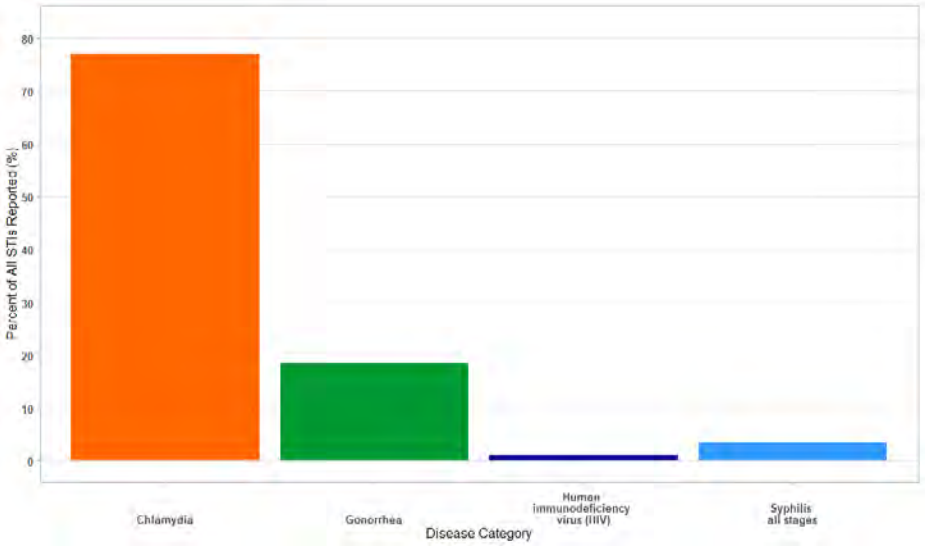
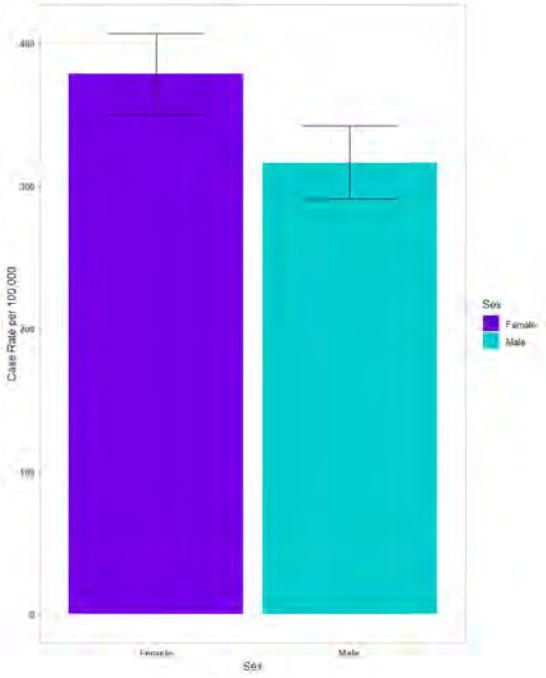
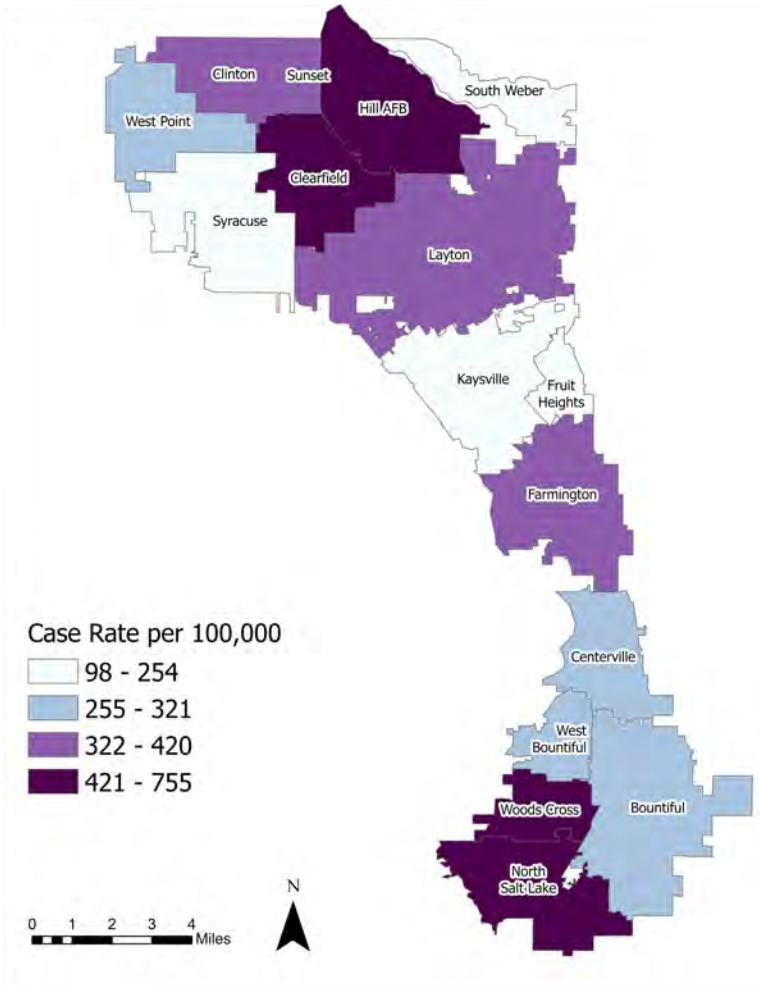


Figure 21. Rates of STIs, by Sex, Davis County, 2022



STIs are reported more frequently in females than in males. Figure 21 shows the rate of STI reporting among males and females. As previously discussed, females are often diagnosed during routine medical visits; males are typically diagnosed following contact investigations or if they become symptomatic. It is DCHD's goal to locate all partners, offer free testing and treatment, provide disease education, and assist in developing a risk reduction plan. Contact investigations not only limit the

Figure 22. Rate of STIs, by City, Davis County, 2022



spread of infection to other individuals, but also decreases the likelihood of reinfections. Reinfections can occur when appropriately-treated individuals engage in sexual activity with their untreated partners or resume sexual activity before the infection is cleared.

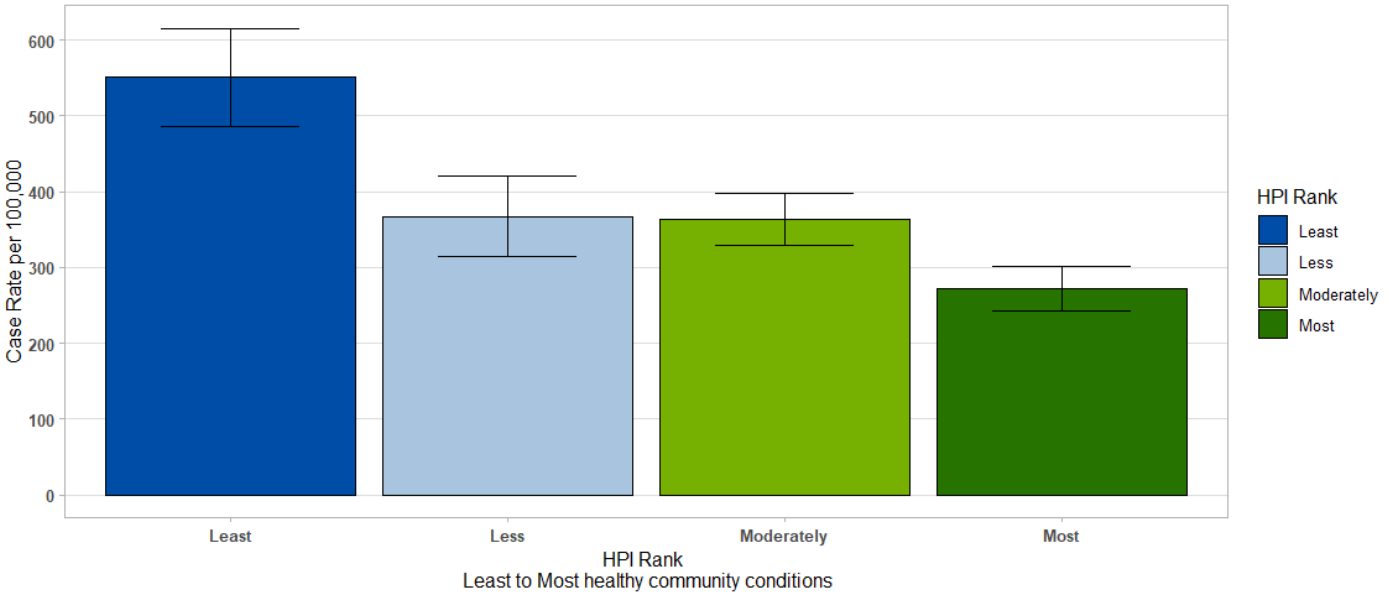
In 2022, STIs were reported within every locality in Davis County. Figure 22 presents the incidence rate of STIs reported by city per 100,000 people.

Hill AFB, North Salt Lake, Clearfield, and Woods Cross had the highest rates of STIs, while Fruit Heights, Kaysville, Syracuse, and South Weber had the lowest rates.

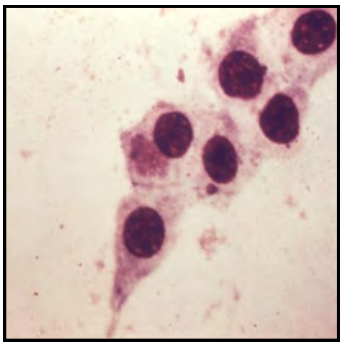
Figure 23 displays the rates of STIs stratified by HPI rank area. While the rates in the less and moderately healthy areas are comparable, there still exists an overall pattern of decreasing rates as healthy community conditions improve.

In the least healthy area, the rate of STIs was 550.6 cases per 100,000 people. This is 69% higher compared to the rest of the county. Conversely, the most healthy area had a rate of 272.3 cases per 100,000 people, which is 33% lower compared to the rest of the county.

Figure 23. Rate of STIs, by HPI Area, Davis County, 2022



Chlamydia

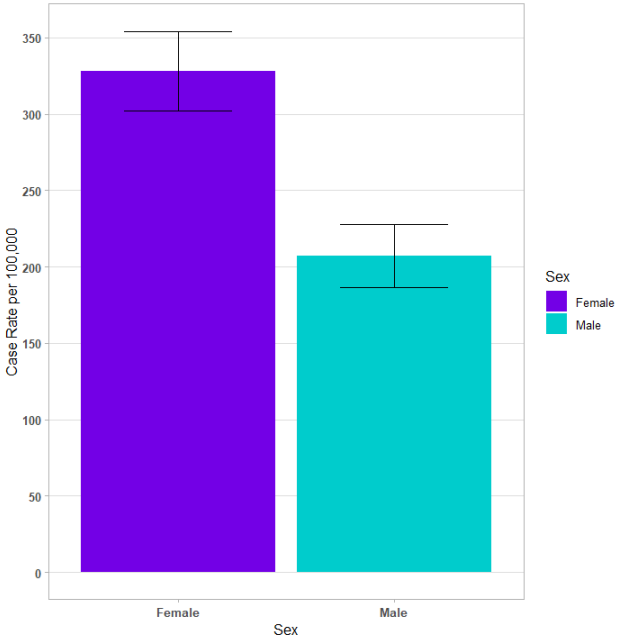


Chlamydia is the most commonly reported STI in the United States.

Chlamydia is an STI caused by the bacteria *Chlamydia trachomatis.* It is the most commonly reported STI in the US. People infected with chlamydia often do not have obvious symptoms, but serious complications can include cervicitis, urethritis, infertility, ectopic pregnancies, epididymitis, and arthritis.[40]

Chlamydia infections continue to account for the single largest disease-specific burden in Davis County at 45.5% (excluding COVID-19). During 2022, there were **986** cases of chlamydia reported in Davis County. Figure 24 presents the incidence rates of chlamydia infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. From 2017 through 2019, Davis County's rate was comparable to the rest of the state. However, a decrease in Davis County occurred in 2020 and up to this point in time, has been consistently lower than the rest of the state.

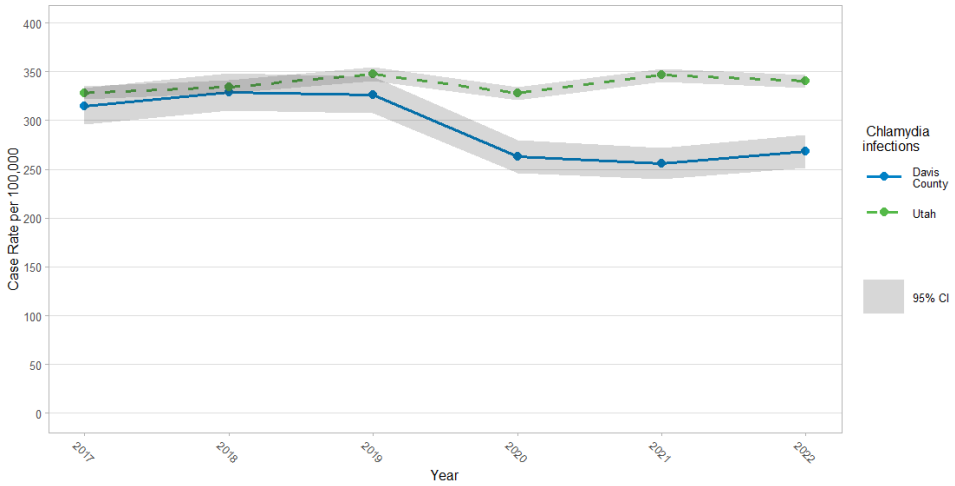
Figure 25. Chlamydia by Sex, Davis County, 2022



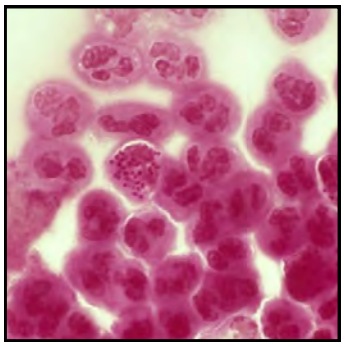
Utah public health procedures do not require local health departments to investigate all cases of chlamydia. Instead, each jurisdiction individually determines local investigation procedures. DCHD has an adaptable approach to chlamydia case investigations. This approach is based on established risk groups and CD/Epi disease investigation staff capacity. Regardless of staff capacity, a chlamydia case is investigated if it falls into at least one higher risk population: individuals who are 21 years old or younger, men who have sex with men (MSM), and pregnant women. As staff capacity allows, all chlamydia cases are investigated. This occurred in 2022 when DCHD received funding to hire additional staff as disease intervention specialists (DIS) to investigate the disease burden of chlamydia and other diseases.

Figure 25 shows the rate per 100,000 people of chlamydia among men and women for Davis County in 2022. The rate among women is 58.5% higher when compared to men (328.0 and 207.0 cases per 100,000 people, respectively). Reasons for differences in STI reporting are discussed on page 23. In addition, the female reproductive system is more susceptible to bacteria growth. Women are less likely to have symptoms than men. If the symptoms do occur, they may go away, but the infection can remain. If left untreated, chlamydia may cause permanent damage to the reproductive system.[40]

Figure 24. Rate of Chlamydia Infections, by Year, Davis County and Utah, 2017-2022



Gonorrhea is an STI caused by the bacteria *Neisseria gonorrhoeae* and is the second most common notifiable STI in the US.[41] 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.[41] Fluoroquinolones are no longer recommended by 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.

During 2022, there were **237** cases of gonorrhea reported in Davis County. Figure 26 presents the incidence rates of gonorrhea infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, Davis County rates of gonorrhea have consistently been lower than the rest of the state.

Figure 27 shows the rate of gonorrhea infections among males and females. Unlike chlamydia, gonorrhea infections in Davis County were more frequent in males. Disease interviews identified 1) being MSM, 2) incarceration, 3) substance abuse, 4) having multiple sex partners, or 5) anonymous sex partners as common risk factors for gonorrhea infection.

A urine sample can be used to screen for both gonorrhea and chlamydia.[42] This testing process is less invasive, more appealing to patients, and may encourage sexually-active individuals to seek testing. When patients are participating in rectal or oral intercourse, however, some STIs may be missed if exclusively using the conventional urine test. Medical providers are encouraged to include rectal and oral swabs in STI screenings for patients that engage in rectal and/or oral intercourse.[43] Another testing option involves self-collected specimens.

Beginning in 2019, rectal and oral testing has been available to high-risk patients and their partners at DCHD. The Low-Cost Screening Clinic provides an opportunity for individuals to access STI screening. These individuals are provided with educational materials, testing, and treatment for STIs.

