DISTRICT HEALTH DEPARTMENT #10

2022 ANNUAL COMMUNICABLE DISEASE SUMMARY

INTRODUCTION
BY JENNIFER MORSE, MD, MPH, FAAFP

To Our Community,

In 2019, prior to the start of the COVID-19 pandemic, infectious, or communicable diseases caused around 4% of the deaths in the United States. The majority of these were caused by pneumonia and influenza. Globally, the average death from infectious diseases was 15.5% in 2019, and in the poorest countries it was just over 41%. It has been less than a hundred years since things like malaria, tuberculosis, and polio were regular occurrences in this country. Public health agencies were developed in the United States back in the 1800s to combat disease and better protect our communities. These efforts resulted in clean water, proper sanitation, vaccinations, laboratories, and professionals to respond to infections and outbreaks.

Reporting communicable diseases to local public health dates back to the early 1900s to ensure these contagious and dangerous diseases were controlled. This includes both treating the person infected and providing education and ensuring steps have been taken to prevent the spread to others. Michigan Law requires physicians, laboratories, primary and secondary schools, child daycares, and camps to report specific diseases according to Act No. 368 of the Public Acts of 1978 (Michigan's Public Health Code). There are currently over 80 conditions that are reportable as listed below. Outbreaks, epidemics, and any unusual occurrence of any disease or condition must also be reported.

Note that for every case of illness discussed below, local public health department professionals had to investigate how it happened, if it was treated properly, if education was properly provided, and make sure steps were taken to keep illness from spreading to others. This is just one of the many services of public health that occur often unnoticed. Click on any of the conditions below in blue to learn more. The categories that the illnesses are listed in below are not absolute. For example, giardia could spread by contaminated food, but also in contaminated pool or lake water. Tuberculosis is a lung (respiratory) disease 3 out of 4 times, but the other 25% of the time it infects other parts of the body.

Prior to the COVID-19 pandemic, most citizens had little knowledge of this public health function of disease reporting and the public health investigation that followed. It is still a very important function of your local health department and is one of the reasons the United States does not suffer from more infectious illnesses or widespread outbreaks.

The 2022 Communicable Disease Summary below provides a review of DHD#10's communicable disease cases of the last year and the trends over time. If you have questions on the data, please feel free to connect with our team at data@dhd10.org

Sincerely,

Jennifer Morse, MD, MPH, FAAFP
Medical Director
District Health Department #10

Sources:

· Hannah Ritchie, Fiona Spooner and Max Roser (2018) - "Causes of death". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/causes-of-death' [Online Resource]
· Institute of Medicine (US) Committee for the Study of the Future of Public Health. The Future of Public Health. Washington (DC): National Academies Press (US); 1988. 3, A History of the Public Health System. Available from: https://www.ncbi.nlm.nih.gov/books/NBK218224/

District Health Department #10

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DHD#10 Epidemiologist

3/16/2023

2023 MICHIGAN
REPORTABLE CONDITIONS

Foodborne Illnesses
(infections spread during sex or other intimate contact)

B. cereus serovar anthracis (Anthrax)
Campylobacteriosis
Cryptosporidiosis
2 Cronobacter sakazakii
Cyclospora species (Cyclosporiasis)
2 Clostridium botulinum (Botulism)
Giardiasis
Shiga Toxin-producing Escherichia coli (STEC)
Hemolytic Uremic Syndrome (a complication of STEC)
Listeria monocytogenes (Listeriosis)
Trichinella spiralis (Trichinellosis)
Salmonella Paratyphi (Paratyphoid Fever)
Salmonllosis
Shigellosis
Yersinia enterocolitica (Yersiniosis)
2 Vibrio cholera (Cholera)
Vibrio species (Vibriosis: non-cholera species)

Sexually Transmitted Infections
(infections spread during sex or other intimate contact)

Chlamydia trachomatis
Haemophilus ducreyi (Chancroid)
Human Immunodeficiency Virus (HIV)
Neisseria gonorrhoeae (Gonorrhea)
Treponema pallidum (Syphilis)

Respiratory Conditions
(diseases of the airways or lungs)

Blastomycosis
Coccidioidomycosis (Valley Fever)
Cryptococcosis
Histoplasmosis
2 Tuberculosis (Mycobacterium tuberculosis complex)
Novel Coronavirus COVID-19
Legionellosis

Antibiotic Resistant Organisms

2 Carbapenemase Producing - Carbapenem Resistant Enterobacterales (CP-CRE)
2 Candida auris (Candidiasis)
2 Staphylococcus aureus, vancomycin intermediate/ resistant (VISA/VRSA)

Viral Hepatitis

Hepatitis A (HAV), Hepatitis B (HBV), and Hepatitis C (HCV) viruses

Other Reportable Conditions

Multisystem Inflammatory Syndrome (MIS)
Staphylococcus pneumoniae (in the blood, brain, or other parts of body that should not have bacteria)
2 Hemorrhagic Fever Viruses
1 Kawasaki Disease
Mycobacterium leprae (Leprosy)
2 Orthopox viruses (Smallpox/Mpox)
1 Staphylococcus aureus Toxic Shock Syndrome (TSS)
Streptococcus pyogenes, group A, Streptococcal Toxic Shock Syndrome (STSS)

Vector Borne Diseases

(diseases spread by vectors - which are living things like mosquitoes, ticks, and fleas)

Anaplasma phagocytophilum (Anaplasmosis)
Arboviral encephalitides
Chikungunya
Eastern Equine ("EEE")
Jamestown Canyon
La Crosse
Powassan
St. Louis
West Nile
Western Equine
Zika
Babesia microti (Babesiosis)
Borrelia burgdorferi (Lyme Disease)
Dengue virus (Dengue Fever)
Plasmodium species (Malaria)
Rickettsia species (Spotted Fever)
Yellow Fever Virus
Ehrlichiosis
2 Yersinia pestis (Plague)

Vaccine Preventable Diseases

(diseases that can be prevented by effective vaccines)

Bordetella pertussis (Pertussis/"Whooping Cough")
Clostridium tetani (Tetanus/"Lockjaw")
Corynebacterium diptheriae (Diptheria)
Haemophilis influenzae
Mumps
Poliovirus (Polio)
2 Rubella virus
Varicella-zoster virus (Chickenpox)
Measles virus (Measles/Rubeola)

Neurologic Diseases

(diseases that affect the brain or nerves)

Meningitis (all)
Neisseria meningitidis
Encephalitises, viral or unspecified
1 Guillain-Barre Syndrome
1 Acute flaccid myelitis
Prion Disease (CJD)

Zoonotic Diseases

(diseases spread to people by animals)

2 Brucella species (Brucellosis)
2 Burkholderia pseudomallei (Melioidosis)
2 Burkholderia mallei (Glanders)
2 Bacillus anthracis (Anthrax)
Chlamydiophilia psittaci (Psittacosis)
2 Coxiella burnetii (Q Fever)
2 Rabies and possible rabies exposure
2 Francisella tularensis (Tularemia)
2 Leptospira species (Leptospirosis)

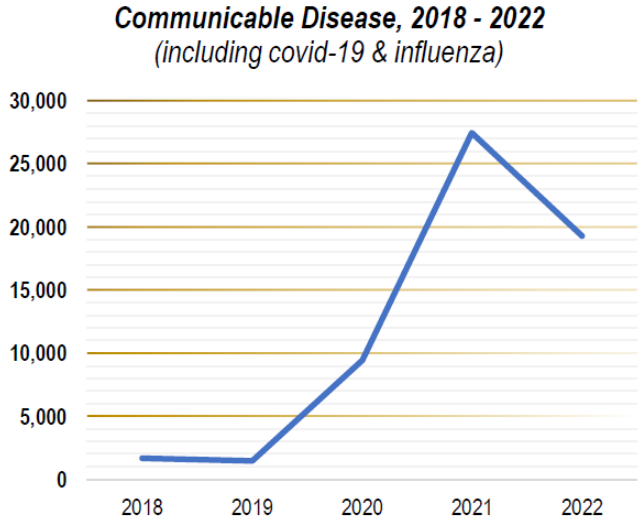
Clarification of "Rate per 100,000 Population"

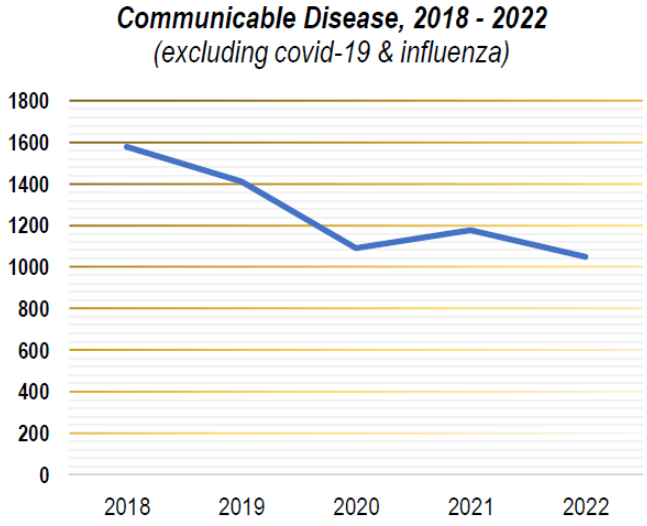
This report uses population standardized rates in order to more accurately estimate and compare how often diseases occur in populations of different sizes. These rates are reported as the number per 100,000 population and adjusted to year 2000 standard population sizes. This can be interpreted as the number of cases that is estimated to occur in every 100,000 people. This method is more widely familiar on a smaller scale, for example, news media may report "1 in 10 people" or "5 in 10 people". Here is a good video that gives a quick explanation of epidemiology and its terms https://youtu.be/V1slYP0h2xk

Note: Reporting is required within 3 days for " 1 " labeled conditions; labs must submit suspect or confirmed isolates immediately for " 2 " conditions.