Figure 27. Gonorrhea by Sex, Davis County, 2022

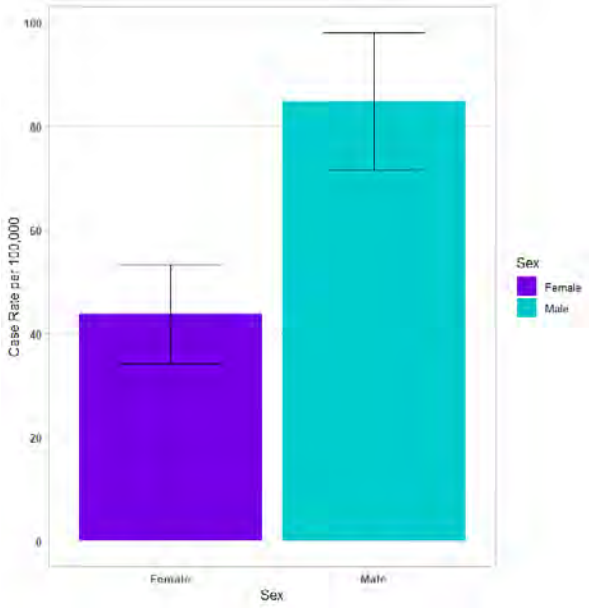
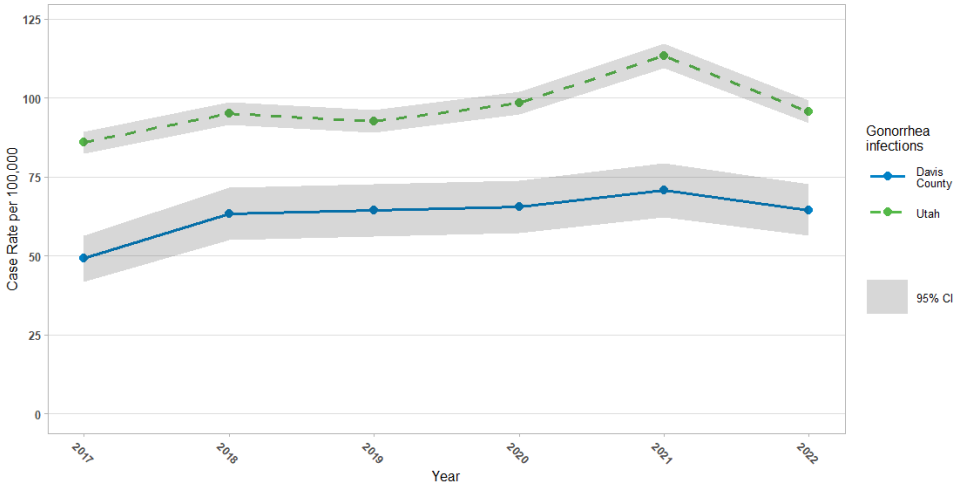
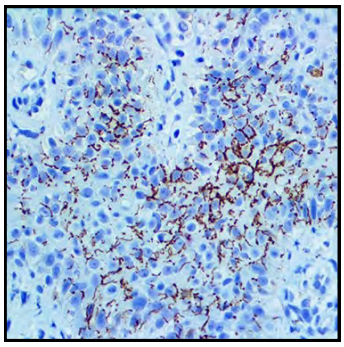


Figure 26. Rate of Gonorrhea Infections, by Year, Davis County and Utah, 2017-2022



Syphilis



Syphilis can cause long-term complications if not treated correctly.

Syphilis is an STI caused by the bacterial spirochete *Treponema pallidum*.[44] Syphilis in adults are classified in stages: primary, secondary, early latent, and late latent syphilis.[45] Syphilis is usually transmitted from person-to-person by direct contact with a syphilitic sore, known as a chancre, during sexual contact. Syphilis is not transmitted by casual contact with objects, such as doorknobs or toilet seats.[45] Pregnant women with the disease can transmit it to their child. This is called congenital syphilis. At birth, a baby with a syphilis infection may not have signs or symptoms of disease. However, if the baby does not receive treatment right away, the baby may develop serious problems within a few weeks. These babies can have health problems, such as cataracts, deafness, or seizures, and can die.[45]

Syphilis has been called “The Great Pretender'' as its symptoms can mimic many other diseases.[44] 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.[45] Thus, most transmission is from people who are unaware of their infection. Over the past several years, syphilis has continued to increase among the MSM population. Recent national outbreaks among MSM have been marked by high rates of coinfection with HIV and high risk sexual behaviors.[45]

During 2022, there were **44** cases of syphilis across all stages reported in Davis County. Table 6 shows the distribution of syphilis stage categories that were reported. Figure 28 presents the incidence rates of primary and secondary syphilis infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, the data suggest that Davis County has rates comparable to the rest of the state.

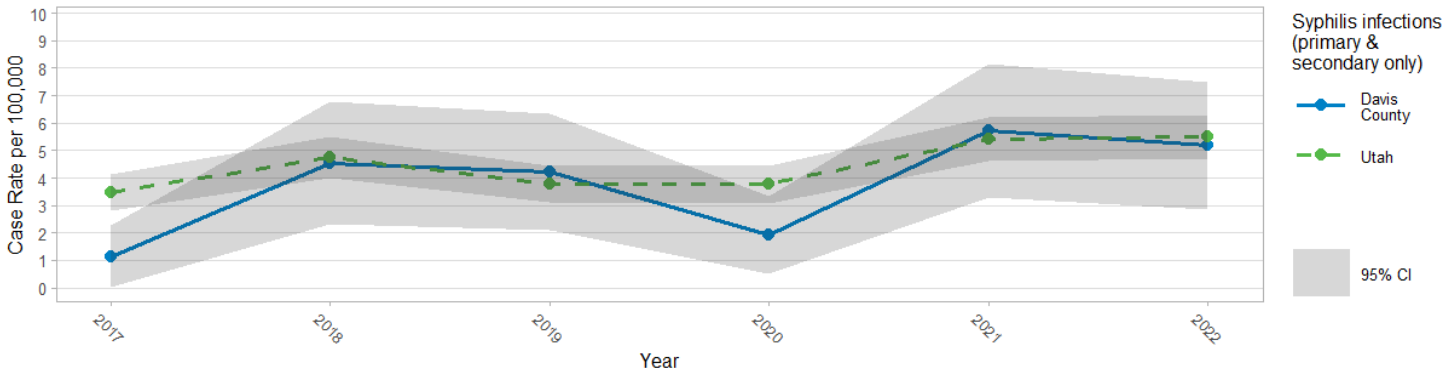
Syphilis case investigations in 2022 identified multiple risk factors. These include 1) having multiple sex partners, 2) being MSM, 3) injection drug use, 4) having anonymous sex with individual of unknown STI/HIV status, and 5) incarceration.

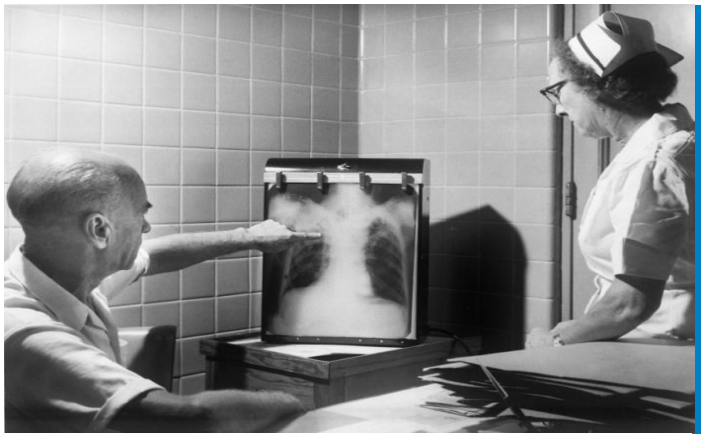
Table 6. Stage of Reported Syphilis Cases, Davis County, 2022

Syphilis Stage Category	Number of Cases (%)
Congenital	1 (2.3%)
Early non-primary, non-secondary	8 (18.2%)
Primary	10 (22.7%)
Secondary	9 (20.5%)
Late or unknown duration	16 (36.4%)
Total	**44 (100%)**

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.

Figure 28. Rate of Primary and Secondary Syphilis Infections, by Year Davis County and Utah, 2017-2022





Tuberculosis

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

Tuberculosis (TB) is caused by a type of bacteria called *Mycobacterium tuberculosis.* The bacteria usually attacks the lungs, but may attack any part of the body. It is spread through the air when a person with TB coughs, speaks, or sings. People nearby may breathe in these particles and become infected.[46] Not everyone infected with TB bacteria becomes sick. As a result, two TB conditions exist: active TB disease (ATBD) and latent TB infection (LTBI). It is estimated that up to 13 million people in the US live with inactive TB. Without treatment, 10% of people with inactive TB will get sick with ATBD, which can spread to others and be deadly.[47]

Tuberculosis is a serious health threat, especially for people living with HIV. People living with HIV are more likely than others to become sick with TB. Worldwide, TB is one of the leading causes of death among people living with HIV. [48]

In most cases, TB is treatable and curable; however, people with TB can die if they do not get proper treatment. Sometimes drug-resistant TB occurs when bacteria become resistant to the drugs used to treat TB. This means that the drug can no longer kill the TB bacteria. [49]

In 2022, there were **four** ATBD cases, **104** newly identified LTBI cases, and **one** case of Hansen's disease (leprosy) in Davis County. Figure 29 presents the number of ATBD cases in Davis County and Utah. Figure 30 shows the incidence rate per 100,000 people for identified LTBI in Davis County from 2017 to 2022.

Figure 29. Number of Active TB Cases, by Year, Davis County and Utah, 2017-2022

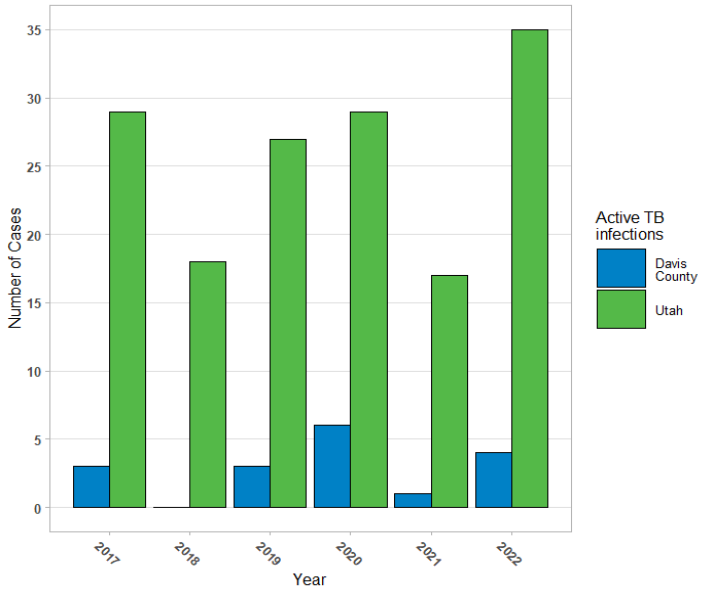
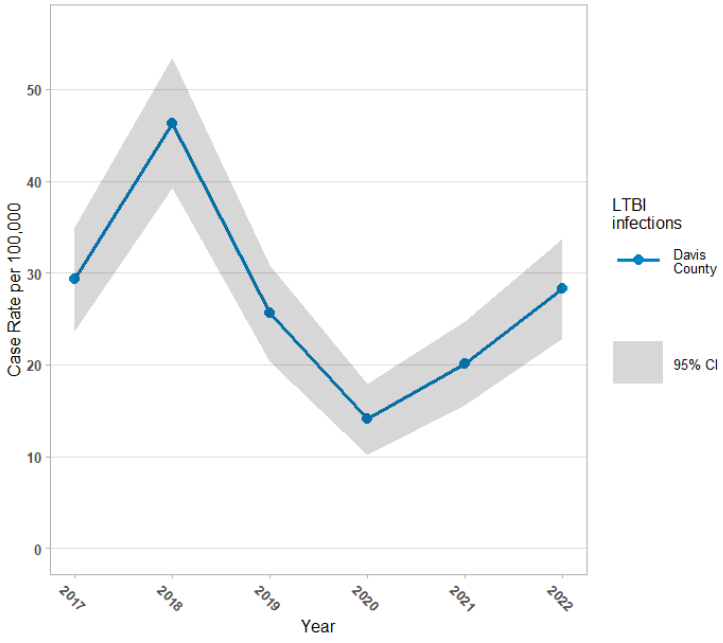
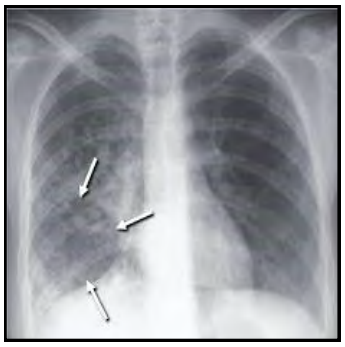


Figure 30. Rate of LTBI, by Year, Davis County, 2017-2022



Active Tuberculosis Disease



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.

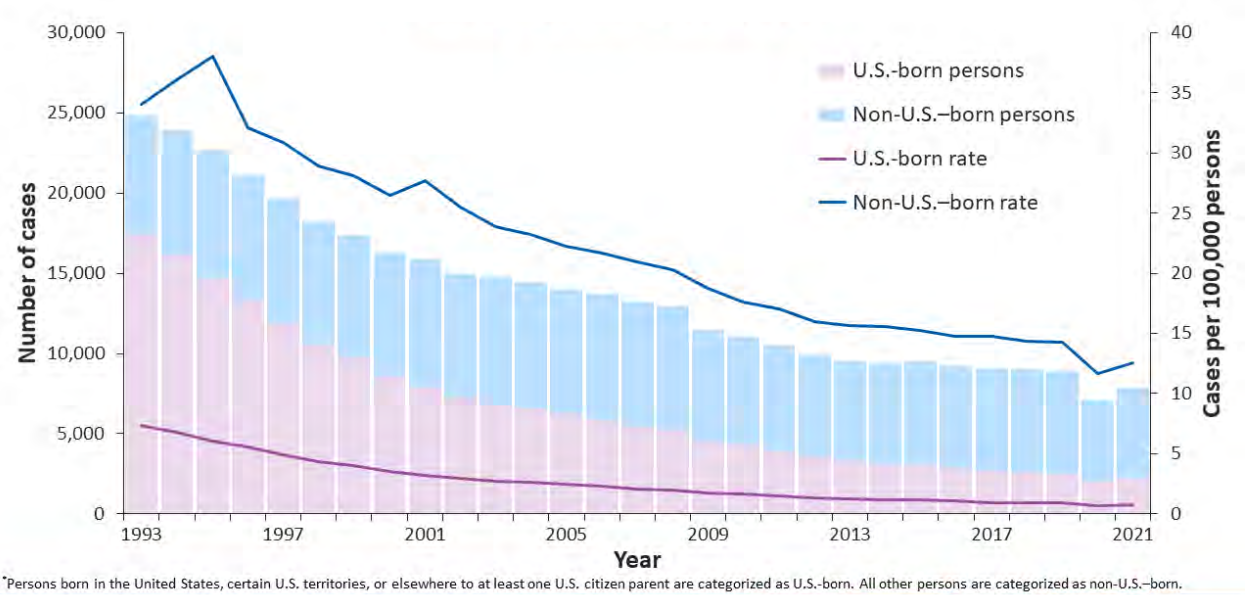
TB bacteria become active if the immune system cannot stop the bacteria from growing. When TB bacteria begin to multiply in the body, ATBD is the result.[50] When ATBD manifests in the lungs, it is known as pulmonary TB. Whereas when it manifests in other parts of the body, it is classified as extrapulmonary TB.[50]

In 2020, 10 million people worldwide became sick with ATBD resulting in approximately 1.5 million TB-related deaths. In the US, there were 7,860 TB cases in 2021 (2.4 cases per 100,000 people).[51] This represents a 9.6% increase compared to the 7,174 cases reported in 2020. The increase in cases between 2020 and 2021 may be the result of delayed diagnosis of symptom onset due to the COVID-19 pandemic.[51] While increased TB cases were seen in both US-born and non-US-born people in the US, TB is primarily seen in individuals who are foreign-born or have traveled or lived in endemic countries.[47, 51] Figure 31 compares the case counts and the incidence rates of TB in the US by origin of birth.

In 2022, Utah had **35** cases of ATBD, **four** of which were in Davis County. Management of ATBD cases requires close collaboration between several agencies including DCHD, medical providers, DHHS, UPHL, and commitment from the infected individual. Both pulmonary and extra-pulmonary TB typically require six months of treatment. Complicated cases of TB can require treatment to be extended up to two years (e.g. meningeal infections, multidrug resistant/extensively-drug resistant infections [MDR/XDR]).

Patients with infectious pulmonary TB is of most concern for public health. These individuals are isolated until sputum sample tests indicate the individual is no longer infectious. To ensure compliance to treatment, medication is administered under directly observed therapy (DOT).[52] Because DOT can seem personally invasive to the patient, CD/Epi seeks to implement multiple strategies to promote a less intrusive and more flexible schedule, where possible. This includes bi-/tri-weekly treatments, home visits, and video conferencing.

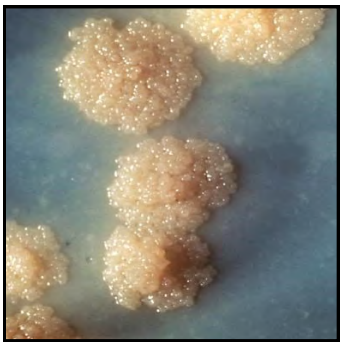
Figure 31. TB Cases and Incidence Rates by Origin of Birth,* United States, 1993—2021



*Persons born in the United States, certain U.S. territories, or elsewhere to at least one U.S. citizen parent are categorized as U.S.-born. All other persons are categorized as non-U.S.–born.

LTBI is a condition in which 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.