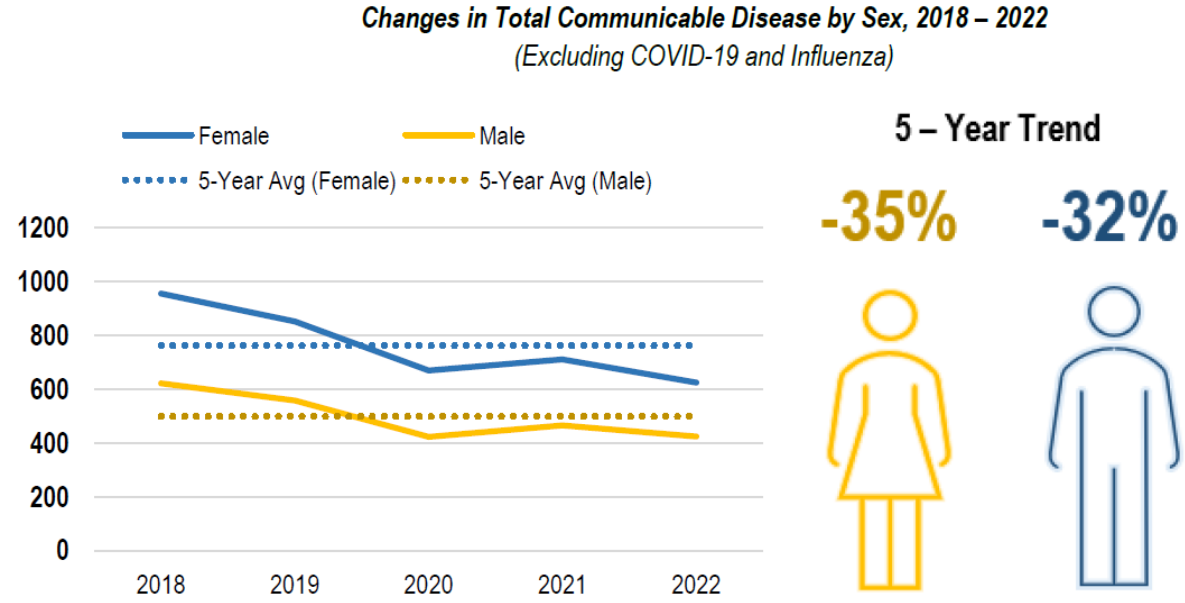
DISTRICT HEALTH DEPARTMENT #10
COMMUNICABLE DISEASE SUMMARY

The total number of communicable disease cases in the District Health Department #10 (DHD#10) jurisdiction significantly increased with the arrival of the novel coronavirus, COVID-19, in March of 2020. Likely because of increased COVID-19 testing protocols, there was also a significant increase of reported influenza. Excluding cases of COVID-19 and influenza, there was a 34% decrease in reported communicable disease cases from 2021 to 2022. The overall decrease of non-COVID-19 and influenza communicable diseases during the pandemic were due to the pandemic itself. People were less likely to have routine testing done and seek care when ill, leading to a decrease in diagnosis of illness. Healthcare providers and laboratories were overwhelmed with duties due to the pandemic and reporting of communicable diseases stopped or slowed greatly.

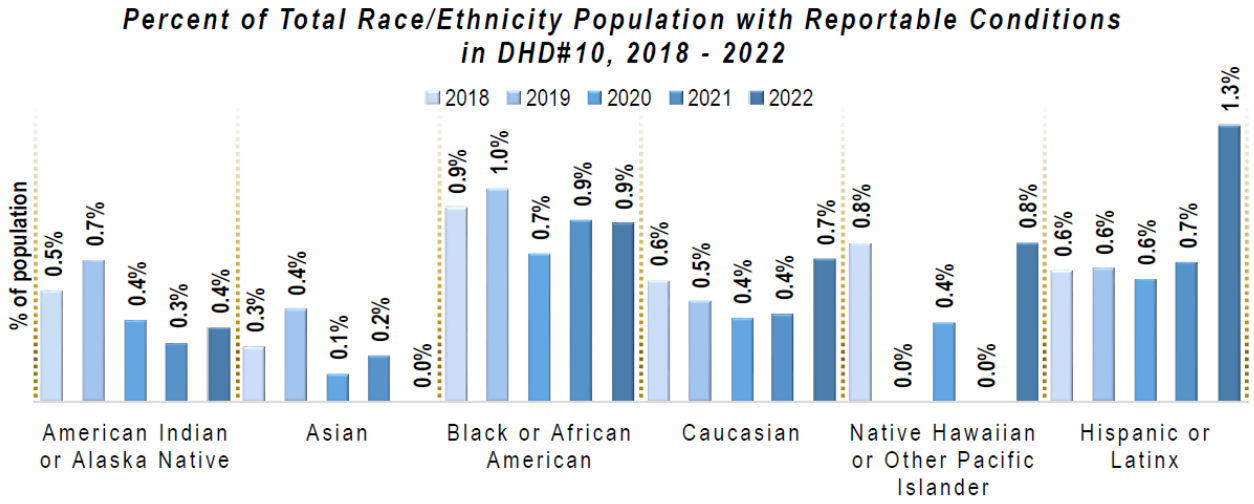




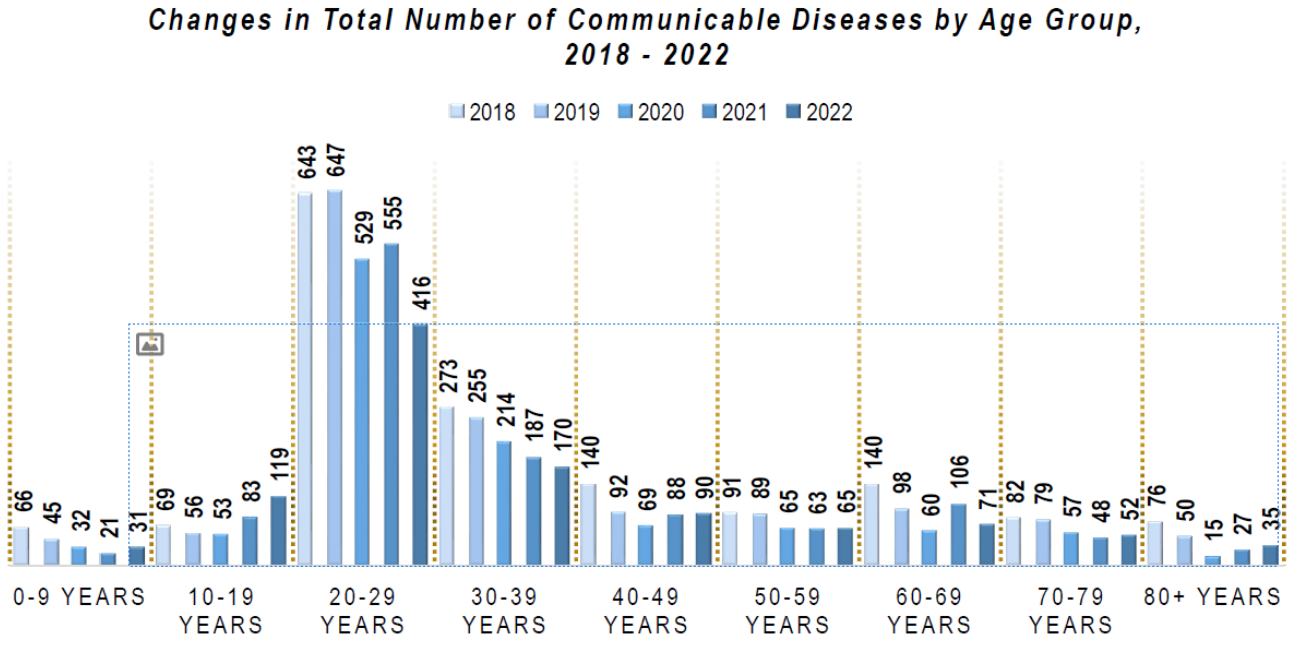
Looking at differences in prevalence of communicable disease between men and women of DHD#10, women have been diagnosed with more communicable diseases. Women make up 49% of the total DHD#10 population but accounted for about 59% of all communicable disease cases from 2018 to 2022. Women accounted for 58% of all communicable disease cases in 2022, a 2% decrease from the previous year.



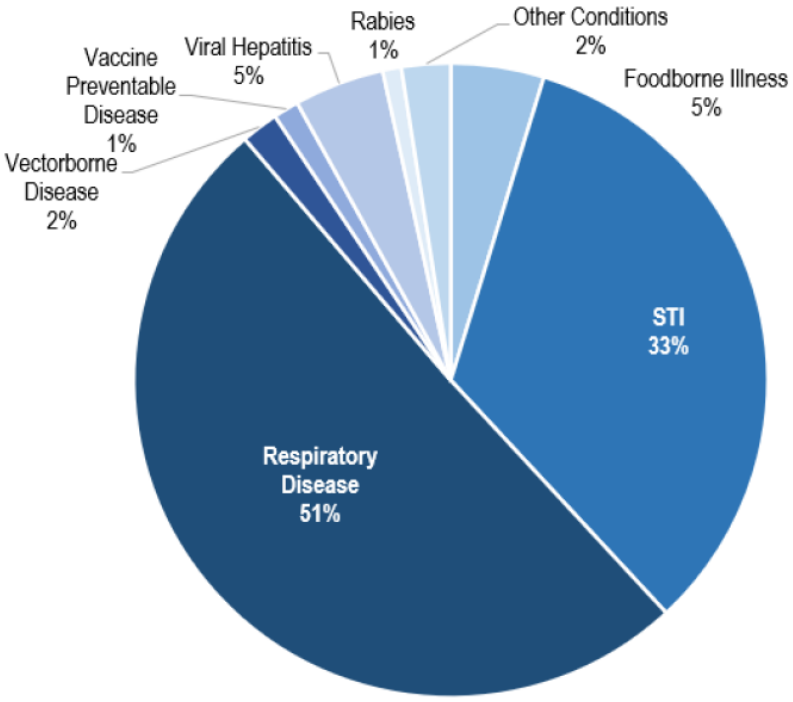
When we look at how communicable diseases are distributed between race and ethnicities from 2018 to 2022 in the DHD#10 area, there was an increase in cases being reported among the Hispanic or Latinx population in 2022 when compared to previous years. Upon further investigation there was an increase in reported influenza cases specifically in the Hispanic or Latinx population in 2022, but this could be due to variability in influenza reporting to MDSS. There were no other significant changes or differences in communicable disease incidence when comparing race or ethnicity for DHD#10.



This graph excludes COVID-19 cases and influenza, due to changes over time and variability in reporting. The 20-29 age group had the highest number of cases each year, but this age group also saw a 35% decrease in cases over the past 5 years. Almost every age group had a decreasing trend in communicable disease prevalence from 2018 – 2022, except for the 10-19 age group. The 10-19 age group saw a 14.5% increase in cases from 2018 – 2022. Diseases present in both the 10-19 and 20-29 age groups largely consisted of chlamydia cases, which will be discussed further in the sexually transmitted diseases section of this report.