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

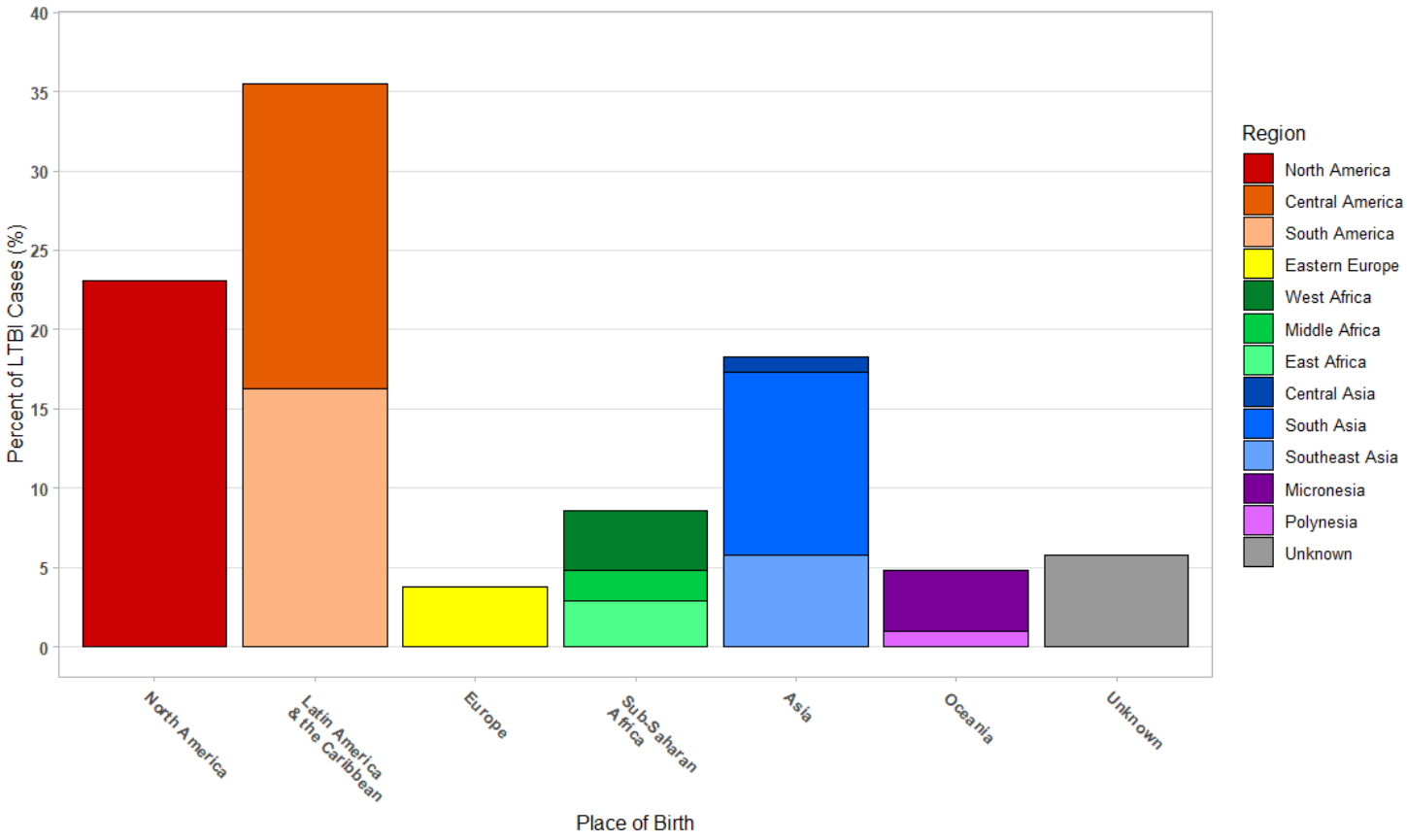


People with LTBI do not feel sick and do not have any symptoms. They are infected with *M. tuberculosis*, but do not have active TB disease.

With the low incidence of ATBD in Davis County and Utah as a whole, the largest disease burden for tuberculosis falls under LTBI. During 2022, DCHD managed **104** clients with LTBI. Treatment reduces the risk that LTBI will progress to ATBD and is essential to the control and elimination of TB disease.[47] Case management of LTBI includes initial testing to rule out ATBD and ensuring appropriate treatment.

Because of the substantially greater risk of exposure to TB outside of the US, origin of birth is a prominent risk factor for TB in the US.[47, 51] As such, the majority of individuals who receive LTBI treatment in Davis County are born outside of the US. Figure 32 presents the place of birth for the LTBI cases identified during 2022 in Davis County.

Figure 32. Percent of LTBI, by Place of Birth and Region, Davis County, 2022



Latent Tuberculosis Infection

Typically, treatment for LTBI consists of daily antibiotic therapy for three to nine months.[54] 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, taken once weekly for 12 doses.[54] It is recommended for people age two years or older who are otherwise healthy, but also meet a certain set of criteria.

Referrals are sent to DCHD for suspect ATBD and LTBI follow-up from various medical facilities and providers not only in Davis County, but throughout the state. Screening tests for TB consist of a tuberculin skin test (TST) or blood test (e.g. QuantiFERON Gold). People who receive positive test results are often referred to DCHD for evaluation and treatment. There are many reasons why someone receives a TB screening test.

Since people with LTBI do not have symptoms, they may be unaware that they are infected with TB. Sometimes these people learn that they have LTBI due to being screened for some other reason. The most frequent screening reasons that resulted in CD/Epi identifying an LTBI case were incoming immigrants or refugees and job or school requirements. Table 7 shows the reasons why each of the 104 LTBI cases in 2022 were initially screened.

While LTBI is not a reportable condition, DCHD provides free or low-cost services for the community. DCHD provided 966 TSTs to the public in 2022. Table 8 presents the reasons for which a TST was sought at DCHD. However, this number only accounts for a small portion of all TB tests performed in Davis County.

Table 7. Reasons Why Identified LTBI Cases Were Initially Screened for TB, Davis County, 2022

Reason for TB Screening	Number of Cases (%)
Contact with ATBD case	3 (2.9%)
General medical screening	6 (5.8%)
Immunocompromised	9 (8.7%)
Incoming immigrant or refugee	42 (40.4%)
Job or school requirement	30 (28.9%)
Nursing home pre-screening	1 (1.0%)
Other	8 (7.7%)
Pre– or post– mission requirement	4 (3.8%)
Unknown	1 (1.0%)
Total	**104 (100%)**

Table 8. Reasons People Requested Tuberculin Skin Tests at Davis County Health Department, 2022

Reason for TB Screening	Number of Tests (%)
Contact with ATBD case	6 (0.6%)
Daycare employee	6 (0.6%)
Immunocompromised	1 (0.1%)
Incoming immigrant or refugee	9 (0.9%)
Job requirement	461 (47.7%)
Migrant worker	2 (0.2%)
Personal choice	25 (2.6%)
Pre– or post-mission requirement	42 (4.3%)
Student	361 (37.4%)
Volunteer	19 (2.0%)
Unknown	34 (3.5%)
Total	**966 (100%)**

Vaccine-Preventable Diseases

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

Figure 33. Percent of VPDs Reported, by Category, Davis County, 2022

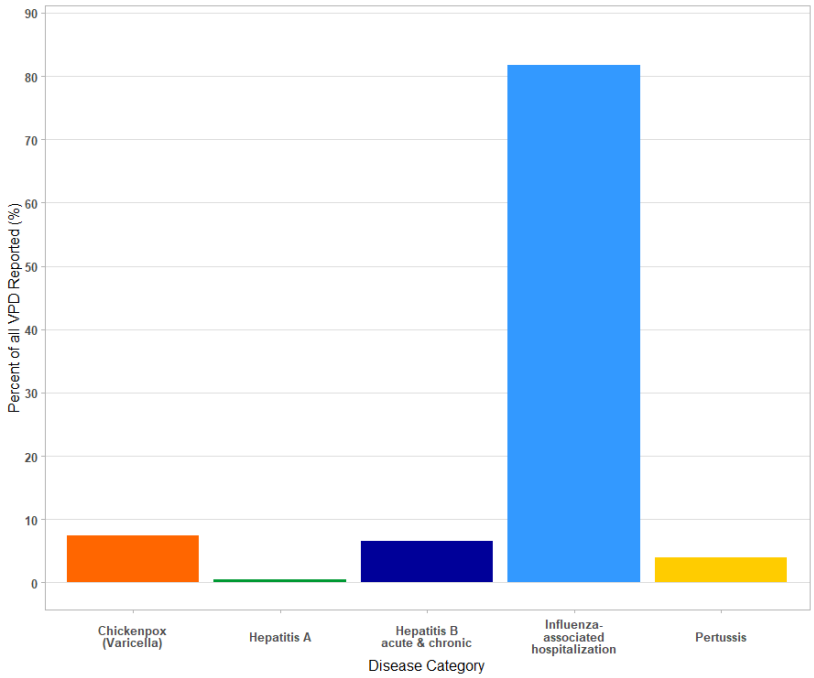
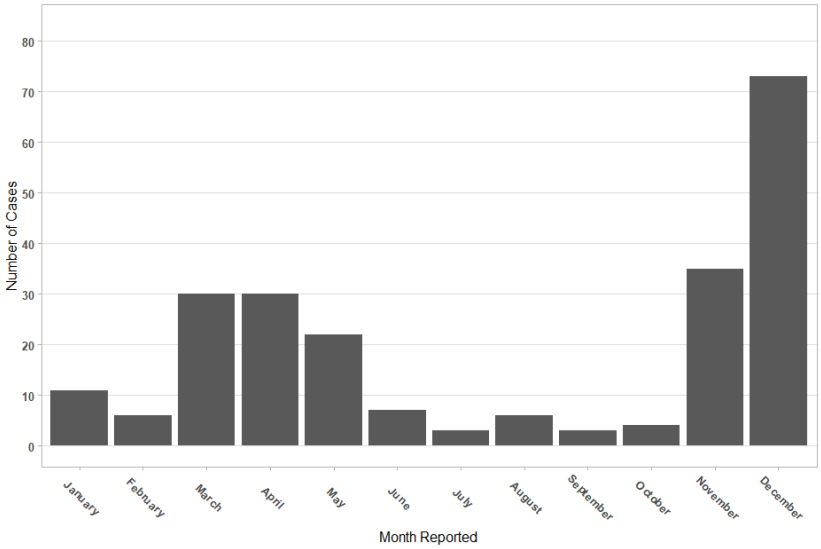


Figure 34. Number of VPDs Reported, by Month, Davis County, 2022



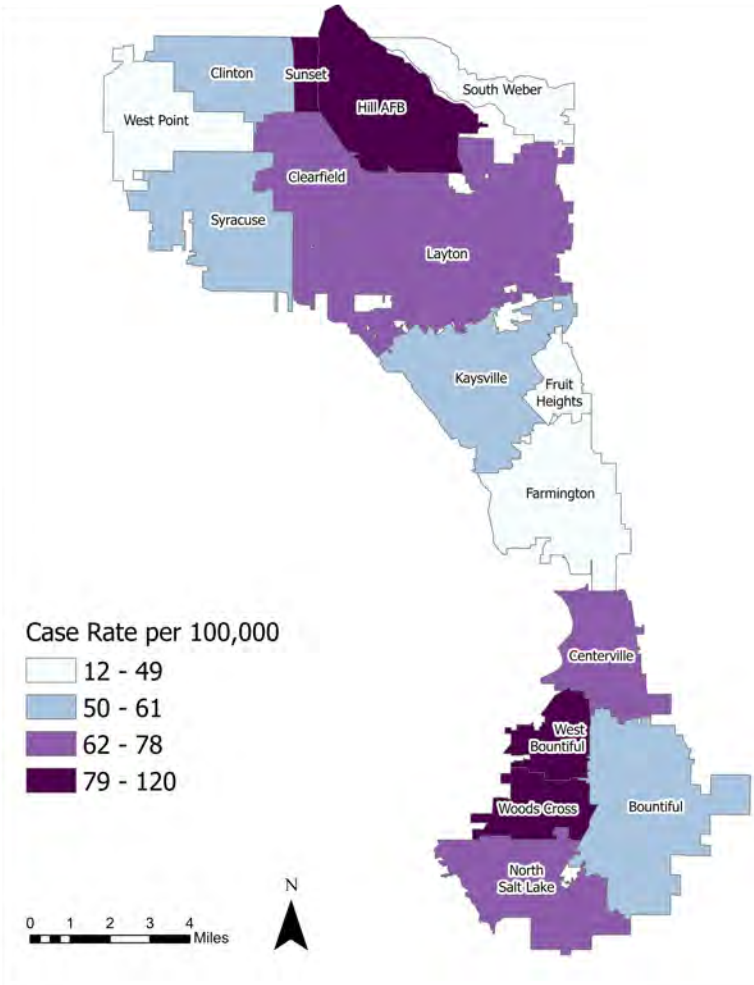
Vaccine-preventable diseases (VPDs) are diseases that are preventable through the use of immunizations. Historically, children had high rates of morbidity and mortality from VPDs. Rates of VPDs have dramatically declined in large part because of immunizations. However, these diseases can still occur due to importation, vaccine failure, disease breakthrough, and inadequate or no vaccine coverage.

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

There were **230** VPDs reported in 2022. Figure 33 presents the percentage of all VPD reports attributed to each specific disease. Influenza-associated hospitalizations were the most commonly reported with **188** (81.7%). Others include chickenpox with **17** cases (7.3%), hepatitis B (acute and chronic) with **15** cases (6.5%), pertussis with **9** cases (3.9%), and hepatitis A with **one** case (0.4%).

Figure 34 presents the count of VPDs by month. The highest counts in November and December are due to the large percent of influenza-associated hospitalizations that occurred during peak influenza season.

Figure 35. Rate of VPDs, by City, Davis County, 2022



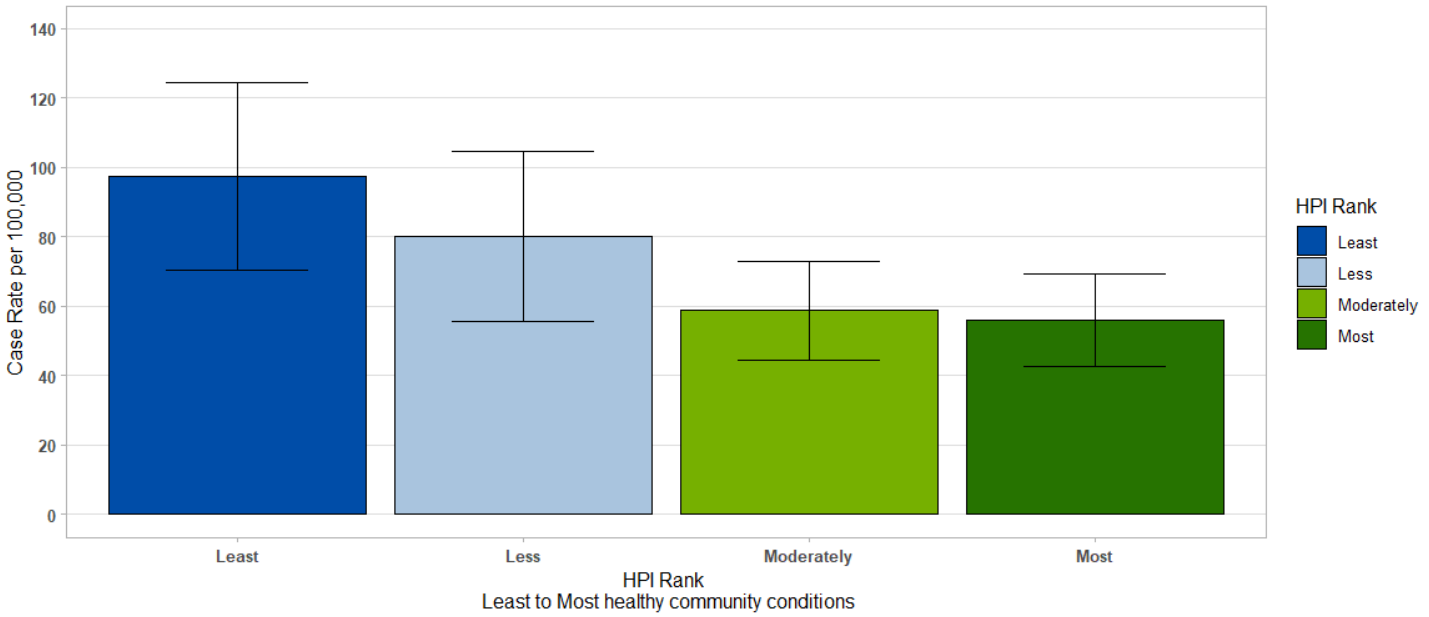
In 2022, VPDs were reported within every locality in Davis County. Figure 35 presents the incidence rate of VPDs reported by city per 100,000 population.

Hill AFB, Woods Cross, Sunset, and West Bountiful had the highest VPD rates, while South Weber, Fruit Heights, West Point, and Farmington had the lowest.

Figure 36 shows the rates of VPDs stratified by HPI rank area. These data suggest a general decrease in VPD rates as healthy community conditions improve. However, when the moderately and most healthy areas are reached, the rates become similar (58.7 cases and 55.9 cases per 100,000 population, respectively).

When compared to the rest of the county, the least healthy area has a rate that is 58% higher (97.3 cases per 100,000 people), whereas the most healthy area has a rate 23.5% lower (55.9 cases per 100,000 people).

Figure 36. Rate of VPDs, by HPI, Davis County, 2022

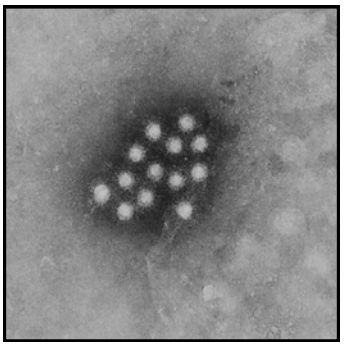


Hepatitis A is a disease caused by the hepatitis A virus, which causes liver infection.[55] It is transmitted via the fecal-oral route either by person-to-person contact or by consumption of contaminated food or water. Hepatitis A is highly contagious and is best prevented through vaccination.[55]

Since 1999, when routine vaccination was recommended for children living in states with high incidence (including Utah), the rates of hepatitis A have steadily declined. In recent years, however, there has been a resurgence of the disease due to outbreaks among high-risk populations.[56]

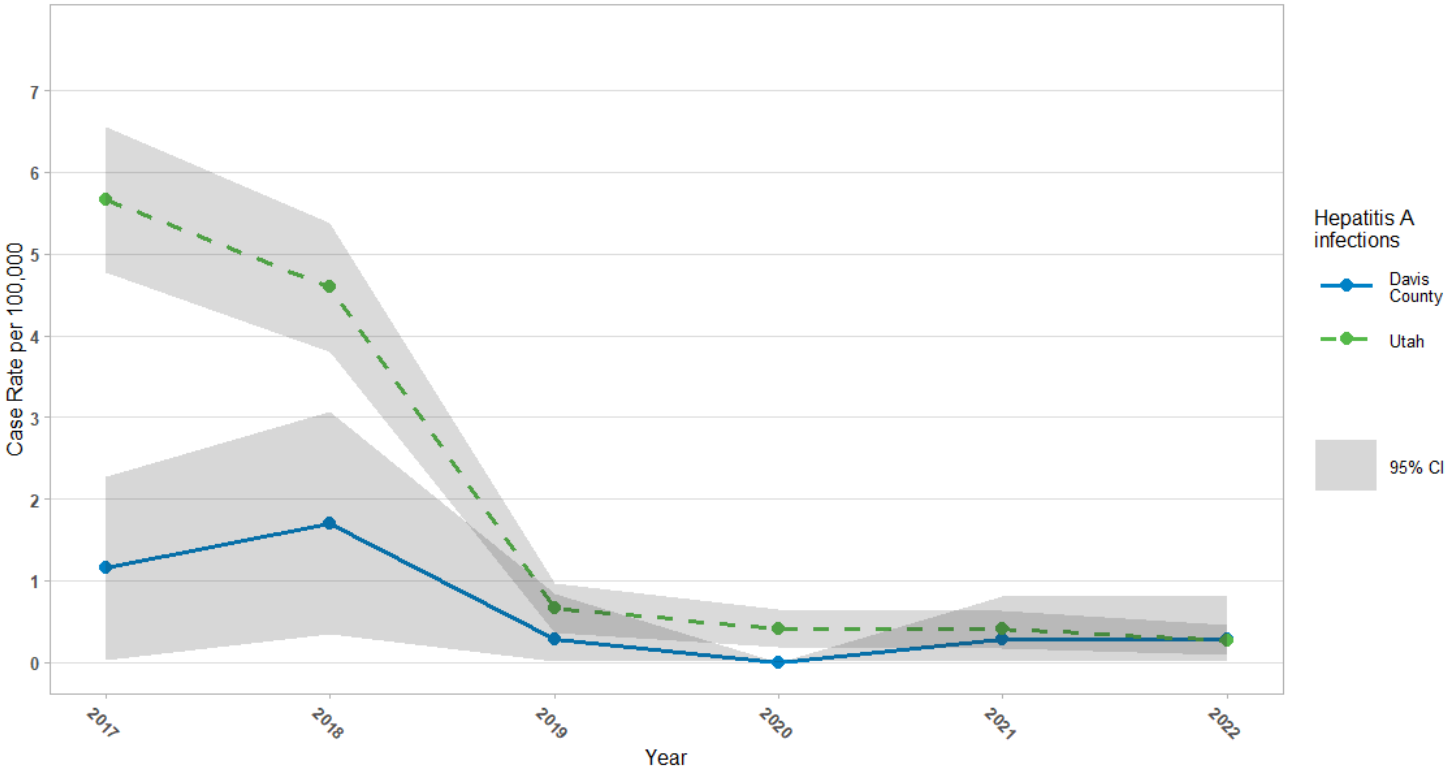
A widespread person-to-person outbreak of hepatitis A across the US was identified in the mid-2010s, and affected Utah from 2017 to 2019.[56] Utah continues to monitor reported hepatitis A cases within the community and prevent outbreaks.

During 2022, there was **one** case of hepatitis A reported in Davis County. Figure 37 presents the incidence rates of hepatitis A infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. After the hepatitis A outbreak concluded in 2019, the rates of hepatitis A in Davis County have been comparable to the rest of the state.

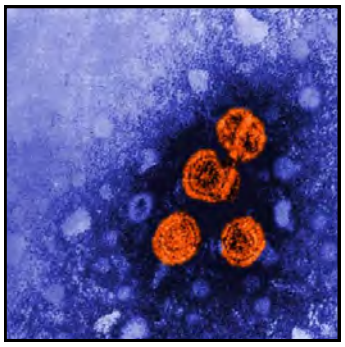


Hepatitis A is a liver infection caused by the Hepatitis A virus. It is highly contagious and can be transmitted by the fecal-oral route.

Figure 37. Rate of Hepatitis A Infections, by Year, Davis County and Utah, 2017-2022



Hepatitis B

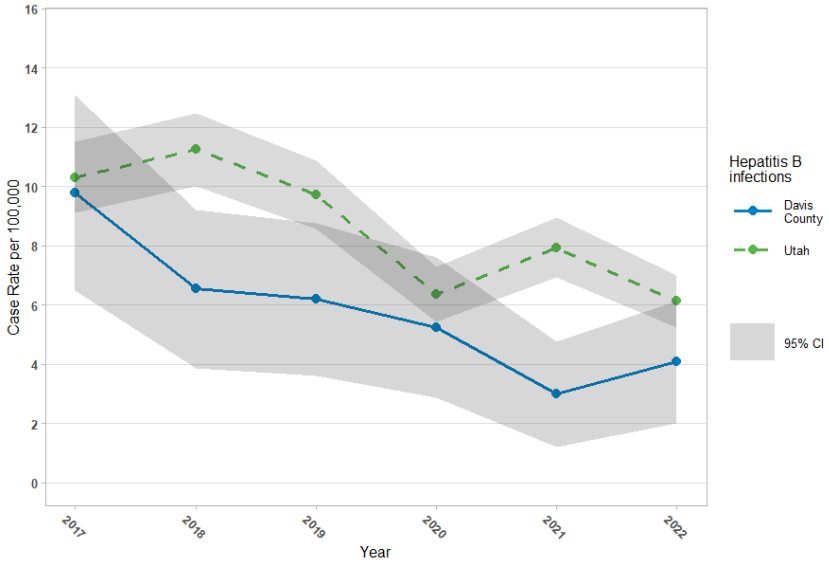


The mission of the Perinatal Hepatitis B Prevention Program is to increase identification and treatment of women, their infants, and household contacts that are positive for the hepatitis B virus.

Hepatitis B is a VPD caused by the hepatitis B virus (HBV). It is transmitted through blood or body fluids. HBV is more infectious than any other blood-borne pathogens (such as hepatitis C or HIV) and is more durable in the environment.[57] Common modes of transmission include percutaneous and per mucosal exposure to infectious body fluids, sharing needles or syringes, sexual contact with an infected person, and perinatal exposure from an infected mother. In the US, an estimated 850,000 to 2.2 million people have chronic HBV infection.[58] Acute HBV infection occurs most commonly among adolescents and adults in the US.

As many as 90% of infants who acquire HBV infection from their mothers at birth become chronically infected.[59] Approximately 30% of children under five years old who become infected with HBV will become chronically infected. The risk of chronic infections drops to 2-6% when a person is infected as an adult.[57] HBV has an effective vaccine which has prevented more than half a million children in the US from contracting the disease in the last 30 years.[59]

Figure 38. Rate of Acute and Chronic Hepatitis B Infections, by Year, Davis County and Utah, 2017-2022



During 2022, there were **15** cases of hepatitis B reported in Davis County. Of these 15 cases, **14** of them were chronic infections and **one** was determined to be a new acute infection. Several of these cases were at high risk for infection (e.g. foreign born, intravenous drug users, sexual/household exposure to a positive contact). Figure 38 presents the incidence rates of hepatitis B infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, the data suggest that rates in Davis County are lower than the state.

Perinatal Hepatitis B Prevention Program

The Perinatal Hepatitis B Prevention Program is responsible for evaluating, monitoring, testing, and treating all reported cases of hepatitis B among pregnant women 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 of delivery. This is done to help 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 women in this program can range from eight to 18 months.

In 2022, **four** women were referred to the DCHD Perinatal Hepatitis B Prevention Program.

Influenza is an acute respiratory infection caused by ribonucleic acid (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. Influenza is a contagious respiratory illness caused by influenza viruses. It can cause mild to severe illness.[60]

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

Influenza Surveillance

Influenza infection is very common, and the number of people infected each season can only be estimated because not everyone will seek medical care or get tested.[60] It is instead monitored using a variety of methods. One method is syndromic surveillance. When people seek treatment in a medical facility, the facility sends de-identified data about the visit, including chief complaint, diagnosis codes, and patient characteristics, to state and local health departments. These data are called "syndromic surveillance" because it tracks the symptoms and diseases people are experiencing. CD/Epi currently uses syndromic surveillance data to track outpatient visits due to influenza-like illness and emergency department visits associated with influenza. Another method monitors hospitalizations and deaths. 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 are evaluated as another measure to assess how severe the current influenza season is. Finally, hospitals and other clinics submit specimens for influenza testing and typing to the UPHL so that circulating strains can be identified. These methods of influenza surveillance help CD/Epi evaluate influenza trends and severity throughout the year.

Influenza-Associated Hospitalizations

During the 2021-2022 influenza season (October 2021 through May 2022), there were **77** influenza-associated hospitalizations. Figure 39 shows the monthly count of influenza-associated hospitalizations in Davis County from January 2018 to January 2023. The 2021-2022 season saw an increase in hospitalizations after dramatic decreases in 2020-2021. These decreases were largely due to community-wide infection control measures for the COVID-19 pandemic. Although influenza cases can occur at any time of the year, influenza viruses thrive during cold weather and cases typically peak in the colder months.[61] The current 2022-2023 influenza season (October 2022 through May 2023) has been more severe compared to previous seasons.

Figure 39. Number of Influenza-Associated Hospitalizations, by Month, Davis County, January 2018-January 2023

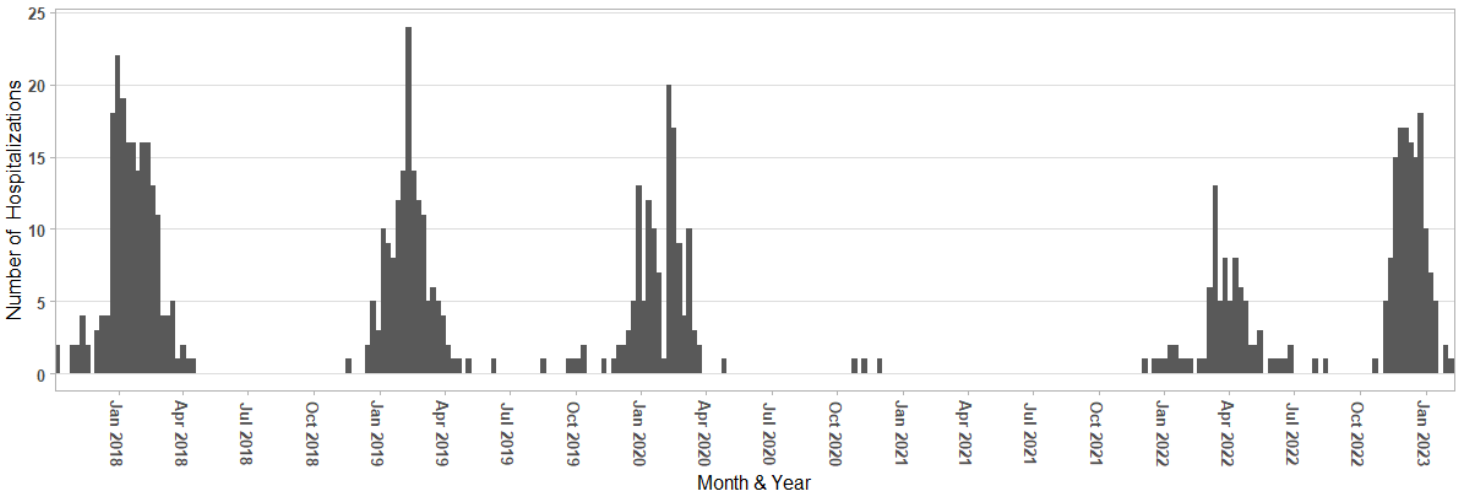


Figure 40. Rate of Influenza-Associated Hospitalizations, by Age Group, Davis County, 2021-2022 Season

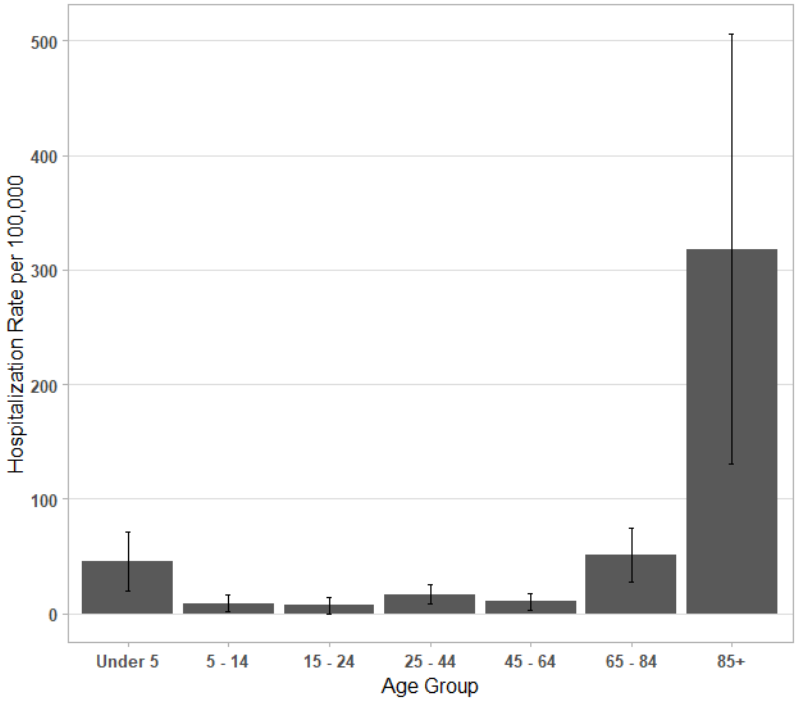
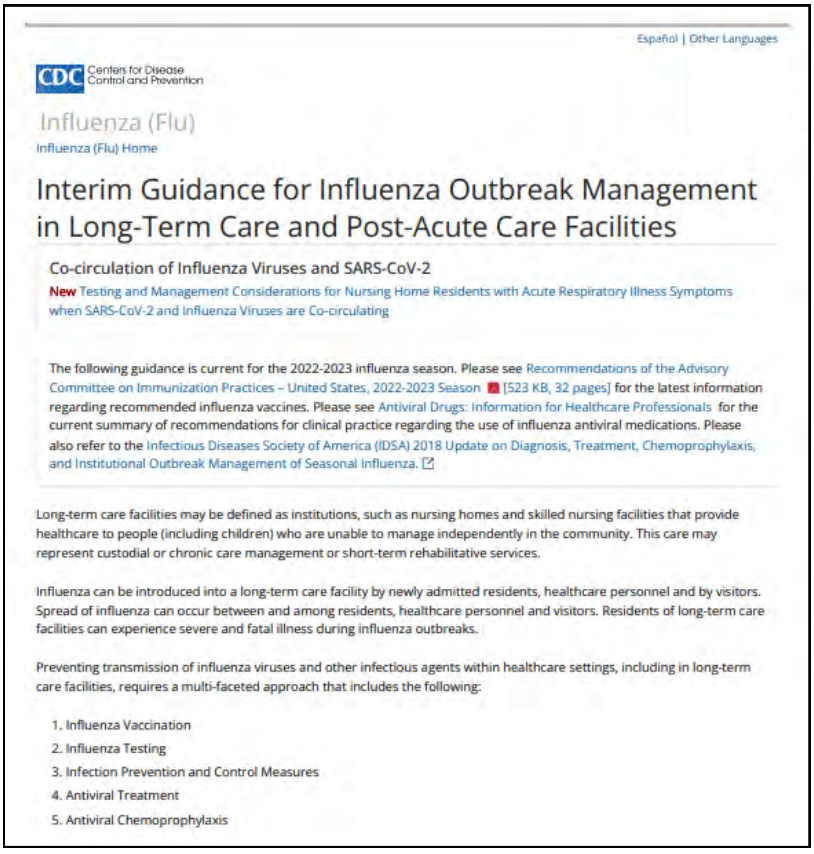


Figure 41. Influenza Outbreak Management Procedures for Long-Term and Post-Acute Care Facilities (Screenshot)



Español | Other Languages

CDC Centers for Disease Control and Prevention

Influenza (Flu)

Influenza (Flu) Home

Interim Guidance for Influenza Outbreak Management in Long-Term Care and Post-Acute Care Facilities

Co-circulation of Influenza Viruses and SARS-CoV-2

New Testing and Management Considerations for Nursing Home Residents with Acute Respiratory Illness Symptoms when SARS-CoV-2 and Influenza Viruses are Co-circulating

The following guidance is current for the 2022-2023 influenza season. Please see Recommendations of the Advisory Committee on Immunization Practices – United States, 2022-2023 Season [523 KB, 32 pages] for the latest information regarding recommended influenza vaccines. Please see Antiviral Drugs: Information for Healthcare Professionals for the current summary of recommendations for clinical practice regarding the use of influenza antiviral medications. Please also refer to the Infectious Diseases Society of America (IDSA) 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.

Long-term care facilities may be defined as institutions, such as nursing homes and skilled nursing facilities that provide healthcare to people (including children) who are unable to manage independently in the community. This care may represent custodial or chronic care management or short-term rehabilitative services.

Influenza can be introduced into a long-term care facility by newly admitted residents, healthcare personnel and by visitors. Spread of influenza can occur between and among residents, healthcare personnel and visitors. Residents of long-term care facilities can experience severe and fatal illness during influenza outbreaks.

Preventing transmission of influenza viruses and other infectious agents within healthcare settings, including in long-term care facilities, requires a multi-faceted approach that includes the following:

1. Influenza Vaccination
2. Influenza Testing
3. Infection Prevention and Control Measures
4. Antiviral Treatment
5. Antiviral Chemoprophylaxis

The very young and very old are the susceptible to severe influenza infection. Figure 40 shows the influenza-associated hospitalization rate by age group per 100,000 people during the 2021-2022 season. During this time, people age 85 years and over had the highest rate at 318.2 hospitalizations per 100,000 people. Following that, people ages 65 to 84 years and children under age 5 years had comparable rates at 50.8 and 45.7 hospitalizations per 100,000 people, respectively.