Types of Diseases Reported in DHD#10 in 2022



Respiratory diseases are the most commonly reported diseases in DHD#10, accounting for over half of all communicable disease cases reported in 2022. This was followed by sexually transmitted infections, which made up 33% of all cases. Vector borne diseases, vaccine preventable diseases, viral hepatitis, foodborne illnesses, rabies, and other reportable conditions made up 16% of all communicable diseases. Below is a summary of diseases in the DHD#10 jurisdiction that are monitored on a quarterly and monthly basis. Each of

Summary of Diseases of Significance to DHD#10

Communicable Disease	2018	2019	2020	2021	2022	5-Year Rate per 100,000
Campylobacter	50	46	31	37	27	**14.4**
Giardiasis	18	10	13	20	3	**4.8**
Salmonellosis	36	35	29	36	39	**13.2**
Shiga toxin-producing Escherichia coli	11	5	5	8	9	**2.9**
Chlamydia	700	753	575	604	566	**241.9**
Gonorrhea	84	84	151	167	101	**44.4**
COVID-19	0	0	9,418	27,458	19,287	**7,080.6**
Multisystem Inflammatory Syndrome	0	0	3	4	4	**0.8**
Lyme Disease	13	22	11	21	31	**7.4**
Pertussis	6	16	0	3	4	**2.2**
Chickenpox	2	8	2	2	2	**1.2**
Hepatitis A	5	7	1	2	0	**1.1**
Hepatitis C (Chronic)	146	116	85	75	82	**38.1**
Streptococcal diseases	50	52	29	25	34	**14.4**
Rabies infected animal	8	1	1	2	1	**1.0**
Rabies (Potential Exposure to Human)	283	100	42	42	18	**36.7**

FOOD & WATER BORNE ILLNESSES

Food and water borne illnesses are conditions that can be caused by eating contaminated food or water. Many of these illnesses are carried by animals and spread to people when animal products or meat are not handled properly. However, these illnesses can also be spread to people without consuming contaminated animal products. For example, salmonella can be carried by chickens without making the chicken sick. Any time people handle, carry, or pet chickens, they could become sick with salmonella if they don't take necessary precautions to prevent it. This is why it is important to wash your hands after interacting with animals before you cook, eat, touch your face, etc.

Cryptosporidiosis ("Crypto") is the leading cause of waterborne disease outbreaks in the US and is an infection caused by a parasite found in stool (poop) of human and animals, particularly cows. The parasite is transmitted when people ingest contaminated food or water. The most common symptoms are diarrhea, vomiting, and weight loss. The average incidence rate per 100,000 population is between 4.1 to 4.7 in the US, and 4.2 in Michigan. Cryptosporidiosis is more common in DHD#10 compared to Michigan and the US with 5.9 cases per 100,000 residents on average.

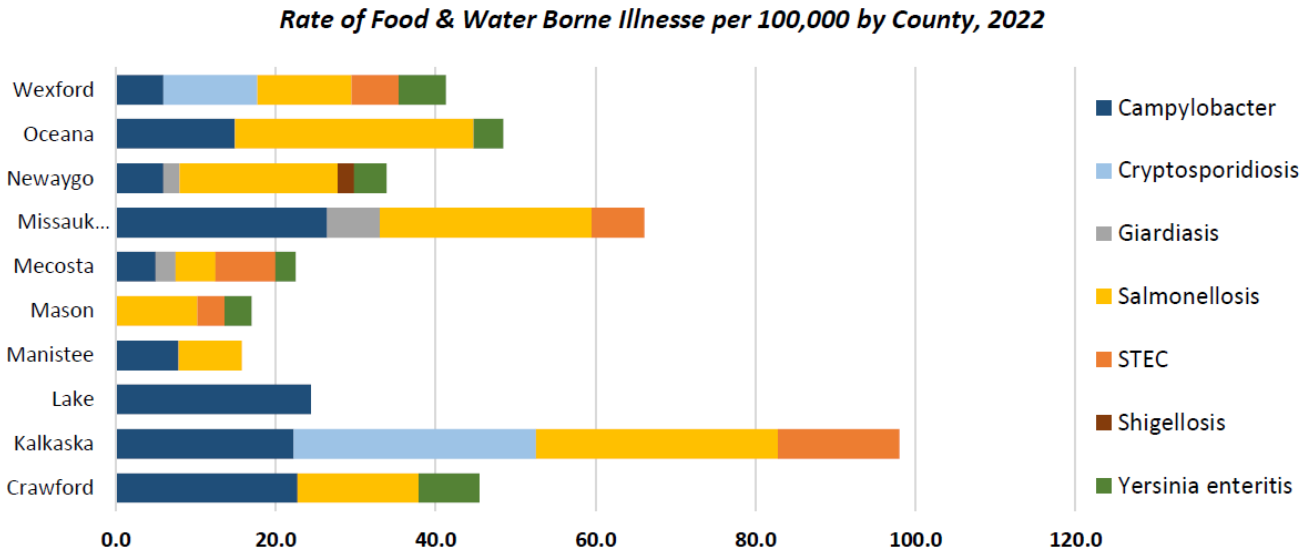
Giardiasis is also caused by a parasite found in stool (poop) of human and animals, and spreads easily through direct contact and causes a variety of symptoms including diarrhea, stomach cramps or pain, greasy stool that may float, nausea, and dehydration. The average incidence rate per 100,000 for Giardiasis is 5.1 to 7.5 in the US and 4.6 in Michigan. While the rate of Giardiasis in DHD#10 is lower than the US average, it is slightly higher when compared to Michigan at 4.8 cases per 100,000 residents.

Shiga Toxin-Producing Escherichia Coli (STEC) is a strain of E. coli that causes disease with symptoms that included severe stomach cramps, mild to bloody diarrhea, vomiting and a low-grade fever. It is transmitted to humans through ingestion of contaminated foods, water, raw milk, or contact with cattle. STEC can also cause a life-threatening condition called ***Hemolytic Uremic Syndrome (HUS)***, which is caused by inflammation in the kidneys and can lead to kidney failure and occurs in 5% -10% of all STEC infections. The average incidence rate of STEC in the US is 34 per 100,000, and about 2.8 per 100,000 in Michigan. Over the past five years, DHD#10 has had a similar incidence rate at 2.9 per 100,000. A multistate STEC outbreak in late summer of 2022 included Michigan resulted in about a 50% increase in STEC cases in Michigan, and a 12% increase in DHD#10.

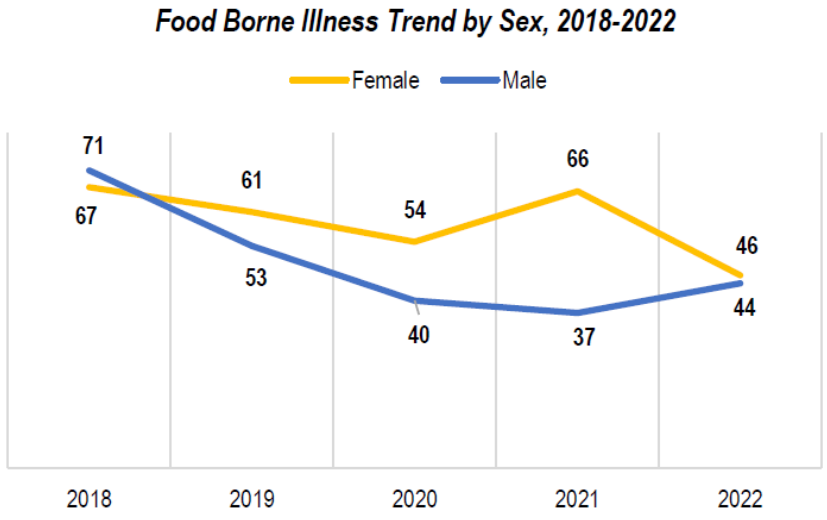
Condition	2018	2019	2020	2021	2022	2022 Rate per 100,000	5-Year Rate per 100,000
Campylobacter	50	46	31	37	27	10.2	**14.4**
Cryptosporidiosis	19	21	15	15	8	3	**5.9**
Giardiasis	18	10	13	20	3	1.1	**4.8**
Salmonellosis	36	35	29	36	39	14.8	**13.2**
Shiga toxin-producing E. coli	0	5	5	8	9	3.4	**2.9**
Hemolytic Uremic Syndrome	2	0	0	0	0	0	**0.2**
Shigellosis	4	0	4	2	1	0.4	**0.8**
Yersinia enteritis	0	0	1	5	8	3	**1.1**
Vibriosis (Non-Cholera)	0	1	1	0	0	0	**0.2**
Cyclosporiasis	0	0	0	6	0	0	**0.5**
Total	**131**	**122**	**104**	**135**	**100**	**37.8**	**44.8**

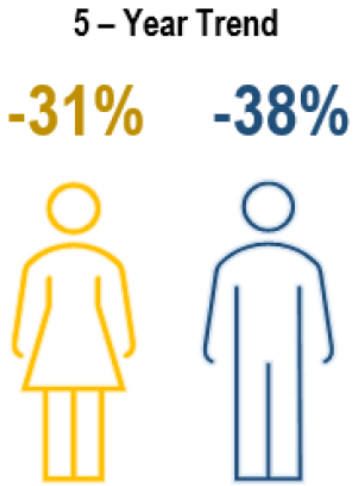
Shigellosis is an infection that occurs after ingestion of Shigella bacteria. Shigella is found in stool and spreads easily via the fecal oral route causing prolonged or bloody diarrhea, fever, and stomach pain. Recently, according to the CDC, extensively drug resistant Shigella infections in the US have increased from 0% in 2015 to 5% in 2022. This is a significant public health concern as Shigella is easily transmissible and has limited antimicrobial treatment options. In Michigan there was an 11% increase in Shigellosis from 2021 to 2022, while in DHD#10 there has been only a few confirmed cases over the past 5 years with a decreasing trend from 2018 to 2022.

Yersinia Enteritis is a condition caused by eating contaminated food, especially raw or undercooked pork products. It can also spread during contact with pigs, or products from pigs, as they are a major animal reservoir for yersinia. Young children are the most often affected, with symptoms including fever, abdominal pain, and often bloody diarrhea. Adults may experience right-sided abdominal pain and fever as predominant symptoms. Michigan and DHD#10 have a 5-year average incidence rate of 1.1 yersinosis cases per 100,000 residents. However, both Michigan and DHD#10 saw a significant increase in cases over the past 5 years.

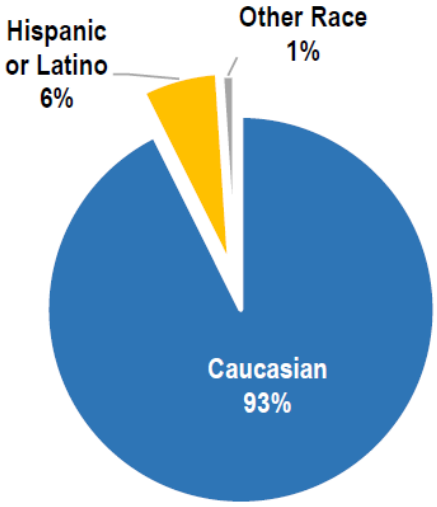


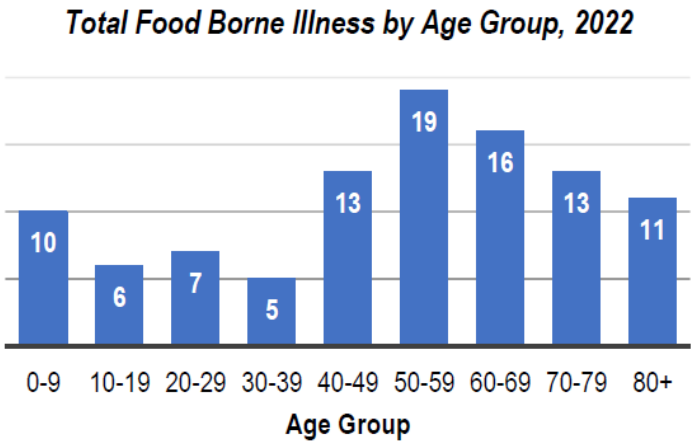
Campylobacteriosis and Salmonellosis are the 2 most commonly occurring foodborne illnesses in DHD#10,Michigan, and the US. Cryptosporidiosis and Yersinia enteritis were tied as the third most common in DHD#10. Kalkaska had the largest burden of this type of condition with 98 cases per 100,000 followed by Missaukee (66), and Oceana (52).