Outbreak Prevention

Long-term care facilities provide a variety of services, both medical and personal care, to people who are unable to live independently. This includes facilities like nursing homes, skilled nursing, and assisted living. While these facilities provide important care, there is a higher risk of outbreaks and severe disease due to the typically high proportion of older individuals living in close proximity. Figure 41 shows CDC guidance that CD/Epi distributes to long-term care facilities to help prevent influenza outbreaks and protect this high-risk group.[62]

CD/Epi seeks to work closely with these types of facilities to help prevent outbreaks. These efforts include:

- Building rapport with facility staff,
- Maintaining open communication,
- Providing up-to-date CDC guidance on infection prevention and control recommendations,
- Following up on identified cases,
- Recommending testing based on exposure, and
- Assisting with required reporting.

This way, CD/Epi can work with facilities to help protect the health of vulnerable members of the community.

Pertussis (also known as whooping cough) is a contagious respiratory illness caused by the bacteria *Bordetella pertussis.*[63] This VPD is of particular concern in infants because of higher rates of hospitalization, pneumonia, and death, when compared with older children and adults.[64]

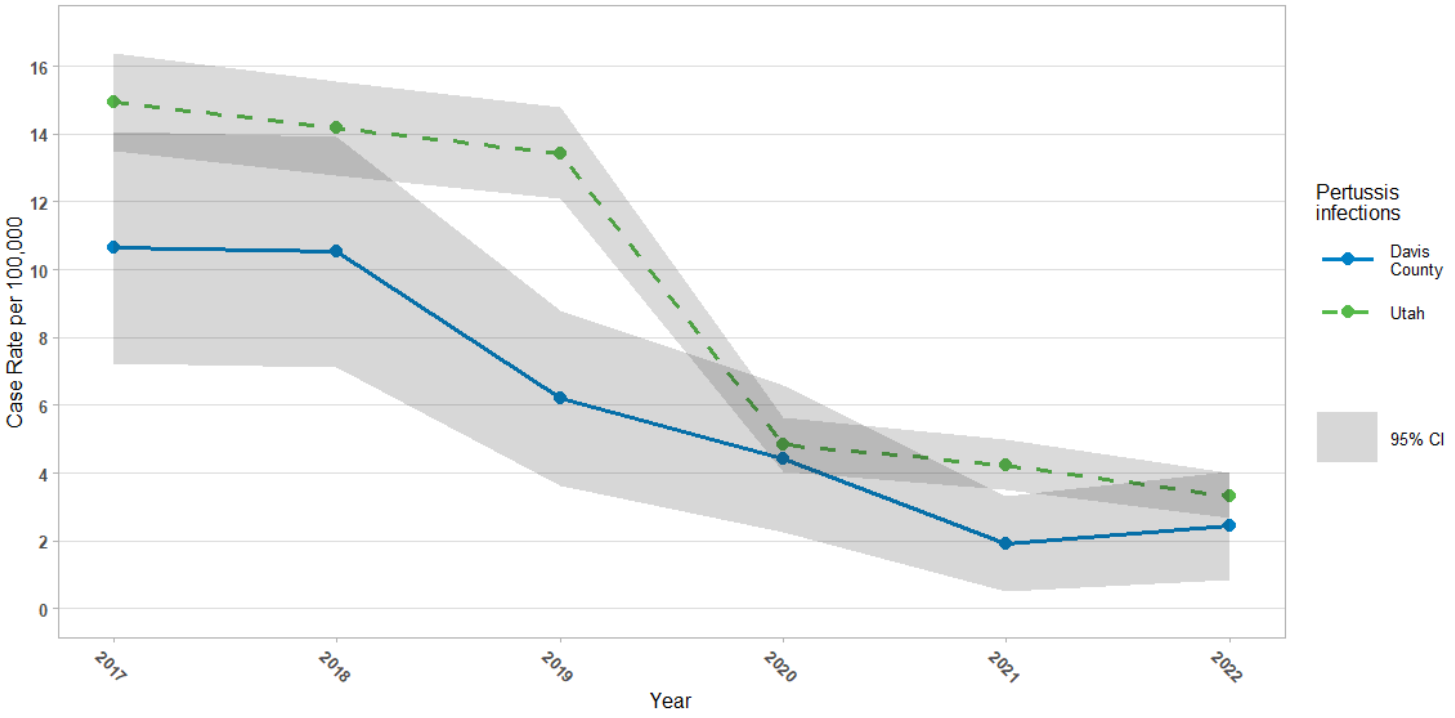
Pertussis is a respiratory illness commonly known as "whooping cough" due to the gasping sound a patient makes when they suck in air after a coughing fit.

Pertussis is a nationally notifiable disease, and all reported cases are investigated promptly in an effort to stop disease spread.[63] 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.[65] Upon entry into junior high, a booster dose of tetanus, diphtheria, and acellular pertussis (TD/Tdap) is required. The Tdap is a one-time vaccine and is recommended for anyone aged 11-64 years.[65] Recent guidance from the CDC recommends pregnant women receive a Tdap vaccine with every pregnancy, preferably given between weeks 27-36.[63] Tetanus vaccination, however, is recommended every 10 years.

The population 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). Although cases are also common in older children and adults due to waning immunity and vaccine exemptions, illness in these age groups is usually milder and the diagnosis is often delayed or missed.

During 2022, there were **nine** cases of pertussis reported in Davis County. Figure 42 presents the incidence rates of pertussis infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, pertussis rates decreased both within Davis County and in the rest of Utah. Since 2020, pertussis rates in Davis County and the rest of the state have become more comparable.

Figure 42. Rate of Pertussis Infections, by Year, Davis County and Utah, 2017-2022



Zoonotic & Vector-borne Diseases

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

Figure 43. Percent of ZVBDs Reported, by Category, Davis County, 2022

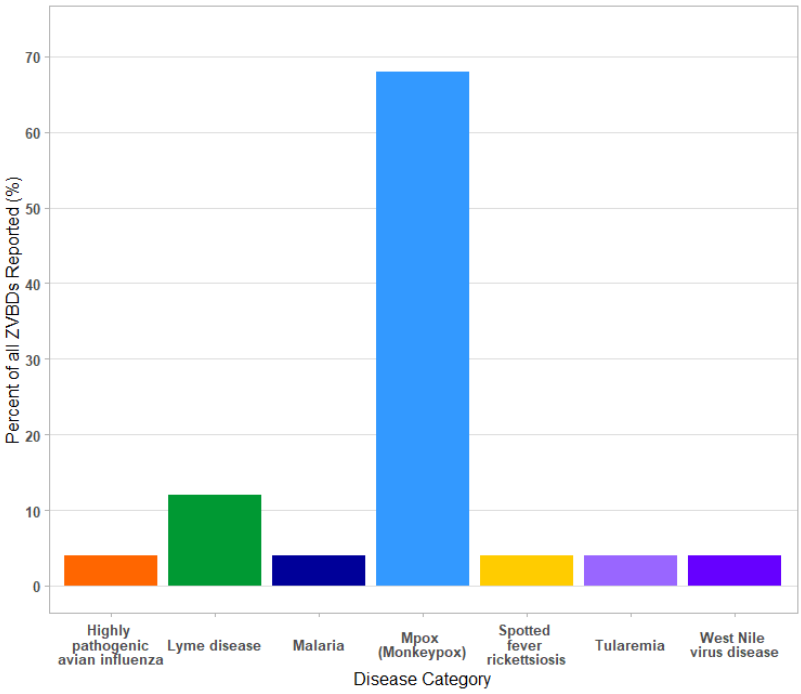
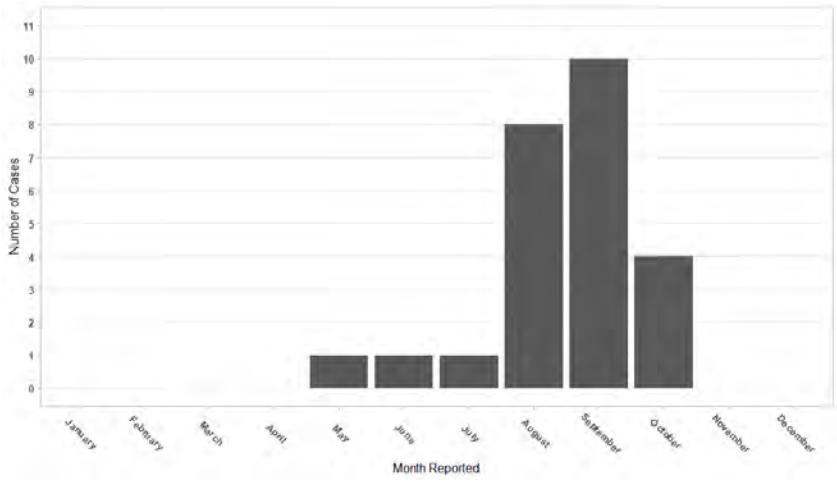


Figure 44. Number of ZVBDs Reported, by Month, Davis County, 2022



Zoonotic and vector-borne diseases (ZVBDs) are diseases that are transmitted by an animal or insect. Zoonotic (sometimes called "zoonoses") refer to diseases that are spread from animals to humans. Vector-borne diseases are spread to humans by insects or arthropods. The most common ways are through bites, or contact with animals and their feces.

While ZVBDs do not occur often in Davis County, there is still a risk of disease from viruses and bacteria spread by vectors. These diseases are typically contracted during out-of-state or international travel.

There were **25** cases of ZVBD reported in 2022. Figure 43 presents the percentage of all ZVBD reports attributed to each specific disease. Mpox (monkeypox) was the most frequently reported with **17** cases (68.0%). Others include Lyme disease with **three** cases (12.0%), and highly pathogenic avian influenza (HPAI), malaria, spotted fever rickettsiosis, tularemia, and West Nile virus disease with **one** case each (4.0% each).

Figure 44 shows the number of ZVBD cases by month. While the majority occurred during August and September, this was primarily driven by the 2022 outbreak of mpox.

Rates of ZVBDs are not displayed by city nor analyzed by HPI rank area due to low case counts.

Highly Pathogenic Avian Influenza

Avian influenza refers to disease in birds caused by infection with avian (bird) influenza type A viruses. Avian influenza A viruses have been isolated from more than 100 different species of wild birds around the world.[66]

Avian Influenza viruses naturally spread among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species.

Avian Influenza in Birds

Avian influenza viruses are classified into the following two categories: low pathogenic avian influenza (LPAI) viruses, and highly pathogenic avian influenza (HPAI) viruses. These categories refer to molecular characteristics of a virus and the virus' ability to cause disease and mortality in chickens in a laboratory setting. Both HPAI and LPAI viruses can spread rapidly through poultry flocks. HPAI and LPAI designations do not refer to or correlate with the severity of illness in cases of human infection with these viruses; both LPAI and HPAI viruses have caused mild to severe illness in infected humans. There are genetic and antigenic differences between the influenza A virus subtypes that typically infect only birds and those that can infect birds and people.[66]

Avian Influenza in Humans

Although avian influenza viruses usually do not infect people, there have been some rare cases of human infection with these viruses. Illness in humans from bird flu virus infections have ranged in severity from no symptoms or mild illness to severe disease that resulted in death. Infected birds shed the virus through their saliva, mucus, and feces. Human infections with avian influenza viruses can occur when virus gets into a person's eyes, nose or mouth, or is inhaled. This can happen when virus is in the air (in droplets or possibly dust) and a person breathes it in, or possibly when a person touches something that has virus on it then touches their mouth, eyes, or nose. Human infections with these viruses have occurred most often after unprotected contact with infected birds or surfaces contaminated with these viruses. However, some infections have been identified where direct contact with infected birds or their environment was not known to have occurred.[67]

To help prevent infection, people are recommended to minimize contact with wild birds or sick or dead poultry by wearing gloves and washing your hands with soap and water after touching birds. Wear respiratory protection, such as an N95 respirator if available or, if not available, a well-fitting facemask (e.g. a surgical mask).[68]

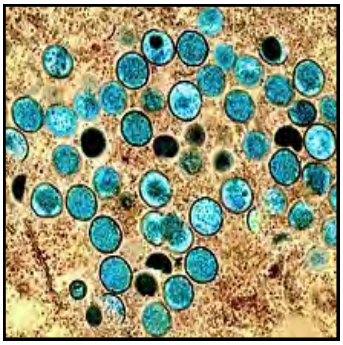
Outbreaks

CDC has been monitoring for illness among people exposed to avian influenza virus-infected birds since outbreaks were first detected in wild birds and poultry in late 2021. As of November 3, 2022, avian influenza viruses have been found in US commercial and backyard poultry in 44 states and in wild birds in 46 states. Since early 2022, more than 49 million birds in 46 states have either died as a result of avian influenza virus infection or have been culled due to exposure to infected birds.[69]

HPAI in Davis County

In 2022, **two** cases of HPAI in humans were reported in Utah, **one** of which was in Davis County. The Davis County case is considered a "suspect" case because CD/Epi was unable to contact the individual and conduct a thorough investigation. If a thorough investigation had been performed, it is possible that HPAI would be ruled out. Despite this, CD/Epi had sufficient evidence to consider this a suspect case of HPAI. In total, CD/Epi staff followed up with 10 people who had confirmed or suspected exposures to HPAI in 2022. Follow up included assessing the person's risk following exposure to a dead or sick bird, monitoring symptoms, and coordinating testing for possible HPAI infection.

Mpox



Mpox can spread between animals and humans. While the animal reservoir is unknown, small mammals are thought to maintain the virus

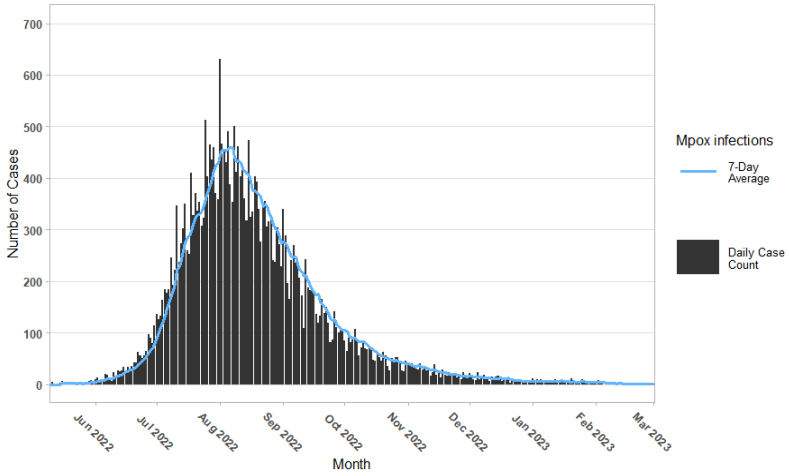
Mpox (previously known as monkeypox) is a disease caused by infection with the mpox virus. The mpox virus is part of the same family of viruses as variola virus, the virus that causes smallpox. Mpox symptoms are similar to smallpox symptoms, but milder, and mpox is rarely fatal. It is not related to chickenpox.[70]

The first human case of mpox was recorded in 1970. Prior to the 2022 outbreak, mpox had been reported in people in several central and western African countries. Previously, almost all mpox cases in people outside of Africa were linked to international travel to countries where the disease commonly occurs or through imported animals.[70]

2022 Mpox Outbreak

In early May 2022, mpox began to be reported in countries where it is not endemic. On May 17, 2022, the US reported its first mpox case in the current outbreak. Mpox cases have so far been found in 110 countries, of which 103 have not historically reported mpox.[71] There have been 30,225 cases and 38 deaths reported in the US as of March 1, 2023.[72] Figure 45 shows the daily count and the seven-day average of mpox cases in the US.[73] In Utah, **196** cases have been reported to date, **17** of which were in Davis County. The 17 cases in Davis County were reported from early July 2022 through late October 2022. No additional cases have been identified in Davis County since then. At this time, data suggest that gay, bisexual, and other MSM make up the majority of cases in the current mpox outbreak. However, anyone, regardless of sexual orientation or gender identity, who has been in close, personal contact with someone who has mpox is at risk.[74]

Figure 45. Daily Number Mpox Cases and 7-Day Daily Average, United States, as of March 1, 2023



Signs and Symptoms

Mpox often produces a rash that may be located on hands, feet, chest, face, or mouth or near the genitals, including penis, testicles, labia, and vagina, and anus. The incubation period is 3-17 days. During this time, a person does not have symptoms and may feel fine. The rash will go through several stages, including scabs, before healing. The rash can initially look like pimples or blisters and may be painful or itchy. Other symptoms can include fever, chills, swollen lymph nodes, muscle aches, and respiratory symptoms. Symptoms usually start within three weeks of exposure to the virus.[75]

Transmission

Mpox can spread to anyone through close, personal, often skin-to-skin contact, including direct contact with mpox rash and scabs from a person with mpox, as well as contact with their saliva, upper respiratory secretions (snot or mucus), and areas around the anus, rectum, or vagina. Direct contact can happen during intimate contact, including:

- Oral, anal, or vaginal sex, or touching the genitals (penis, testicles, labia, & vagina) or anus of a person with mpox;
- Hugging, massaging, and kissing; or
- Prolonged face-to-face contact.

The risk is considered low for getting mpox by touching objects, fabrics, and surfaces that have been used by someone with mpox and not disinfected, such as clothing, bedding, towels, fetish gear, or sex toys. In the current mpox outbreak, the virus is spreading primarily through sexual contact; however, infections have occurred through other exposures, including non-sexual contact with infectious lesions and from contaminated instruments in clinic settings.[76]

Vaccine

Vaccinations played a crucial role in curtailing the spread of mpox. The recommended vaccine for the mpox outbreak is JYNNEOS, which was originally developed for smallpox. It is a two-dose series administered 28 days (four weeks) apart. The standard regimen involves a subcutaneous injection of 0.5 milliliters (mL) and is approved for any age. Due to high demand in the current outbreak, an alternative regimen of 0.1 mL injected intradermally was approved under an Emergency Use Authorization on August 9, 2022. The alternative regimen is currently only approved for individuals age 18 years and over.[77] Due to the lower dose of the alternative regimen, more people were able to be vaccinated in order to curtail the spread of mpox.

Public Health Response

Even before the first mpox case was identified in Davis County, DCHD staff began coordinating and preparing with DHHS and healthcare providers in the event a case should be reported. Once the first case was reported in Davis County, CD/Epi staff performed the case investigation and contact tracing to prevent further exposure. CD/Epi investigators administered testing and coordinated with healthcare providers to offer medication and education. When DCHD's allotment of JYNNEOS vaccine became available, CD/Epi nurses began setting appointments with patients to administer the vaccine.

In addition to individual vaccine appointments, DCHD held two mass vaccination clinics. The first was on August 20, 2022 for individuals to receive their first dose. Second doses were administered at the clinic on September 17, 2022. As of March 9, 2023, DCHD administered 429 doses of the JYNNEOS vaccine. CD/Epi nurses continue to see patients individually to administer the vaccine, provide risk-reduction education, and regularly follow up to ensure they receive the second dose.

Due to the high demand for vaccination, DCHD and DHHS prioritized vaccination based on epidemiological risk factors. CD/Epi created an intake form to screen potential vaccine recipients. CD/Epi nurses provided additional follow up if needed prior to scheduling a vaccine appointment. These risk factors included:

- Individuals who have had close, intimate contact with someone who has mpox.
- Gay, bisexual, and other men who have sex with men, transgender or nonbinary people who in the past 6 months have had:
    - ◊ A new diagnosis of at least one reportable STI (i.e. HIV, chancroid, chlamydia, gonorrhea, or syphilis); or
    - ◊ More than one sex partner.
- People who have had any of the following in the past 6 months:
    - ◊ Sex at a commercial sex venue; or
    - ◊ Sex in association with a large public event in a geographic area where mpox transmission is occurring.
- Sexual partners of people with the above risks.
- People who anticipate experiencing the above risks.

Other Diseases

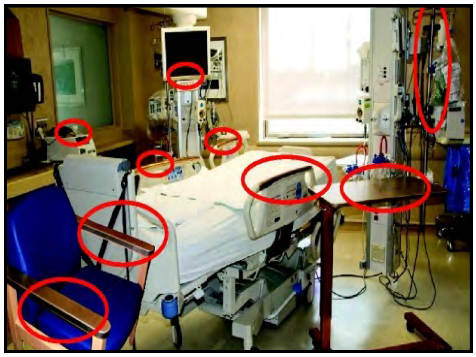
Diseases that do not fall under a specific identified category.

Diseases that do not fall under a specific identified category will be discussed in this section. In 2022, hepatitis C (acute and chronic) infections constituted the majority of this category with **120** cases. Table 9 shows the count of all diseases in this category.

Table 9. Number of Cases of Other Reported Diseases, Davis County, 2022

Disease	Number of Cases
Carbapenem-Resistant Organisms (CROs)	67
Coccidioidomycosis	8
Creutzfeldt-Jakob Disease	2
Hepatitis C, acute & chronic	120
Legionellosis	7
Total	**204**

Hepatitis C



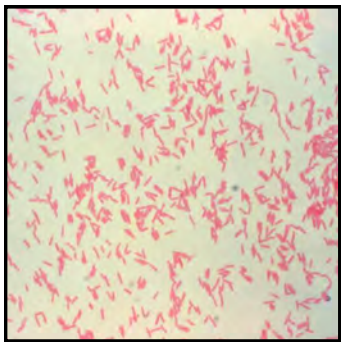
Carbapenem–Resistant Organisms

Coccidioidomycosis

Carbapenem-Resistant Organisms

The public health problem of antibiotic resistance is not new. Since the creation of antibiotic medicines, bacteria continue to evolve to find ways to kill the antibiotics created to stop their spread.[78] 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 organisms (CRO) are particularly concerning. Some CRO infections have developed resistance to most available antibiotics. CRO 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 US.[79] Utah laboratories and healthcare facilities are required to report the following CROs to the state or local health department:

- *Acinetobacter* species
- *Enterobacter* species
- *Escherichia coli*
- *Klebsiella* species
- *Pseudomonas aeruginosa*

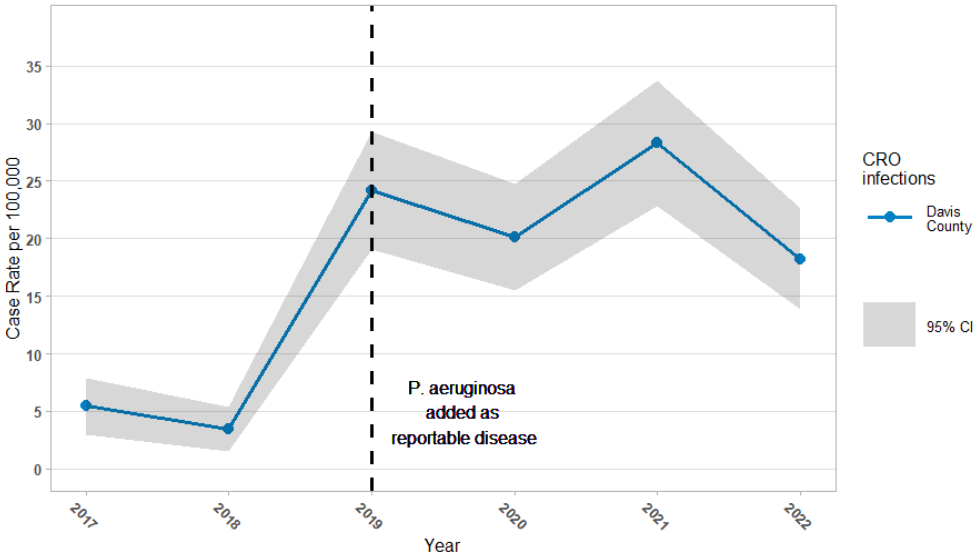


Pseudomonas is a type of bacteria that is found commonly in the environment, like in soil and in water. Of the many different types of *Pseudomonas*, the one that most often causes infections in humans is called *Pseudomonas aeruginosa*, which can cause infections in the blood, lungs (pneumonia), or other parts of the body after surgery.

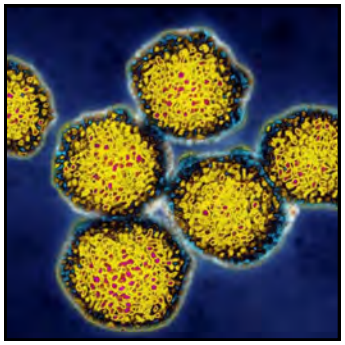
During 2022, there were **67** cases of CRO reported in Davis County. Figure 46 presents the incidence rate of CRO infections per 100,000 people in Davis County from 2017 to 2022. The addition of *Pseudomonas aeruginosa* as a reportable disease likely contributed to the increase in reported cases from 2018 to 2019.

In 2022, a rare strain of *Pseudomonas aeruginosa* (VIM-GES-CRPA), never before seen in the US, caused an outbreak that has spread to 13 states. To date there have been 64 cases, eight reports of vision loss, and one death associated with the outbreak.[1] Most patients reported using artificial tears and specific brands have been identified as being the most likely vector of *Pseudomonas aeruginosa*. Utah is one of the 13 states with reported cases, with all cases occurring in Davis County. The first case in Davis County was identified in July 2022, with additional cases found in the ensuing months. These cases have been genetically linked with the larger nationwide outbreak. CD/Epi staff collaborated with DHHS, CDC, and the health facility to test patients in an effort to find any unreported cases. This has involved mass testing of all residents, advising on discontinuing certain brands of artificial tears, and assisting with infection prevention procedures.

Figure 46. Rate of CRO Infections, by Year, Davis County, 2017-2022



Hepatitis C



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

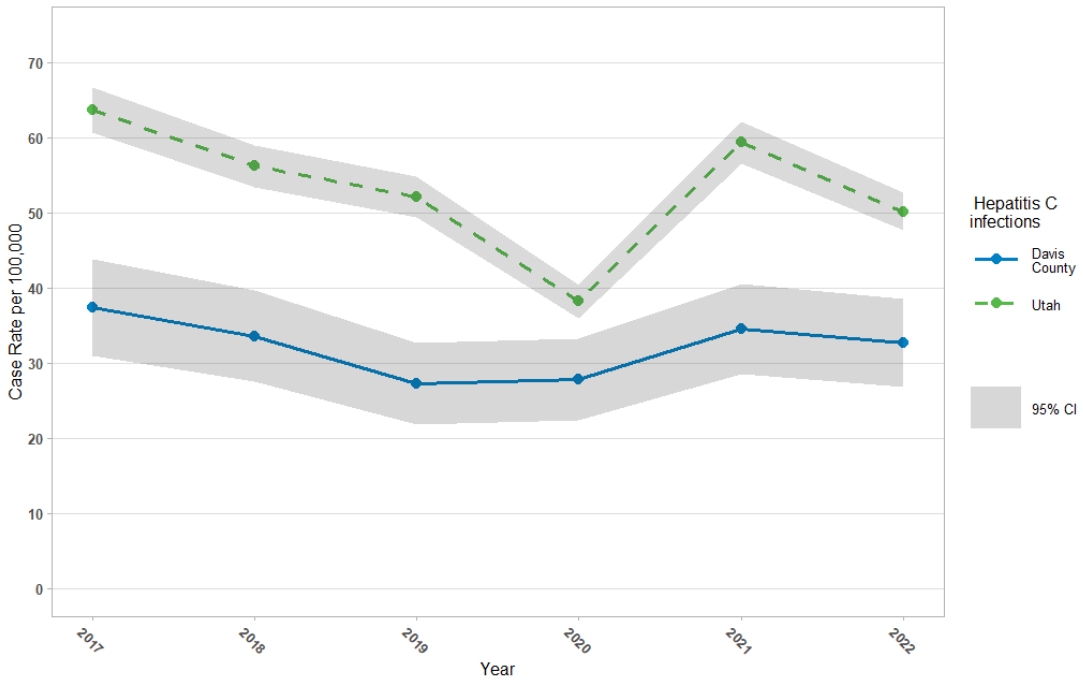
Hepatitis C is a disease caused by a virus that infects the liver. Over time it can cause serious and life-threatening health concerns including cirrhosis, liver failure, and cancer.[80] Approximately 15-25% of those infected with hepatitis C virus (HCV) will recover from the infection. The remaining 75-85% develop chronic infection. Each year approximately 15,000 people die from the complications of liver disease caused by HCV. However, this is a conservative number as most people do not have documentation of having HCV on their death certificate.[81]

Most individuals who develop chronic HCV infection are asymptomatic for many years.[80] Infected people may not know they have the disease. The arrival of symptoms suggest advanced stages of HCV.[80] Symptoms can range from fatigue, headache, joint aches, muscle aches, nausea, jaundice, loss of appetite, and abdominal pain.[81]

HCV is a blood-borne pathogen that is predominantly spread by exposure to contaminated blood or blood products.[81] Currently, the most prevalent mode of transmission is sharing needles or equipment used to inject drugs. Sexual transmission of HCV can occur, but appears to be a less common mode of transmission. Transmission can also occur from mother to her baby.[80] HCV is not spread through casual contact, kissing, sneezing, hugging, sharing glasses/utensils, or from breast milk.

HCV 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 a false-positive test.[81] To do so, confirmatory testing is necessary. Many reports of HCV come from blood or plasma donation centers, which have limited contact information for the person donating, making investigation of the disease difficult. Of those investigated, the most prevalent risk factor identified was injecting drugs, currently or in the past.[81] Most infected individuals were unaware of their infection.

Figure 47. Rate of Hepatitis C Infections (Acute and Chronic), by Year, Davis County and Utah, 2017-2022



During 2022, there were **120** cases of HCV reported in Davis County. Of these 120 cases, **111** of them were chronic infections and **nine** were determined to be new acute infections. Figure 47 presents the incidence rate of HCV infections (both acute and chronic) per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, rates in Davis County have consistently been lower than the state.

Legionella bacteria can cause a serious lung infection called Legionnaires' disease or a less severe disease called Pontiac fever, collectively known as legionellosis.[82] The disease is transmitted through the air from a soil or water source.[83] All studies to date have shown that the organism cannot be spread from person-to-person.[82] Outbreaks occur when individuals are exposed to a common source of *Legionella pneumophila* bacteria in the environment.

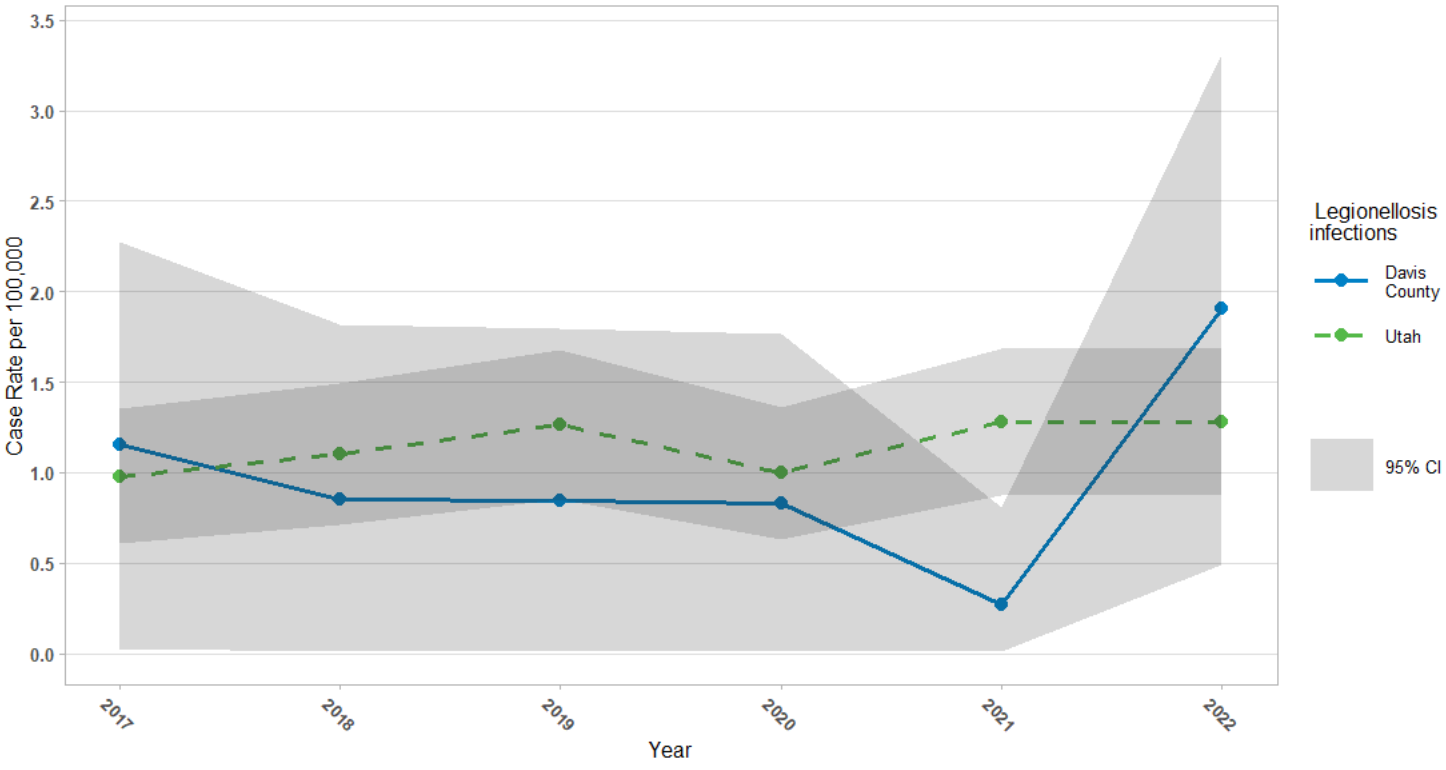
Legionellosis is a bacterial infection that may cause mild respiratory illness or pneumonia. It is associated with two distinct illnesses: Legionnaires' disease and Pontiac fever.

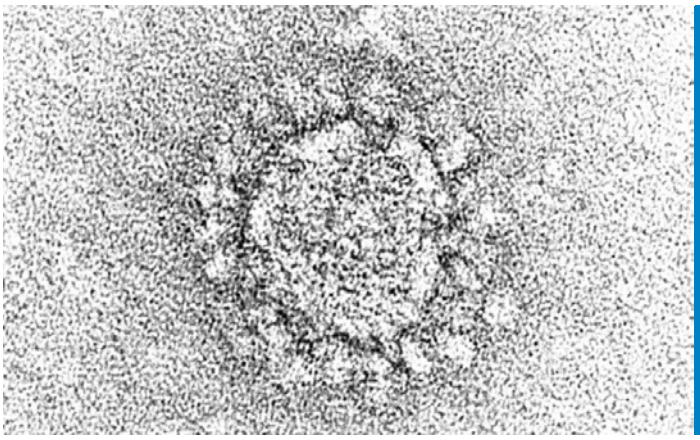
An estimated 8,000-18,000 people need care in a hospital due to Legionnaire's disease each year in the US, and about one in 10 will die.[82] However, many infections are not diagnosed or reported, so this number may be 1.8-2.7 times higher.[82] Most legionellosis cases are sporadic; 23% are nosocomial (hospital acquired) and 10-20% can be linked to outbreaks.

Although *Legionella* is not spread from person-to-person, 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.[83] Healthy individuals, when exposed, typically do not develop the disease. However, those who are immunocompromised, over 50 years of age, or have underlying chronic illnesses are at higher risk.[83]

In 2022, Davis County had **seven** cases of legionellosis. Figure 48 presents the incidence rate of legionellosis infections per 100,000 people in Davis County compared to the rest of Utah from 2017 to 2022. During this timeframe, these data suggest that Davis County rates are comparable to the rest of the state. However, this also may be a function of low case counts.

Figure 48. Rate of Legionellosis Infections, by Year, Davis County and Utah, 2017-2022





Coronavirus Disease 2019 (COVID-19)

Severe acute respiratory syndrome coronavirus (COVID-19) is transmitted through droplets from person-to-person.