In 2022, foodborne illness was most common among the 50-59 age group, which accounted for 19% of all cases, and those aged 40-69 accounted for almost half (48%) of all foodborne illnesses in DHD#10. There was also a high percentage of foodborne illness among the Hispanic or Latino population in 2022.





CAMPYLOBACTERIOSIS

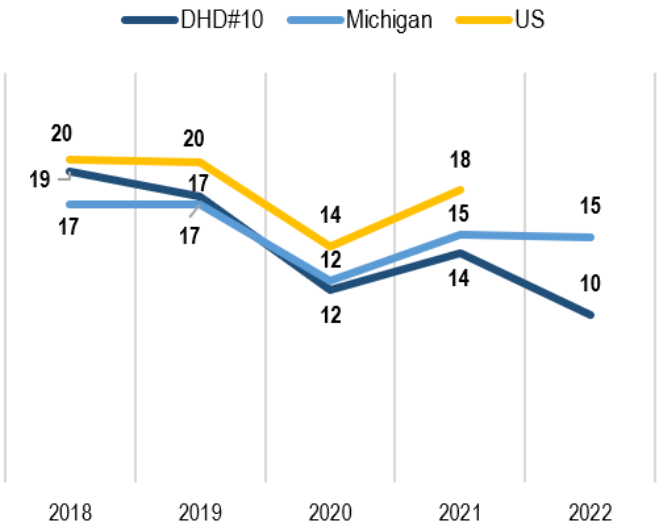
Campylobacteriosis is the most common cause of diarrhea in the US. The bacteria is carried by many common farm animals, can contaminate their milk, and is easily spread when eating contaminated animal products. CDC data shows about 20 cases occur for every 100,000 people in the US each year. The average incidence rate in Michigan (2018-2022) was 15.2 per 100,000. In 2022, there was a significant decrease in cases with an incidence rate of 10.2 in DHD#10, compared to 14.4, which is the 5-year average.

In 2022, campylobacter cases occurred in nearly every county, except for Mason county. Missaukee county had the highest rate of campylobacteriosis, but Crawford, Kalkaska, Lake, and Missaukee all had incidence rates higher than the US average in 2022. Campylobacter can affect people of all ages but in DHD#10 most cases occurred in older adults. The highest rate being the 80+ age group. This is likely due to elderly people being at higher risk because of weakened immune systems. Those unable to cook for themselves are also more likely to eat foods handled by more people which increases the risk for contamination by a variety of bacteria.

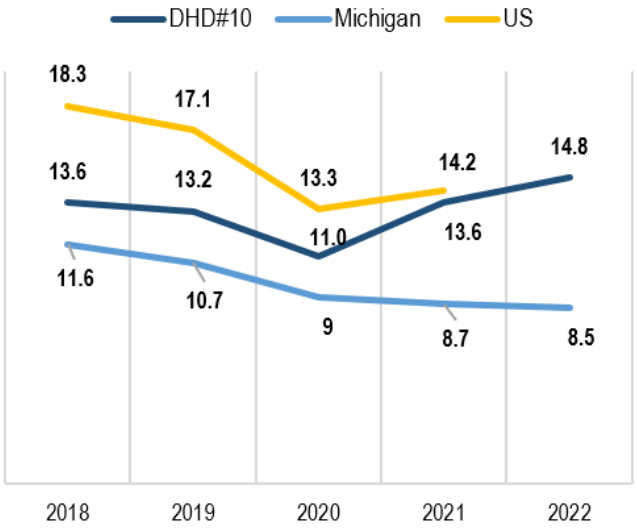
Historically, DHD#10 has had a higher rate of campylobacteriosis than Michigan. Since the start of the COVID-19 pandemic, rates have dropped below the Michigan average, likely due to fewer people eating away from home.

2022	Campylobacteriosis	2022 Incidence Rate per 100,000
Sex		
Female	13	4.9
Male	14	5.3
Age Group		
0-9	3	10.8
10-19	0	0
20-29	2	6.6
30-39	2	6.9
40-49	4	14.4
50-59	5	13.9
60-69	6	14.2
70-79	3	11.2
80+	2	16.9
DHD#10 County		
Crawford	3	22.7
Kalkaska	4	22.2
Lake	3	24.4
Manistee	2	7.9
Mason	0	0.0
Mecosta	2	5.0
Missaukee	4	26.4
Newaygo	3	6.0
Oceana	4	14.9
Wexford	2	5.9

Rate of Reported Campylobacter Cases, 2018-2021



Rate of Reported Samonellosis Cases, 2018-2022



SALMONELLOSIS

Salmonella is found in the intestinal tracts of animals and spreads to people by ingesting food that is contaminated with animal feces. It can also spread when interacting with animals that carry salmonella, such as baby chicks, reptiles, and cows. Antibiotics are not normally needed as symptoms usually go away on their own but are prescribed for those with or at risk for severe disease.

Most salmonellosis cases in DHD#10 occurred in Newaygo and Oceana. Lake county was the only DHD#10 county that reported 0 cases in 2022. Most cases occurred in the 40-69 age range but there was also a higher rate among the 0-9 age group.

Incidence of salmonellosis in the US is about 14.2 per 100,000 people. In Michigan, salmonella incidence has been decreasing 5 years in a row, with an average incidence of 9.7 per 100,000. While DHD#10 tends to have higher salmonella rates than the Michigan average, there has been significant increases in cases since 2020. In 2020, salmonella was 18% higher in DHD#10 than Michigan. In 2022, with 14.8 cases per 100,000 people, salmonellosis was 43% higher than Michigan. While 2022 data for national salmonella cases has not yet been released, it is possible that DHD#10 has surpassed the US salmonella rate.

2022	Salmonella	Salmonella Rate per 100,000
Sex		
Female	18	13.9
Male	21	15.6
Age Group		
0-9	6	21.6
10-19	4	12.2
20-29	2	6.6
30-39	1	3.5
40-49	6	21.6
50-59	7	19.5
60-69	7	16.5
70-79	2	7.5
80+	4	33.9
DHD#10 County		
Crawford	2	15.1
Kalkaska	4	22.2
Lake	0	0
Manistee	2	7.9
Mason	3	10.2
Mecosta	2	5.0
Missaukee	4	26.4
Newaygo	10	19.9
Oceana	8	29.8
Wexford	4	11.8

SEXUALLY TRANSMITTED INFECTIONS

Sexually transmitted infections are very common in the US, but it is difficult to estimate how often they occur in the population as they don't always cause symptoms or symptoms may be mild enough to go away on their own. However, it is estimated that 1 in 5 people in the US have an STI and almost half of new STIs are among young adults. All STIs are treatable with medication, however some are incurable diseases, such as HIV.

Condition	2018	2019	2020	2021	2022	2022 Incidence Rate per 100,000	5-Year Incidence Rate per 100,000
Chlamydia	700	753	575	604	566	214.1	241.9
Gonorrhea	84	84	151	167	101	38.2	44.4
Syphilis (no latent)	4	2	4	5	*	*	1.4
HIV*	20	27	19	17	*	*	8.5
Total	**808**	**866**	**749**	**793**	**667**	**256.8**	**296.2**

**HIV data is combined with Central Michigan Health Department data by the state of Michigan to protect possibly identifiable health information*

Syphilis is a bacterial STI that can also spread from mother to child during pregnancy. Anyone can get syphilis, but in the US, it is more common among men who have sex with men (MSM) and African Americans. Primary syphilis (PS) and secondary syphilis (SS) are the earliest stages of syphilis where symptoms are present. PS can last 3-6 weeks and 2-10 weeks for SS. After these stages, syphilis is called latent, but can still be infectious and cause long-term health issues. For the purpose of this report, PS and SS are included and latent syphilis is not.

According to the CDC, the US saw historically low counts of syphilis in 2000-2001. However, cases have been increasing every year since. On average, there are 48 cases per 100,000 in the US and 22 cases per 100,000 in Michigan. The average rate in DHD#10 is 1.4 cases of PS or SS per 100,000 residents. However, it is likely that the rate is actually higher than this due to the fact that DHD#10 is a rural region where it is harder to access healthcare to get tested for syphilis.

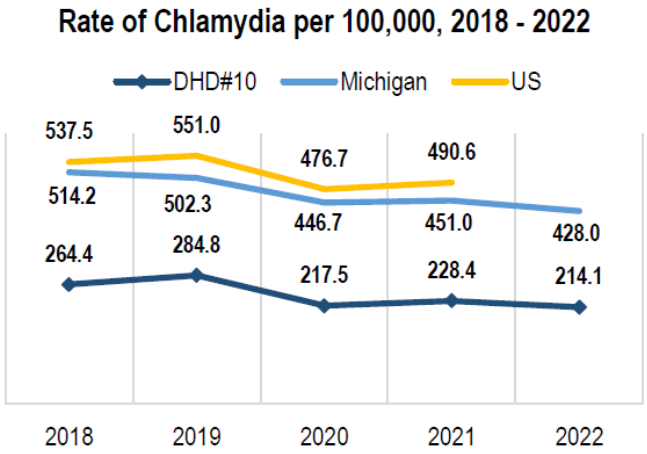
Human Immunodeficiency Syndrome (HIV) is a virus that attacks the body's immune system, hence the name "immunodeficiency". This is a serious infection as the immune system is how the body fights against viruses, bacteria, and other disease-causing agents. If left untreated, infected people may develop acquired immunodeficiency syndrome (AIDS). HIV can also be transmitted from mother to child during pregnancy, birth, or breastfeeding. The only way to know if you have HIV is to get tested. People may develop some flu-like symptoms, but some have none at all. While there is no cure for HIV or AIDS, treatments are effective and may make the infection undetectable. Infection that is undetectable is not able to spread through sex. HIV is a complex condition, for more information on how to protect yourself or others, symptoms, and treatment, click here.