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV2),[84] and is commonly known as COVID-19. Transmission of COVID-19 occurs through droplets spread from person-to person. Droplets can enter through the eyes, mouth, or nose, usually from a cough or sneeze. Touching the eyes, nose, or mouth with hands contaminated with the virus may also cause infection. Symptoms include fever or chills, new loss of smell or taste, cough, fatigue, muscle or body aches, headache, sore throat, congestion, difficulty breathing, chest pain, nausea or vomiting, and diarrhea.[85] COVID-19 is extremely contagious, which has allowed it to spread quickly.

Figure 49. Rate of COVID-19, Davis County and Utah, by Week, 2022

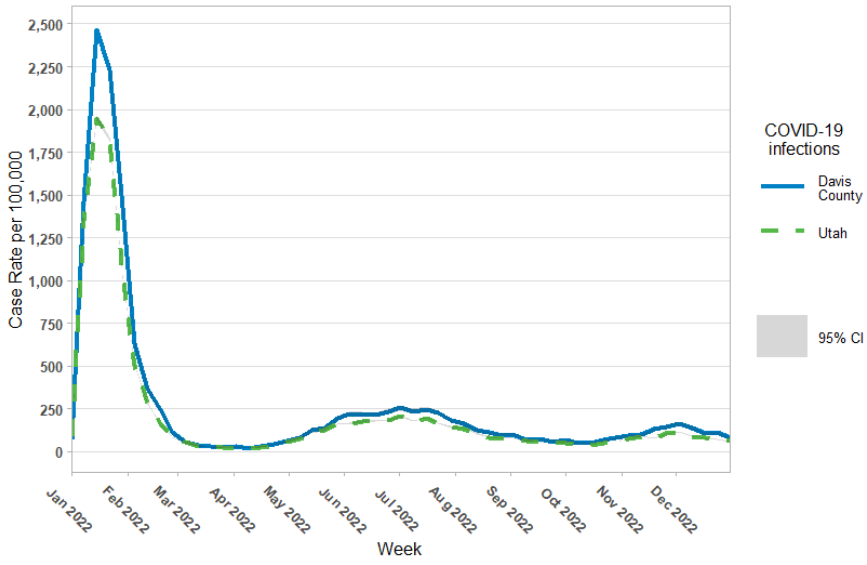
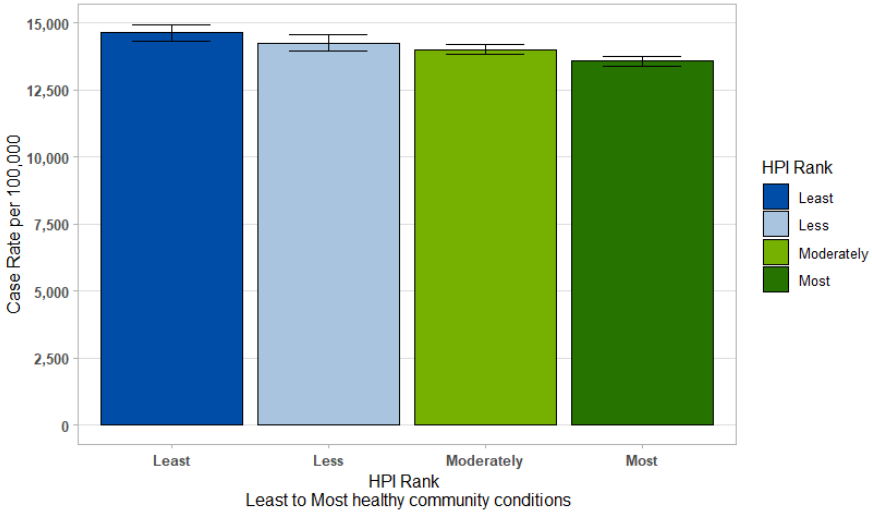


Figure 50. Rate of COVID-19, by HPI Area, Davis County, 2022



COVID-19 Cases

During 2022, there were **51,696** COVID-19 cases reported in Davis County. Figure 49 presents the 2022 weekly incidence rates of COVID-19 infections per 100,000 people in Davis County compared to the rest of Utah. At the beginning of 2022 during the Omicron variant surge, Davis County had a higher case rate than the rest of the state. Following that, the case rates were generally comparable.

Figure 50 presents the rate of COVID-19 infections by HPI area in Davis County. While the pattern of descending rates from the least healthy to the most healthy area is observed, the differences are not large. The rate in the least healthy area was 5.4% higher than the rest of the county, whereas in the most healthy area it was 4.6% lower. More pronounced differences are seen in the hospitalization and mortality rates.

COVID-19 Hospitalizations

During 2022, Davis County had **428** COVID-19 hospitalizations. Figure 51 presents the monthly incidence rate of COVID-19 hospitalizations per 100,000 people. Comparisons to the rest of the state are not included due to methodological differences in defining a COVID-19 hospitalization. In Davis County, hospitalizations peaked in early 2022 due to the Omicron surge and decreased soon thereafter.

Figure 51. Rate of COVID-19 Hospitalizations, by Month, Davis County, 2022

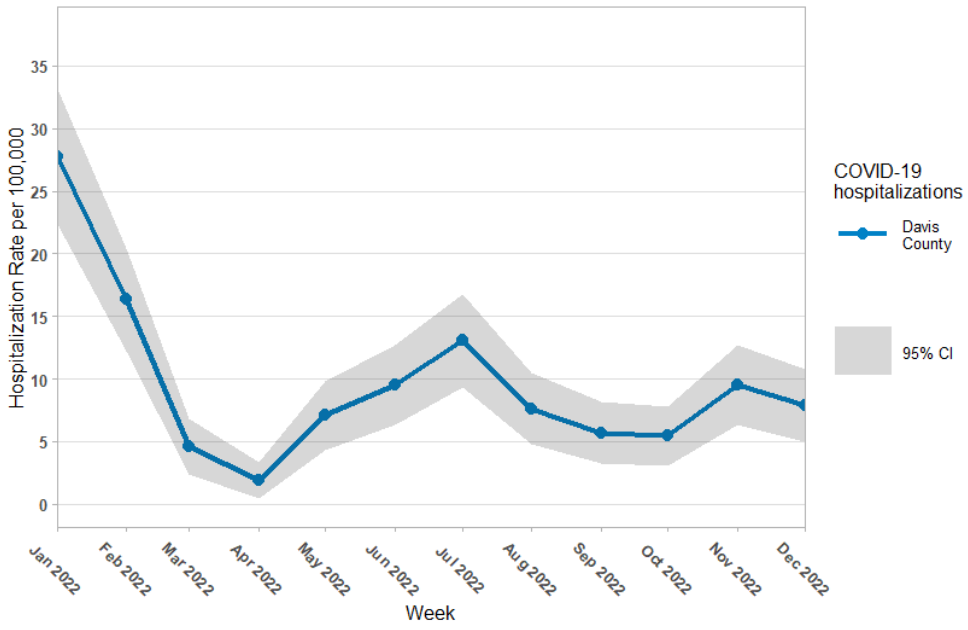
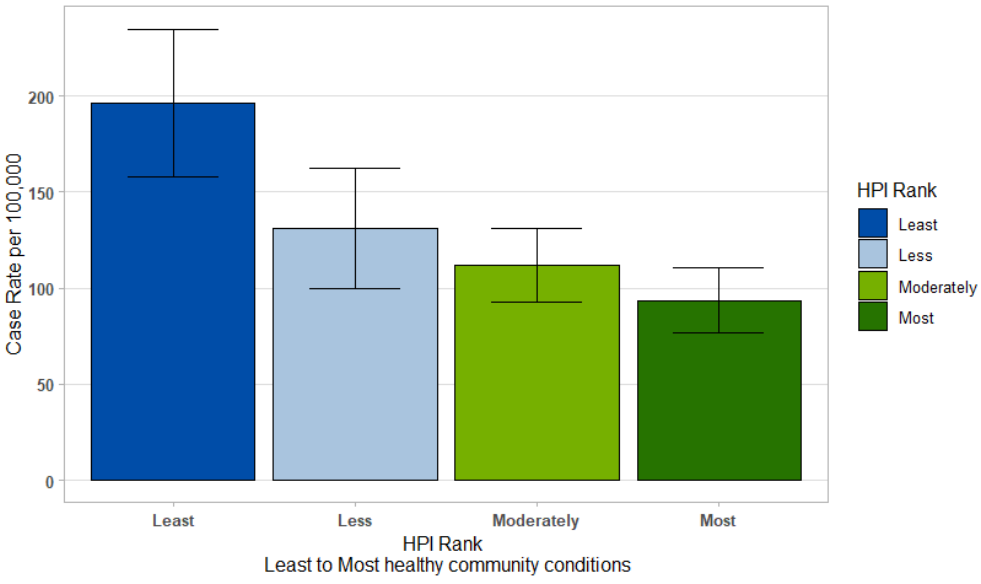


Figure 52 presents the rate of hospitalizations for COVID-19 by HPI area in Davis County. A marked pattern of descending rates from the least healthy to the most healthy area is observed. In this case, hospitalization rates in the least healthy area were 83% higher when compared to the rest of the county. Conversely, rates in the most healthy area were 31% lower.

Figure 52. Rate of COVID-19 Hospitalizations, by HPI Area, Davis County, 2022



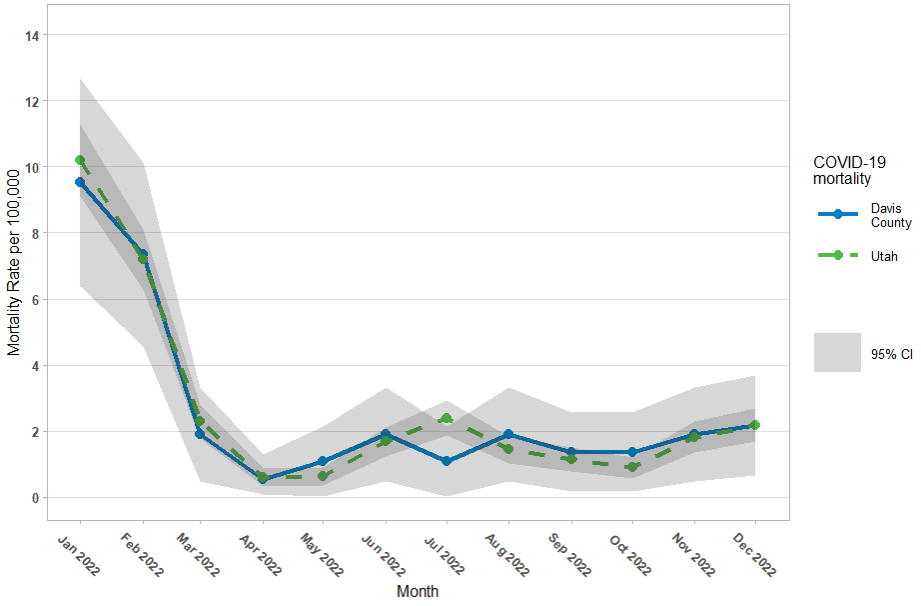
COVID-19 Mortality

During 2022, Davis County had **118** deaths due to COVID-19. Figure 53 presents the monthly incidence rate of COVID-19 mortality per 100,000 people in Davis County compared to the rest of the state. Throughout 2022, the COVID-19 mortality rate in Davis County was comparable to the rest of the state. Figure 54 presents the rate of COVID-19 mortality by HPI area in Davis County. These data suggest that mortality rates decrease moving from the least healthy to the most healthy areas. The rate in the most healthy area is 30% lower when compared to the rest of the county. These HPI analyses for COVID-19 hospitalizations (Figure 52) and mortality (Figure 54) continue to show how the most severe outcomes of COVID-19 are inequitably borne by a vulnerable minority in Davis County.

COVID-19 Response Highlights

As was the case since the beginning of the COVID-19 pandemic, many changes occurred throughout 2022. CD/Epi continually sought to adapt its response based on these changes. The major efforts that CD/Epi undertook during the COVID-19 response in 2022 are outlined below.

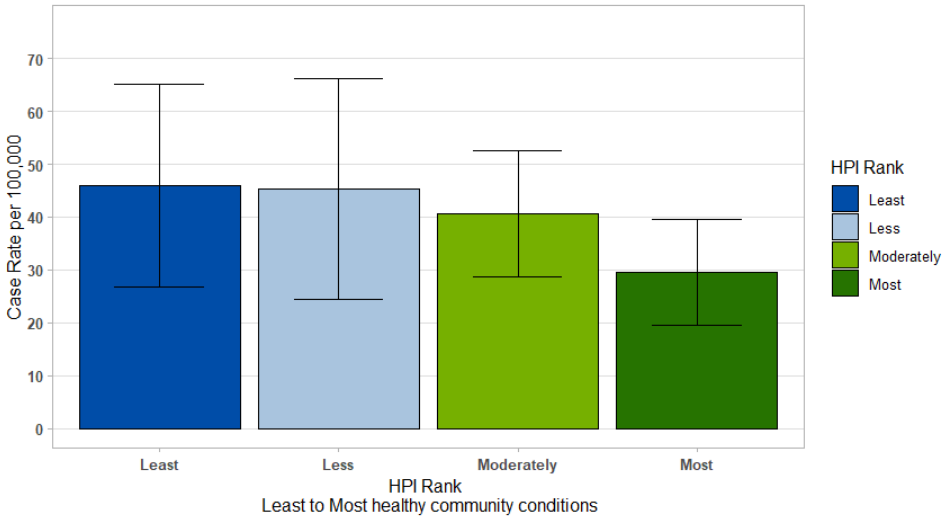
Figure 53. Rate of COVID-19 Mortality, by Month, Davis County and Utah, 2022



Omicron Variant

The Omicron variant was first identified in Botswana and South Africa in November 2021. (However, later investigations identified earlier cases in the Netherlands.)[86] It quickly became apparent that this variant was much more transmissible than Delta, a previous variant of concern. The first US case of Omicron was identified on December 1 and by the end of the month it was the most prevalent strain in the country. The symptoms of Omicron were generally less severe than the Delta variant. However, its high transmissibility led to an enormous strain on hospitals and health care systems across the country.[87]

Figure 54. Rate of COVID-19 Mortality, by HPI Area, Davis County, 2022



During this time, CD/Epi continued its efforts to investigate cases; give isolation and quarantine education; conduct testing events; provide testing supplies; and track school classroom outbreaks. Whenever possible, information was also provided about treatments, vaccinations, and other resources. Case rates peaked in Davis County during the week ending January 15, 2022 at 2,467 cases per 100,000 people (Figure 49). Due to the high volume of cases, CD/Epi prioritized investigations based on risk. The priority groups included people age 65 and over, children under the age of 5 (who at the time were ineligible for COVID-19 vaccines), cases associated with long-term care facilities, and immunocompromised individuals.

The Utah Test-To-Stay requirements for public schools were still in effect at the beginning of the Omicron surge. CD/Epi continued to support these events by providing staff and testing supplies. However, the high number of cases overwhelmed these events and testing supplies were quickly depleted. The Test-To-Stay program was suspended on January 13, 2022. By early March 2022, cases had rapidly decreased and the Omicron surge effectively ended.

Since that time, Omicron and its numerous sub-variants have dominated the COVID-19 landscape around the world. Researchers continue to monitor changes in the virus to help determine whether tests, treatments, and vaccines will work against emerging variants.[88]

Isolation and Quarantine Guidance Changes

In August 2022, CDC streamlined its isolation and quarantine guidance for the general public.[89] These changes ended quarantine and instead recommended that people wear a high-quality mask for 10 days and get tested on day five if exposed to COVID-19. Regarding isolation, if anyone tests positive for COVID-19, regardless of vaccination status, they should isolate for at least five days. Isolation may end after five days if symptoms are improving or if asymptomatic. Isolation should continue until symptoms improve and the individual is fever-free for 24 hours without the use of medication. Regardless of when isolation ends, CDC recommends wearing a high-quality mask indoors around others at home and in public for five additional days. The full guidance for COVID-19 isolation and precautions is found on the CDC website.[90]

Bivalent Vaccine

While multiple COVID-19 vaccines had been available for over a year, the bivalent mRNA COVID-19 vaccine represented a crucial step in the pandemic response.[91] Whereas the initial monovalent vaccine is based on the original (ancestral) strain of SARS-CoV-2, the bivalent vaccine adds the Omicron BA.4/BA.5 variants as a second strain.[4] These changes were made in response to the rapid dominance of Omicron and are designed to broaden protection against COVID-19 and reduce severe disease.[92]

The CDC endorsed the bivalent vaccine on September 1, 2022 for adolescents and adults (age 12 years and over for Pfzier-BioNTech and age 18 years and over for Moderna).[93] Access to the bivalent vaccine was expanded to children ages 5 through 11 years old on October 12, 2022.[93] By the end of the year, it was recommended for children ages 6 months through 4 years old.[94]

Infection Prevention and Control in Long-Term Care Facilities

CD/Epi gradually shifted its COVID-19 response throughout 2022 to helping control and prevent outbreaks in long-term care facilities, such as nursing homes, skilled nursing, and assisted living facilities. These types of facilities provide important care but there is a higher risk of outbreaks and severe disease due to the typically high proportion of older individuals living in close proximity.

CD/Epi staff worked closely with these facilities to build rapport and provide the most up-to-date and pertinent guidelines. These guidelines are stricter than the general public guidelines due to vulnerability faced by long-term care facility patients. This required CD/Epi staff to stay apprised of frequent changes to guidance and effectively communicate back to the facilities. Guidance varies based on the type of facility and its specific circumstances. When an outbreak was identified in a facility, CD/Epi staff consulted on:

- Isolation and quarantine for staff and residents,
- Personal protective equipment (PPE) for staff and residents,
- Test recommendations, and
- Reporting requirements.

All of these strategies are focused on protecting the health of vulnerable members of the community and their caregivers.

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Appendix 1 — Davis County Demographics (2021)

Table 10. Davis County and Utah Population, Count and Percent, by Age Group, 2021

Age Group	Davis County Population	Utah Population
Under 5	26,252 7.1%	234,281 7.0%
5—14	66,558 18.1%	542,138 16.2%
15—24	55,282 15.1%	550,829 16.5%
25—44	105,611 28.8%	952,940 28.5%
45—64	74,720 20.3%	669,667 20.1%
65—84	35,405 9.6%	350,481 10.5%
85+	3,457 0.9%	37,639 1.1%
Total	**367,285 100%**	**3,337,975 100%**

Table 11. Davis County and Utah Population, Count and Percent, by Gender, 2021

Sex	Davis County Population	Utah Population
Male	185,841 50.6%	1,694,770 50.8%
Female	181,444 49.4%	1,643,205 49.2%
Total	**367,285 100%**	**3,337,975 100%**

Table 12. Davis County and Utah Population, Count and Percent, by Race, 2021

Race	Davis County Population	Utah Population
White alone	308,392 84.0%	2,647,741 79.3%
Black or African-American alone	4,660 1.3%	35,982 1.1%
American Indian or Alaskan Native alone	1,296 0.4%	32,622 1.0%
Asian alone	7,820 2.1%	84,056 2.5%
Native Hawaiian or Pacific Islander alone	1,944 0.5%	28,855 0.9%
Some other race alone	11,606 3.2%	191,842 5.7%
Two or more races	31,567 8.6%	316,877 9.5%
Total	**367,285 100%**	**3,337,975 100%**

Table 13. Davis County and Utah Population, County and Percent, by Ethnicity, 2021

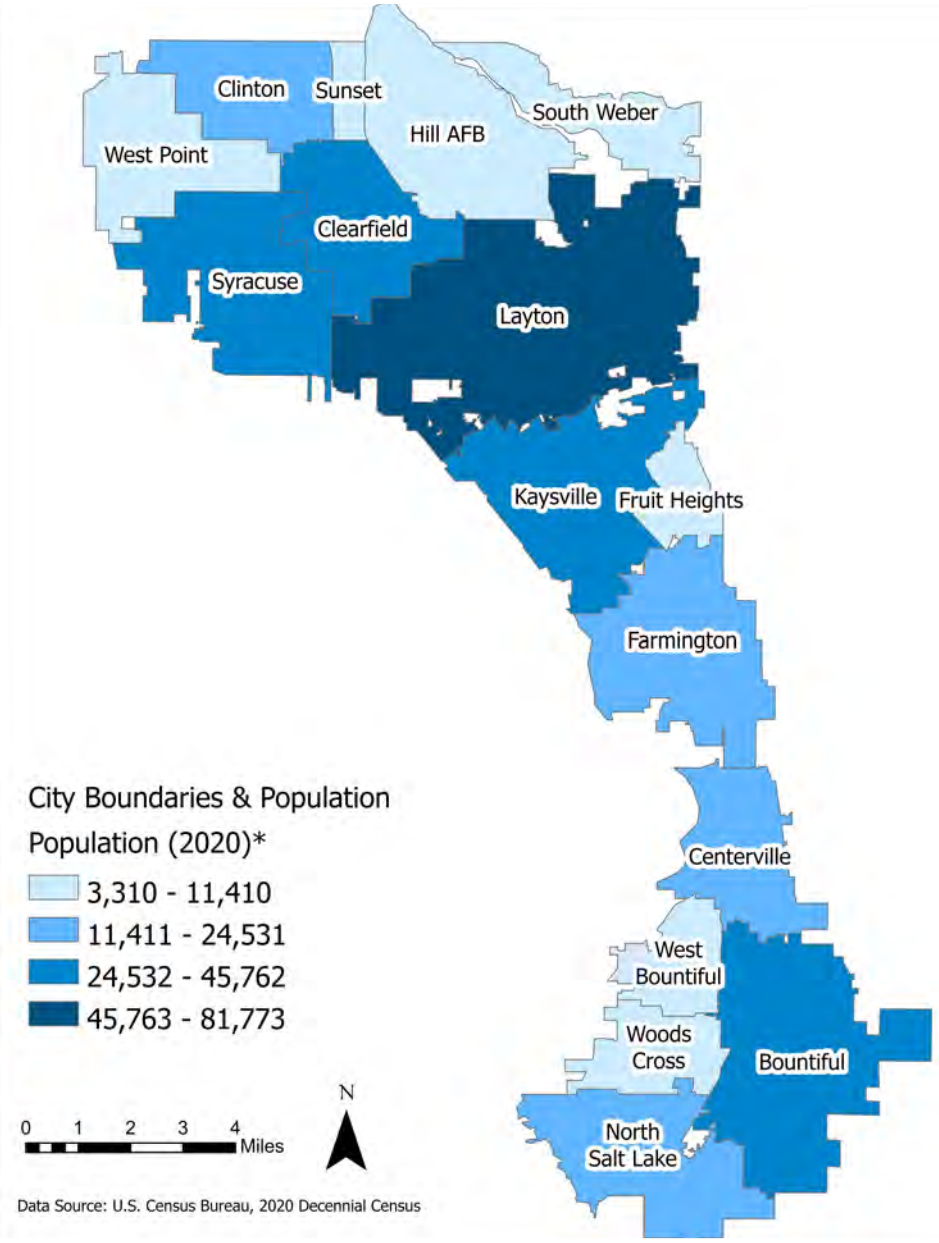
Ethnicity	Davis County Population	Utah Population
Hispanic or Latino (of any race)	39,482 10.7%	493,639 14.8%
Not Hispanic or Latino	327,803 89.3%	2,844,336 85.2%
Total	**367,285 100%**	**3,337,975 100%**

*Population estimates for 2021 are not yet available.
2021 data: US Census Bureau. 2021 American Community Survey. https://data.census.gov/. Accessed on December 29, 2022.
2020 data: US Census Bureau. 2020 Decennial Census. https://data.census.gov/. Accessed on December 29, 2022.

Table 14. Davis County Population, by City, 2020*

City	Population
Bountiful	45,762
Centerville	16,884
Clearfield	31,909
Clinton	23,386
Farmington	24,531
Fruit Heights	6,101
Hill Air Force Base	3,310
Kaysville	32,945
Layton	81,773
North Salt Lake	21,907
South Weber	7,867
Sunset	5,475
Syracuse	32,141
Unincorporated	398
West Bountiful	5,917
West Point	10,963
Woods Cross	11,410

Figure 55. Davis County City Boundaries & Population, 2020*



*Population estimates for 2021 are not yet available.
2021 data: US Census Bureau. 2021 American Community Survey. https://data.census.gov/. Accessed on December 29, 2022.
2020 data: US Census Bureau. 2020 Decennial Census. https://data.census.gov/. Accessed on December 29, 2022.

Appendix 2 — Utah Reportable Diseases

UTAH REPORTABLE DISEASES

Utah law requires that the following diseases be reported to your local health department or the Utah Department of Health and Human Services.

REPORT WITHIN 24 HOURS OF A SUSPECT DIAGNOSIS

- Anthrax (*Bacillus anthracis*) or anthrax-like illness caused by *Bacillus cereus* strains that express anthrax toxin genes[2]
- Botulism (*Clostridium botulinum*)[2]
- Cholera (*Vibrio cholerae*)
- Coronavirus, novel – including COVID-19, MERS, and SARS
- Diphtheria (*Corynebacterium diphtheriae*)[2]
- *Haemophilus influenzae*, invasive disease[2]
- Hepatitis A
- Influenza infection, non-seasonal strain
- Measles (Rubeola virus)[2]
- Meningococcal disease (*Neisseria meningitidis*)[2]
- Plague (*Yersinia pestis*)[2]
- Poliomyelitis, paralytic and non-paralytic
- Rabies (human and animal)
- Rubella (excluding congenital syndrome)
- Smallpox (Variola virus)
- *Staphylococcus aureus*, with resistance (VRSA)[1, 2] to vancomycin
- Transmissible spongiform encephalopathies (prion diseases), including Creutzfeldt-Jakob disease
- Tuberculosis (*Mycobacterium tuberculosis* complex)[1,2]
- Tularemia (*Francisella tularensis*)[2]
- Typhoid, cases and carriers[2]
- Viral hemorrhagic fevers, including *Ebola*, *Lassa*, *Marburg*, and *Nipah* virus-related illnesses

Also Immediately Reportable: Unusual diseases or outbreaks of any kind and any exposure/infection that may indicate a bioterrorism event

REPORT WITHIN 3 WORKING DAYS OF IDENTIFICATION

- Acute flaccid myelitis (AFM)
- Adverse event resulting from smallpox vaccination (Vaccinia virus)
- Anaplasmosis (*Anaplasma phagocytophilum)*
- Arbovirus infection, including Chikungunya, West Nile[2], and Zika virus[2]
- Babesiosis (*Babesia*)
- Botulism, infant (*Clostridium botulinum*)[2]
- Brucellosis (*Brucella species*)
- Campylobacteriosis (*Campylobacter*)[2]
- Candida auris or haemulonii from any body site[1, 2]
- Carbapenem-resistant *Acinetobacter species*, *Enterobacter species*, *Escherichia coli*, *Klebsiella* species and *Pseudomonas aeruginosa*[1, 2]
- Carbapenemase producing *Acinetobacter species*, *Enterobacter species*, *Escherichia coli*, *Klebsiella species*, any other *Enterobacteriaceae* species and *Pseudomonas aeruginosa*[2]
- Chagas disease
- 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 or meningitis (bacterial, fungal, parasitic, protozoan and viral)
- Shiga toxin-producing *Escherichia coli* (STEC) infection[2]
- Giardiasis *(Giardia lamblia)*
- Gonorrhea (*Neisseria gonorrhoeae*) sexually transmitted and ophthalmia neonatorum[1]
- Hantavirus infection (Sin Nombre virus)
- Hemolytic uremic syndrome, post-diarrheal
- Hepatitis, viral, including hepatitis B (acute, chronic and perinatal), C (acute, chronic and perinatal), D, and E
- Human immunodeficiency virus (HIV) infection, including perinatal and acquired immunodeficiency syndrome (AIDS) diagnosis
- Influenza-associated hospitalization[2]
- Influenza-associated death in a person less than 18 years of age
- Legionellosis (*Legionella*)[2]
- Leprosy (Hansen's Disease)
- Leptospirosis (*Leptospira*)
- Listerosis (*Listeria monocytogenes*)[2]
- Lyme disease (*Borrelia burgdorferi*)
- Malaria (*Plasmodium*)
- Mumps
- Mycobacteria other than tuberculosis
- Pertussis (*Bordetella pertussis*)
- Psittacosis (*Chlamydophila psittaci*)
- Q Fever (*Coxiella burnetii*)
- Relapsing fever, tick-borne and louse-borne (*Borrelia*)
- Rubella, including congenital syndrome
- Salmonellosis (*Salmonella*)[1, 2]
- Shigellosis (*Shigella*)[1, 2]
- Spotted fever rickettsioses, including Rocky Mountain spotted fever (*Rickettsia*)
- Streptococcal disease, invasive, due to *Streptococcus pneumoniae*[1] and Groups A and B
- Syphilis, all stages, congenital, and syphilitic stillbirths
- Tetanus (*Clostridium tetani*)
- Toxic shock syndrome, staphylococcal or streptococcal
- Trichinellosis (*Trichinella*)
- Vibriosis (*Vibrio*)[2], including Cholera

Also Reportable: Pregnancies associated with Hepatitis B, Hepatitis C, HIV, *Listeria*, Rubella, Syphilis, or Zika virus infection even if the disease was reported to public health prior to the pregnancy

[1]Full panel susceptibility results, including minimum inhibitory concentration and results suppressed to the ordering clinician, are reportable when performed on the following organisms.

[2]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.

Electronic Laboratory Reporting (ELR)

Entities reporting via ELR have additional reporting requirements not listed on this document. Those requirements can be found under the "Information for Reporters" tab at http://health.utah.gov/epi/reporting or by contacting the Utah Department of Health and Human Services at edx@utah.gov.

Diseases may be reported to your local health department or the Utah Department of Health and Human Services (DHHS) by fax (801-538-9923), email (reporting@utah.gov) or telephone (1-888-EPI-UTAH). Email reports should be sent encrypted, through a secure email system. Reports sent without encryption risk breach of confidentiality. DHHS cannot guarantee the security of information submitted without encryption. For questions about disease reporting, email the DHHS at reporting@utah.gov, call 801-538-6191 or visit http://health.utah.gov/epi/reporting.

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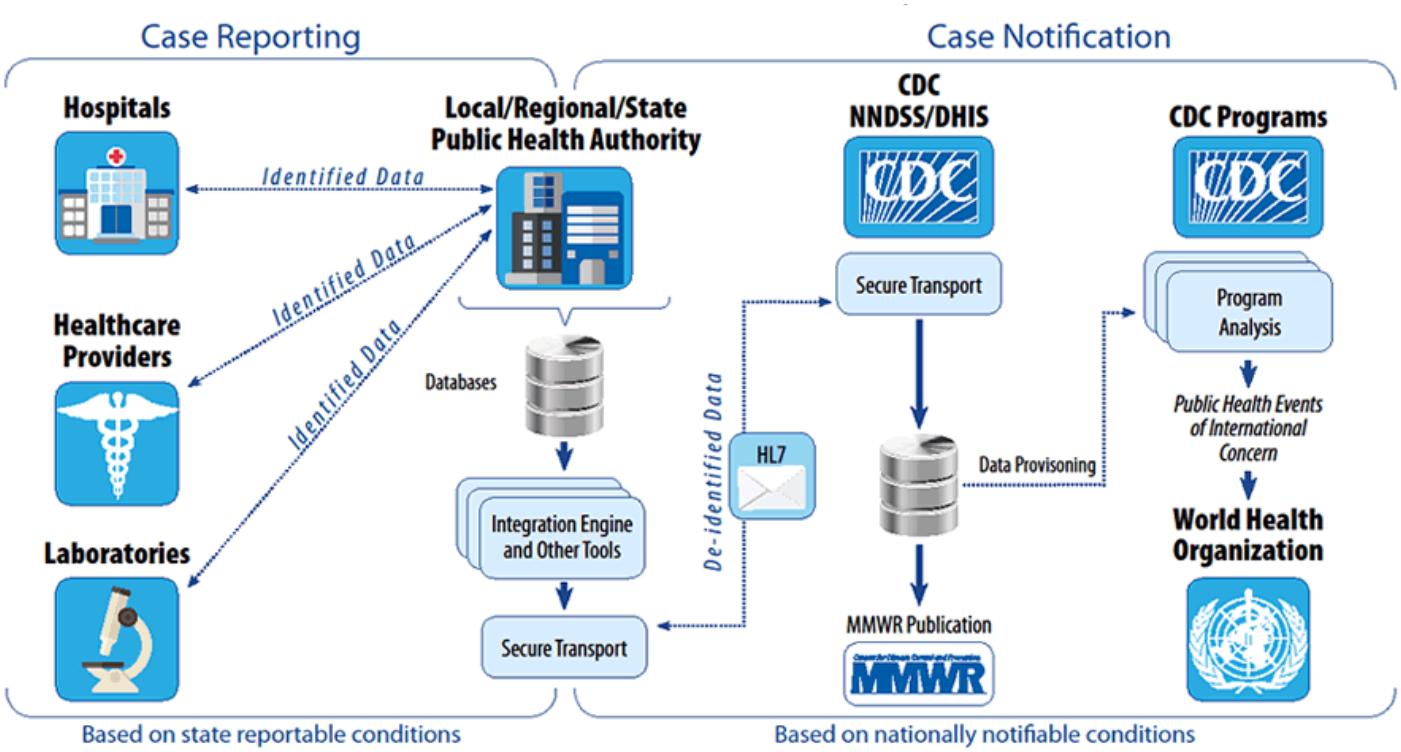
Figure 56. National Notifiable Disease Surveillance System Data Flow



Appendix 4 — Acronyms

ATBD	Active tuberculosis disease
CD/Epi	Communicable Disease and Epidemiology Division
CDC	Centers for Disease Control and Prevention
COVID-19	Coronavirus disease 2019
CROs	Carbapenem-resistant organisms
DCHD	Davis County Health Department
DIS	Disease intervention specialist
DOT	Directly observed therapy
DHHS	Utah Department of Health and Human Services
E.coli	*Escherichia coli*
GBS	Guillain-Barre Syndrome
HBV	Hepatitis B virus
HBIG	Hepatitis B virus immune globulin
HCV	Hepatitis C virus
Hill AFB	Hill Air Force Base
HIV	Human immunodeficiency virus
HPAI	Highly pathogenic avian influenza
HPI	Utah Healthy Places Index
HSV	Herpes simplex virus
HUS	Hemolytic uremic syndrome
IBIS-PH	Indicator-Based Information System for Public Health
IGRA	Interferon gamma-release assay
LPAI	Low pathogenic avian influenza
LTBI	Latent tuberculosis infection
mL	Milliliters
MDR	Multidrug resistant
MDROs	Multidrug-resistant organisms
MSM	Men who have sex with men
PPE	Personal protective equipment
PCV7	Pneumococcal conjugate vaccine
PCV13	Pneumococcal conjugate vaccine
RNA	Ribonucleic acid
SARS-CoV2	Severe acute respiratory syndrome coronavirus 2
SDOH	Social determinants of health
SE	*Salmonella* Enteritidis
STEC	Shiga-toxin producing *E. coli*
STI	Sexually transmitted infection
STSS	Streptococcal toxic shock syndrome
TB	Tuberculosis
TD/Tdap	Tetanus, diphtheria, and acellular pertussis
TST	Tuberculin skin test
UPHL	Utah Public Health Laboratory
US	United States
UV	Ultraviolet
VPDs	Vaccine-preventable diseases
WGS	Whole genome sequencing
XDR	Extensively drug resistant
ZVBDs	Zoonotic and vector-borne diseases