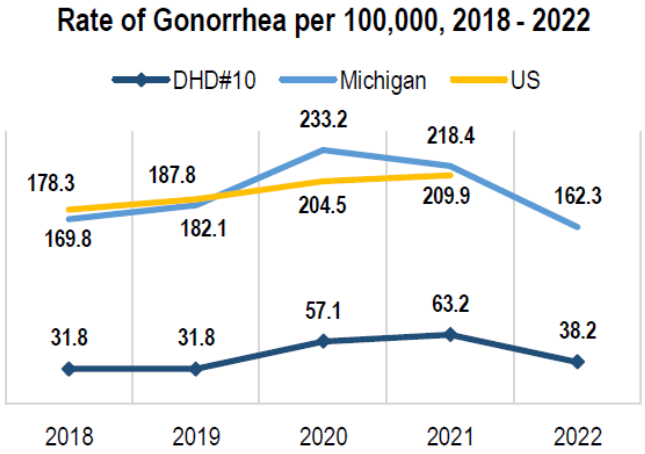
The state of Michigan combines cases of HIV in DHD#10 counties with counties in Central Michigan Health Department to protect the identity of individuals with HIV in these counties. The average rate of HIV in Central Michigan and DHD#10 counties is 8.5 cases per 100,000. Again, it is important to note here that even though the rate of HIV is lower in this region compared to Michigan and the US, it is partly due to less testing being done because of lack of access to healthcare, especially during the COVID-19 pandemic.

2022	Chlamydia	Chlamydia Rate per 100,000	Gonorrhea	Gonorrhea Rate per 100,000
Sex				
Female	393	303.3	55	42.5
Male	173	128.3	46	34.1
Age Group				
0-9 years	1	3.6	0	0
10-19 years	96	292.6	7	21.3
20-29 years	352	1161.8	38	125.4
30-39 years	85	293.6	33	114.0
40-49 years	26	93.4	15	53.9
50-59 years	4	11.1	8	22.3
60-69 years	2	4.7	0	0
70-79 years	0	0	0	0
80+ years	0	0	0	0
County				
Crawford	19	143.9	0	0
Kalkaska	39	216.9	3	16.7
Lake	18	146.2	6	48.7
Manistee	29	114.4	4	15.8
Mason	44	149.7	8	27.2
Mecosta	140	349.7	35	87.4
Missaukee	27	178.5	2	13.2
Newaygo	106	210.8	13	25.8
Oceana	67	249.9	20	74.6
Wexford	77	227.1	10	29.5

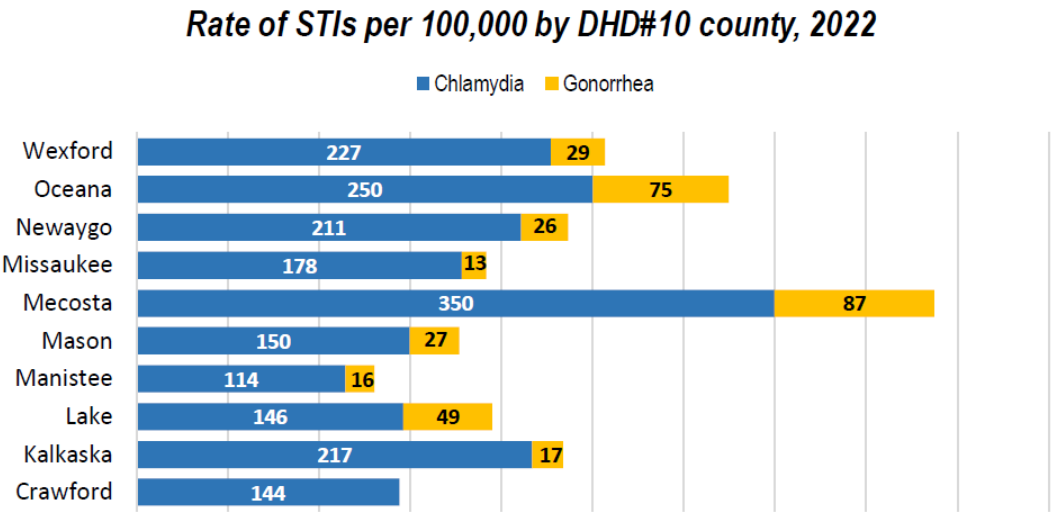
Chlamydia is the most reported bacterial STI in DHD#10, Michigan, and the US. It often does not cause symptoms but can still damage the reproductive system. When symptoms do occur, they can include vaginal discharge and a burning sensation during urination for women, and discharge from the penis, burning during urination, and pain or swelling in the testicles for men. Severe reproductive damage is much more common in women and presents a large public health concern.

Gonorrhea is the second most common bacterial STI with the highest infection rates among sexually active teenagers, young adults, and African Americans. Most women do not develop symptoms of gonorrhea, but they can include vaginal discharge and bleeding between periods. With both gonorrhea and chlamydia, serious risk to health can develop if left untreated. The infections can spread to the uterus or fallopian tubes resulting in pelvic inflammatory disease which causes abdominal pain and fever and can lead to internal abscesses and chronic pain, as well as infertility.





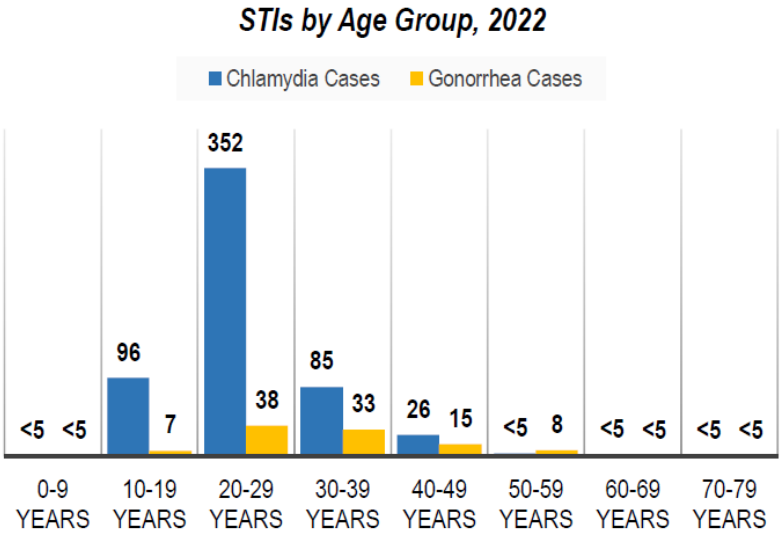
In 2022, the DHD#10 average incidence rates were 214 cases of chlamydia and 38 cases of gonorrhea per 100,000 residents. Mecosta county has the highest rate of STIs out of all DHD#10 counties and Manistee had the lowest incidence rate at 114 cases of chlamydia and 16 cases of gonorrhea per 100,000 in 2022. STI rates in DHD#10 are low compared to the Michigan and US averages but some of this difference can be attributed to being in a rural region where STI cases may be tested for less frequently due to high poverty levels and lack of access to healthcare.

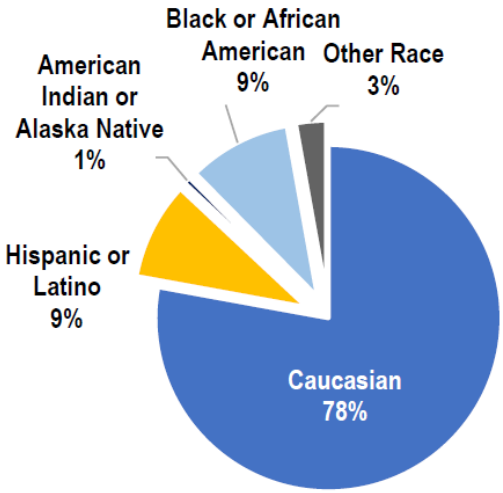


STIs were most common among those 10-39 years old with the highest rates in the 20-29 age group. STI rates in the 20-29 age group were nearly 3 times higher than any other age group. In the US, over half of STIs occur in the 15-34 age group according to the CDC, which is very similar to what we see in DHD#10.

Cases of chlamydia have seen an overall decreasing trend in DHD#10, Michigan, and in the US over the past 5 years. DHD#10 saw a ***19% decrease in chlamydia*** cases, Michigan a 17% decrease, and the US saw a 9% decrease from 2018 to 2021/2022. Cases of chlamydia in women have decreased by 34% from 2018 to 2022 while there was no significant change in cases among men. However, this overall decline in cases of chlamydia may be due to the pandemic, which made access to healthcare more difficult and decreased testing.

Overall, there was a ***20% increase in gonorrhea*** cases in DHD#10, as well as an 18% increase in the US, while Michigan saw a 4% decrease in cases from 2018 to 2022. Cases in women increased by 15% from 2018 to 2022 and cases among men increased by 27%. As stated before, due to difficulty accessing healthcare during the pandemic, this is especially concerning.





While the majority of STI cases are diagnosed in White (non-Hispanic or Latino) population, there was a disproportionately high number of cases among the African American and Hispanic or Latino populations. African Americans make up about 2% of the DHD#10 population but account for 9% of all STI cases. Hispanic or Latinos make up about 5% of the DHD#10 population and account for 9% of all STI cases.

RESPIRATORY INFECTIONS

Due to significant differences in prevalence of influenza and COVID-19 compared to other reportable respiratory conditions, influenza and COVID-19 cases will be analyzed and graphed separately. This will give us a better look at the trends in reportable respiratory conditions. The graphs below do not include cases of COVID-19 or influenza unless stated otherwise.

Communicable Disease	2018	2019	2020	2021	2022	Rate per 100,000	5-Year Incidence Rate per 100,000
Tuberculosis	0	2	2	2	0	0	**0.5**
LTBI*	16	24	8	24	27	10.2	**7.5**
Legionellosis	2	4	5	6	5	1.9	**1.7**
Blastomycosis	1	0	5	2	2	0.8	**0.8**
Coccidioidomycosis	2	5	4	0	1	0.4	**0.9**
Histoplasmosis	6	9	14	11	8	3.0	**3.6**
Cryptococcosis	0	0	1	0	0	0	**0.1**
Total	**38**	**56**	**44**	**57**	**57**	**21.6**	**19.1**
COVID-19	0	0	9,937	31,055	24,894	9,415	10,580

**LTBI is not required to be reported and actual numbers are likely higher.*

Blastomycosis is a fungal infection that is transmitted when a person inhales the fungal spores. Blastomycosis is present in the environment in US states from the Midwest to Southeast. Those at highest risk are those exposed to wooded areas and moist or disturbed soil, especially near the Great Lakes, the Ohio and Mississippi River Valleys, and the Saint Lawrence River. The rate of Blastomycosis in the US is about 1-2 cases per 100,000, in Michigan it's about 0.3, and in DHD#10 it's 0.8. However, the number of cases has been increasing over the past 5 years in Michigan. Cases in Michigan increased from 19 in 2018 to 64 in 2022.

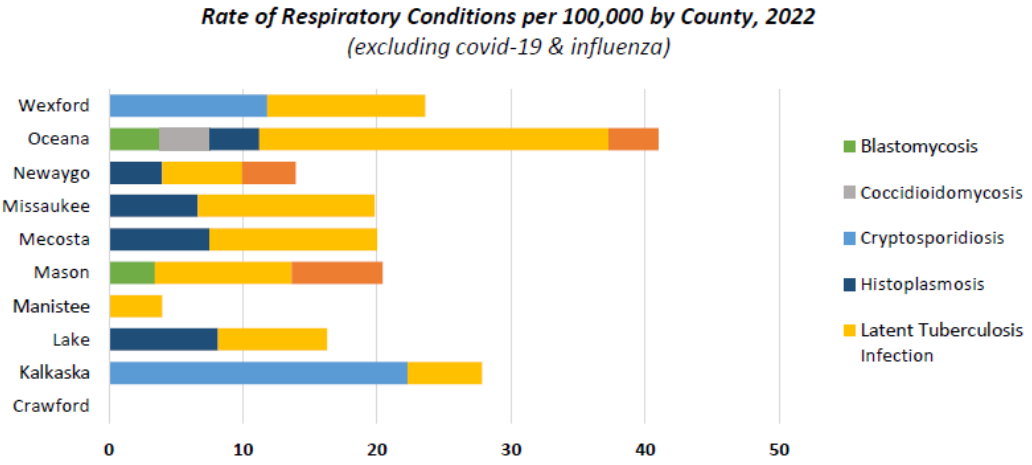
Coccidioidomycosis (Valley Fever) causes a fungal infection when fungal spores are inhaled. The fungus is known to be found in the soil in the southwest of the US and doesn't cause illness in most people but those over the age of 60 are at more risk for severe illness. Valley fever has also been found to be more prevalent in African Americans, Filipinos, and those living in Arizona or California. As Michigan is far away from the southwestern states it does not have as high of an incidence. The average incidence in the US is 7.1 cases per 100,000 but for Michigan the incidence is about 0.6 cases, and in DHD#10 the incidence is slightly higher at about 0.9 cases.

Histoplasmosis is also an infection caused by breathing fungal spores that originate from bird and bat droppings. Often during projects such as building demolition, renovation, or cleanup, the bird and bat droppings are disturbed causing the spores to be dispersed into the air, increasing the risk for laborers such as construction workers. However, soil can also be contaminated and pose risks to farmers and landscapers. Most people do not develop symptoms, but illness can be fatal for infants and those with weakened immune systems. Rates in the US are estimated to be between 3-5 cases per 100,000 population with the highest rates occurring in midwestern states. Rates are slightly higher in DHD#10 at 3.6 cases per 100,000, compared to Michigan, which had an average of 2.5 cases per 100,000.

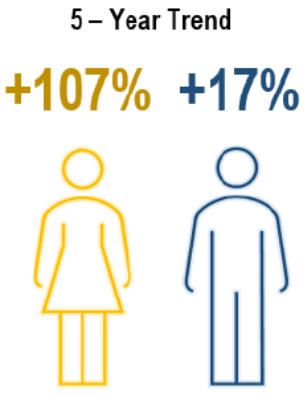
Cryptococcosis is caused by the fungus Cryptococcus neoformans and is present in the environment all over the world. Although this fungus is common, it rarely causes infection except for those with weakened immune systems, especially those living with HIV/AIDS. In the US there are about 0.4 to 1.3 cases for every 100,000 people. The rate is lower in Michigan at 0.2 per 100,000 and in DHD#10 at

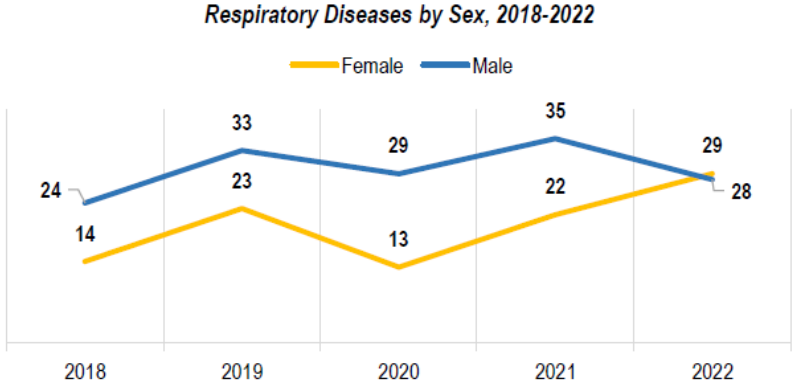
0.1 per 100,000, but the number of cases occurring in Michigan over the past 5 years has increased by almost 3 cases a year. In DHD#10 there has only been 1 case in the past 5 years.

Legionellosis is an infection caused by Legionella bacteria when water droplets contaminated with Legionella are inhaled Legionella can cause 2 different diseases, Legionnaires' Disease, which causes severe pneumonia, and Pontiac Fever, which causes mild respiratory symptoms. Legionellosis has been increasing in the US since 2000 but this could be partly due to improved testing and reporting. Average incidence in Michigan for legionellosis is 5.1 cases per 100,000 people and DHD#10 it's significantly lower at 1.7 per 100,000, but this difference could also be partly due to underdiagnosis.



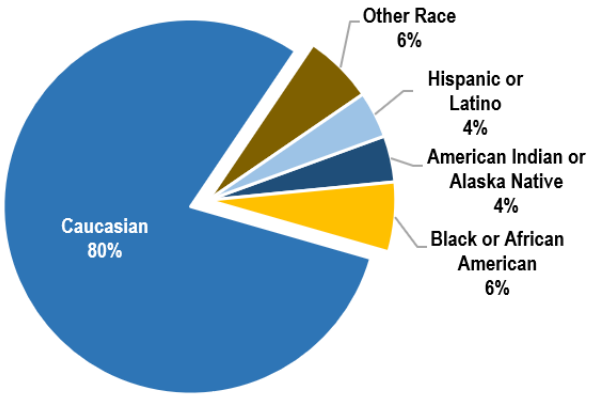
In 2022, the most cases occurred in Mecosta and Oceana counties alone, which accounted for 40% of all reportable respiratory conditions in DHD#10. Oceana had the highest rate of respiratory conditions with 49 cases per 100,000 people, which is in part a result of investigating 2 TB cases which led to identifying more infected people. There has been a significant increase in the number of respiratory diseases occurring in women, which has more than doubled in the past 5 years. This overall increase in respiratory case among women is largely due to increases in Latent Tuberculosis Infection (LTBI) cases in women, which doubled from 9 cases in 2018 to 18 cases in 2022.

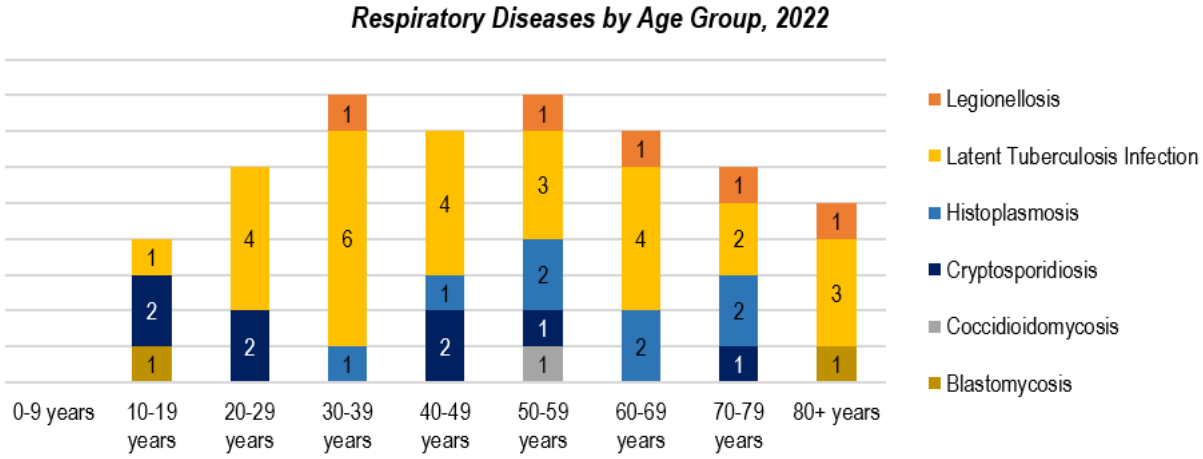


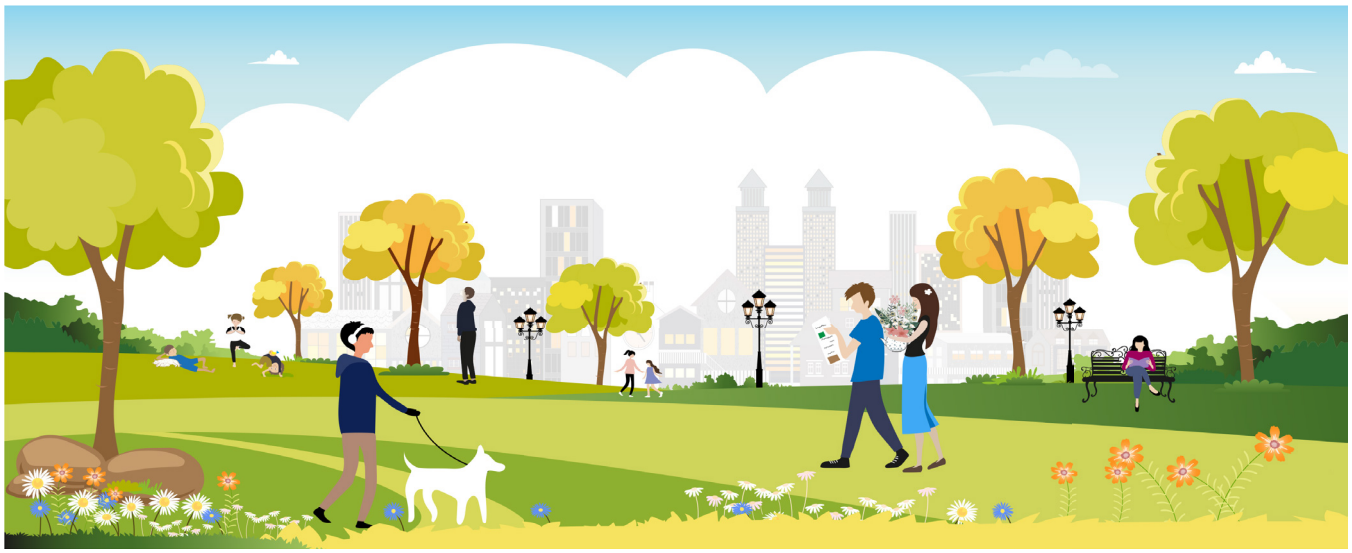


*I*n 2022, respiratory conditions disproportionately affected Hispanic or Latinos and especially African Americans. The Hispanic population makes up about 5% of the total DHD#10 population but accounts for 6% of these reportable respiratory conditions. Similarly, African Americans make up only about 2% of the DHD#10 total population but account for 6% of these reportable respiratory conditions.

Respiratory conditions were the most common in DHD#10 among the 60-69 age group, and the number of cases tended to increase with age. LTBI cases reported to the health department were the most prevalent among those aged 30-39 and least common among those less than 10 years old.







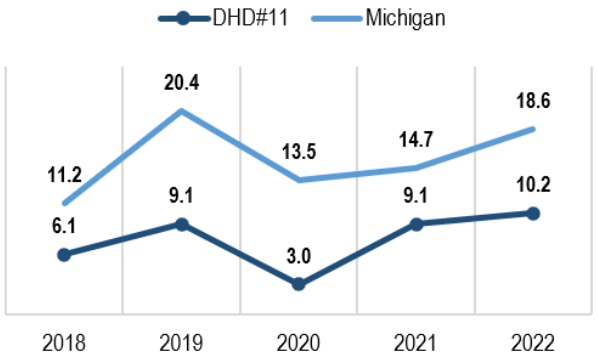
TUBERCULOSIS & LATENT TUBERCULOSIS INFECTIONS

Tuberculosis (TB) is caused by Mycobacterium tuberculosis, which normally affects the lungs but can infect any part of the body. TB spreads through the air from person-to-person when a person with respiratory TB coughs, speaks, or sings near other people. TB can be fatal if left untreated, but TB does not cause everyone to get sick, which is called ***Latent Tuberculosis Infection (LTBI)***. Those with LTBI do not have symptoms or feel sick, are not contagious to others, but usually test positive on TB skin tests or blood tests. Since those with LTBI carry the TB bacteria, they can develop TB disease and become contagious to others. This does not always occur but is more likely in those with weakened immune systems.

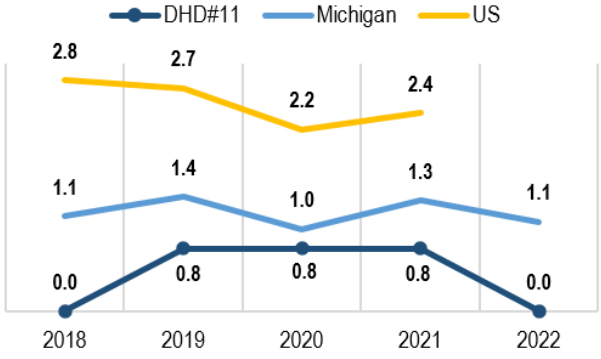
The rate of TB disease in the US is about 2.4 cases per 100,000 population. On average, the rate of TB is lower in DHD#10 than in Michigan and in the US. DHD#10 has a lower rate than the US at 0.5 per 100,000 people while the average rate in Michigan is 1.2 per 100,000 people. Due to the low number of cases of TB in DHD#10 being reported, there were no significant trends that could be identified reliably by age, sex, race/ethnicity, or county.

2018-2022	Tuberculosis	Tuberculosis Rate per 100,000
Sex		
Female	3	0.46
Male	3	0.44
Age Group		
0-9 years	0	0
10-19 years	0	0
20-29 years	1	0.66
30-39 years	1	0.7
40-49 years	0	0
50-59 years	2	1.1
60-69 years	1	0.48
70-79 years	0	0
80+ years	1	1.7
County		
Crawford	0	0
Kalkaska	0	0
Lake	1	1.6
Manistee	0	0
Mason	1	0.68
Mecosta	0	0
Missaukee	0	0
Newaygo	1	0.4
Oceana	2	1.5
Wexford	1	0.58

Rates of LTBI per 100,000, 2018-2022



Rates of TB per 100,000, 2018-2022

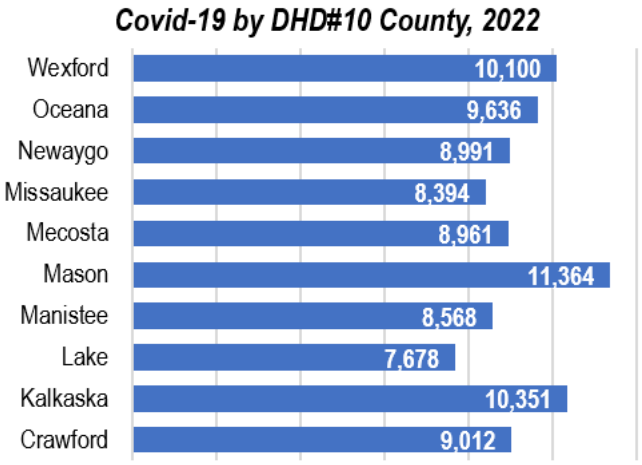


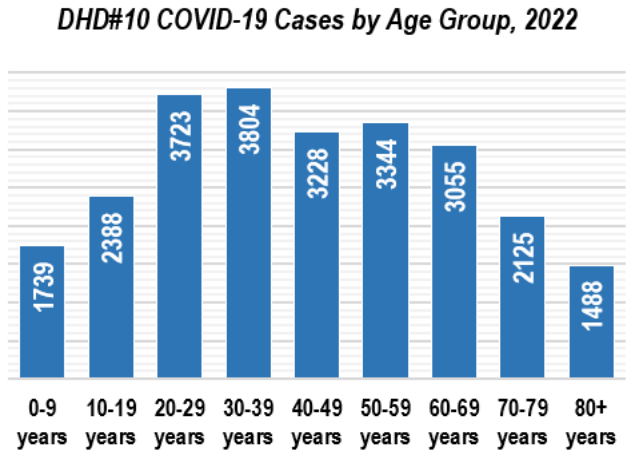
LTBIs are estimated by the CDC to be present in 13 million people in the US. The rate of LTBI reported to DHD#10 (10.2 per 100,000) is much lower than the average rate in Michigan (18.6 per 100,000) but may not all be accounted for as LTBI are not required to be reported. However, there was an overall 67% increase in LTBI cases in DHD#10 from 2018 to 2022, despite a large decrease in cases in 2020 likely due to the COVID-19 pandemic. This is likely due to an increase in the use of blood testing for LTBI diagnosis, which is often reported automatically to the health department. The highest rates of LTBI was found in Oceana county with 130.5 cases per 100,000 which was significantly higher than Mecosta county, which

was the county with the second highest rate of LTBI, with 47.5 cases per 100,000 people. However, many of these cases were found as a result of contact tracing that was done while investigating 2 confirmed TB cases in Oceana. Higher counts of LTBI in Mecosta county is attributable to the university's international student population. LTBI was also more common in women (41.7 cases per 100,000), and those aged 20 to 69 years but especially those 40 to 49 years old (64.7 cases per 100,000).

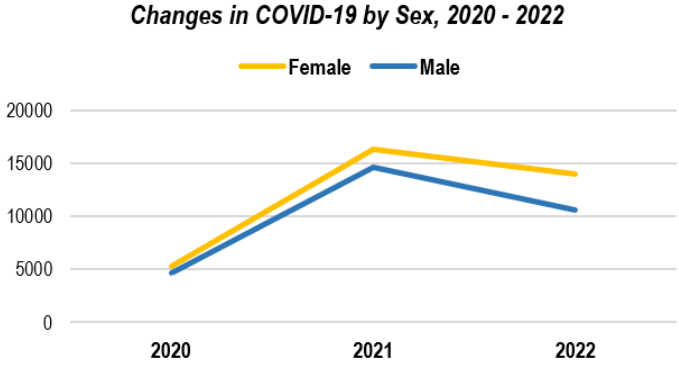
NOVEL CORONAVIRUS COVID-19

COVID-19 has been the predominate communicable disease since its emergence in March of 2020. In 2022, Mason county experienced the highest burden of COVID-19, followed by Kalkaska and Wexford. The 30 to 39 years age group had the highest rate of cases, followed by those 80 years and older with the second highest rate.





COVID-19 cases decreased significantly from 2021 to 2022. It is important to note that multiple factors could have contributed to this decrease in cases. First, the introduction of at home testing reduced the number of cases being reported, and this report only reflects PCR confirmed tests. Second, vaccines for COVID-19 were first released in December of 2020 with most mass vaccination efforts occurring throughout 2021, during the outbreak of the Omicron variant which caused the largest wave of cases from January 2021 to March of 2021. At its peak, there were 5 million COVID-19-19 cases being reported in the US in just one week. Therefore, by 2022 many people were fully vaccinated, slowing down the spread of the disease. Lastly, many workplaces ended mandatory regular testing for COVID-19-19 in 2022, which also resulted in fewer cases, especially asymptomatic cases, being caught and reported.



VACCINE PREVENTABLE DISEASES

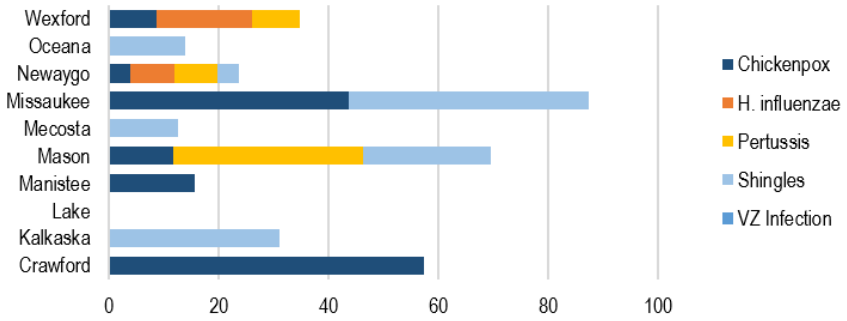
Vaccine preventable diseases have been controlled in the United States due to vaccination efforts. If following the recommended vaccination schedule, by the age of 6 children are protected against hepatitis B, diphtheria, pertussis, tetanus, H. influenzae type b (Hib), pneumococcal disease, polio, measles, mumps, rubella, chickenpox, and hepatitis A. Prevention against these diseases is important as they can result in long-term illnesses, hospitalizations, or death. For example, according to the CDC, before vaccines, chickenpox was responsible for about 100 to 150 deaths every year. Currently, less than 30 people die from chickenpox each year. Pertussis (also known as whooping cough) was responsible for about 9,000 deaths every year, and since vaccines, about 10 people die from pertussis each year.

Communicable Disease	2018	2019	2020	2021	2022	VPD Rate per 100,000	5-Year Rate per 100,000
H. influenzae	15	8	2	2	6	2.3	**2.5**
Pertussis	6	16	0	3	4	1.5	**2.2**
Chickenpox	2	8	2	2	2	0.8	**1.2**
Shingles	5	3	2	4	6	2.3	**1.5**
Mumps	1	0	0	0	0	0	**0.1**
Total	**45**	**48**	**13**	**23**	**26**	**9.8**	**11.7**

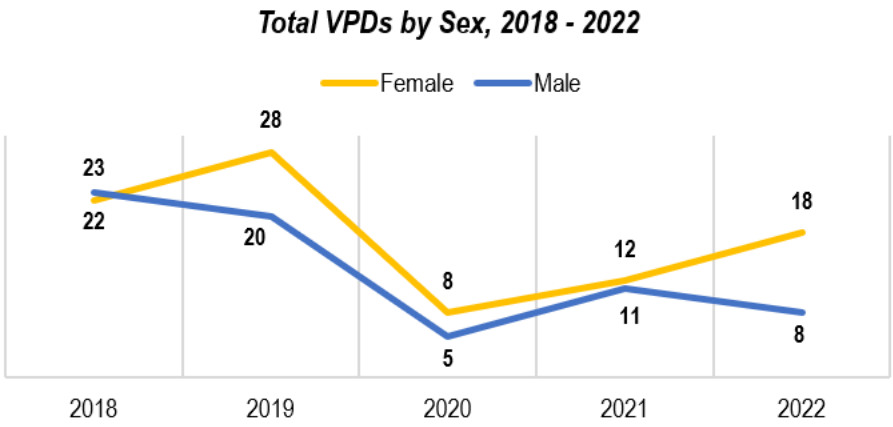
Haemophilus Influenzae (H. influenzae) is a common bacteria that causes a variety of infections from mild ear infections, sinus infections, and pneumonia, to life threatening bloodstream infections and meningitis. Different serotypes of H. influenzae seem to cause more serious disease. H. influenza type b (Hib) is one of the types that most commonly causes serious disease and is the only type out of 6 that is vaccine preventable. H. influenzae is spread person-to-person through respiratory droplets, which are produced when an infected person coughs or sneezes. Serious disease is most common in children under 5 and adults over 65 years of age, American Indian people, and Alaska Native people. Rates of H. influenzae are 0.9 cases per 100,000 in the US, 1.8 per 100,000 in Michigan, and 2.5 per 100,000 in DHD#10. Although DHD#10 has a higher 5-year average than Michigan and the US, DHD#10 has seen a decrease in the number of cases of the past 5 years while the number of cases in Michigan has increased.

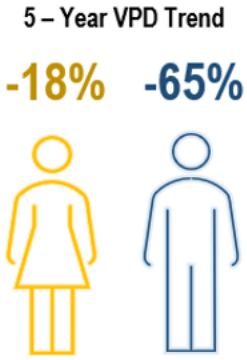
Mumps is a viral disease transmitted through direct contact with saliva or respiratory droplets from the mouth, nose, or throat of an infected person. Direct contact in this case includes coughing, sneezing, talking, sharing things with saliva on them, and close-contact activities such as sports, dancing, and kissing. Mumps is characterized by swollen cheeks and swollen salivary glands. In 2022 there were 322 cases reported in the US, 35 cases in Michigan, and no cases in DHD#10. In the US, and to a similar extent in Michigan, there was a significant decrease in reported mumps cases after the start of the COVID-19 pandemic. The decrease in cases is very likely a direct result of pandemic restrictions that were created to reduce COVID-19-19 transmission, which also reduced mumps transmission.

Rate of VPDs per 100,000 by County, 2022

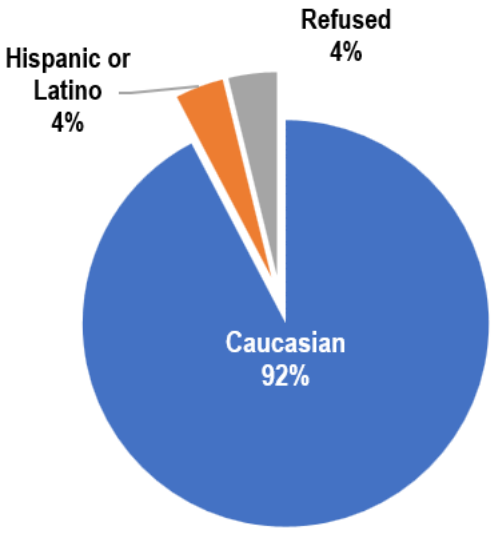


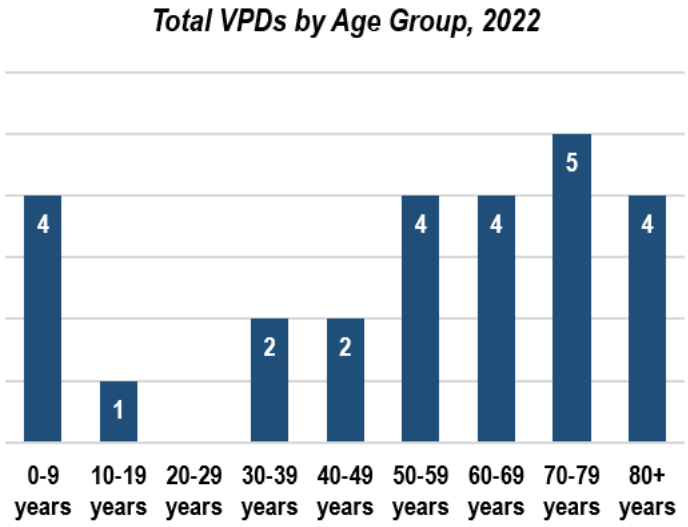
In the past 5 years, VPDs were more common in women than men. Cases of VPDs dropped significantly in 2020 due to the COVID-19 pandemic, likely due to the prevention methods use for COVID-19. However, cases of VPD have been increasing since then. Cases among women dropped by nearly 20% from 2018 to 2022, and cases among men dropped by 65% in the same 5 years. Cases occurred mostly in those 30 years and older and increased with age, with the 70-79 age group having the most VPD cases. Of the 5 cases occurring in those less than 20 years old, 80% of cases were pertussis, and 20% were Chickenpox.





Because of vaccination efforts, the spread of VPDs is controlled and most cases occur among the unvaccinated. Due to low case counts, there were no significant trends by race/ethnicity or age group in 2022. The total incidence rate of all vaccine preventable diseases (VPDs) occurring in DHD#10 was 9.8 cases per 100,000 population in 2022. This is lower than the 5-year average incidence rate of 11.7 per 100,000. Missaukee and Mason counties has the highest rate of VPDs in 2022.





CHICKENPOX & PERTUSSIS

Chickenpox is highly contagious caused by the varicella-zoster virus and is characterized by an itchy, and blister-like rash. It causes disease in 90% of people who are exposed and unvaccinated. The disease can be especially serious during pregnancy and in those with weakened immune systems. Those who get chickenpox are at risk of developing ***shingles*** later in life, which is caused by the reactivation of the varicella zoster virus in the body. Those with shingles are very minimally contagious and it is possible to infect very close contacts that are not immune to chickenpox.

In 2022, there were just 2 confirmed cases of Chickenpox in DHD#10, both occurring in Wexford county, for a rate of 0.8 cases per 100,000 in DHD#10. The average rate of Chickenpox in Michigan is 2.9 cases per 100,000 people.

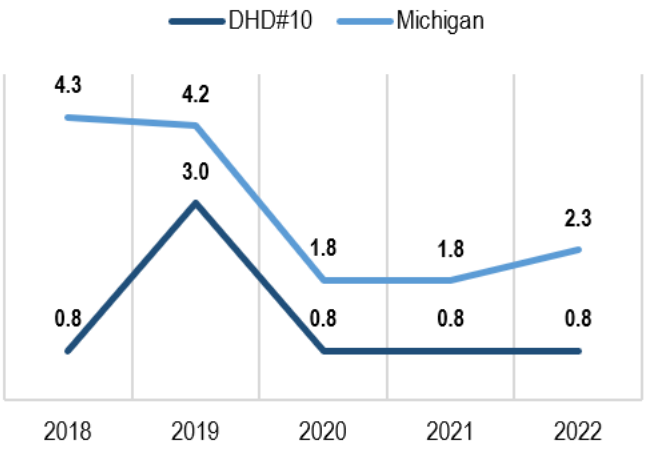
2022	Chickenpox	Chickenpox Rate per 100,000	Pertussis	Pertussis Rate per 100,000
Female	*	*	2	1.5
Male	*	*	2	1.5
Age Group				
0-9 years	*	*	3	10.8
10-19 years	*	*	1	3.0
County				
Newaygo	*	*	2	4.0
Wexford	2	5.9	2	5.9

*Note: * = case counts suppressed to protect potentially identifiable health information*

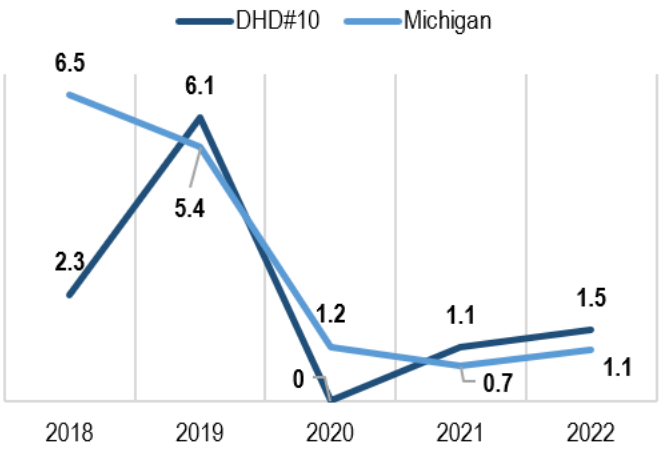
Pertussis (Whooping Cough) is caused by the Bordetella pertussis bacteria and spreads through airborne respiratory droplets. While pertussis can start with common respiratory symptoms like a runny nose, fever, and cough, it can also cause life-threatening apnea and cyanosis in infants. Eventually the characteristic "whooping" noise may develop following the rapid, violent, and repetitive coughing fits that can last 6 weeks or more.

The rate of pertussis in Michigan is 3 cases per 100,000 people and in DHD#10 it's 2.2 per 100,000. There were 4 pertussis cases in DHD#10 in 2022, most of which occurred in children under 10.

Rate of Chickenpox per 100,000, 2018-2022



Rate of Pertussis per 100,000, 2018-2022



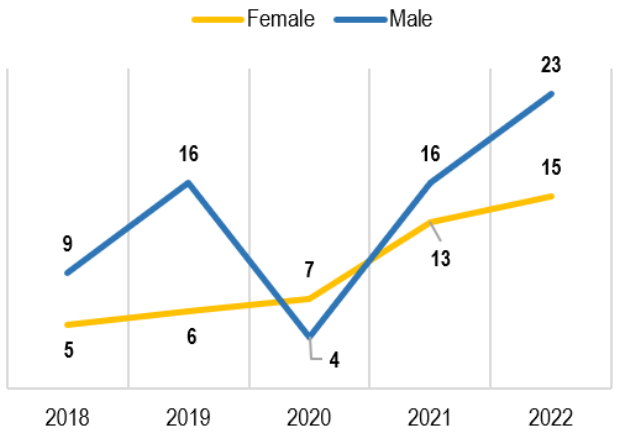
VECTOR BORNE DISEASES

Anaplasmosis is a tick-borne bacterial infection and is the second most common tick-borne illness in Michigan. Blacklegged ticks are the primary source of this disease in Michigan. Anaplasmosis cases are most common in June and July, in upper midwestern and northeastern US, among men, and in people over 40 years or with weakened immune systems. Symptoms include fever, headache, chills, and muscle aches. About 2 cases per 100,000 occur in the US, 0.4 cases per 100,000 in Michigan, and 1.0 cases per 100,000 in DHD#10. Rates have been increasing in the US since around 2000, partly due to it being added as a nationally notifiable condition, but there have been large increases in the past years in Michigan. In 2020, there were 20 total cases in Michigan, which jumped to 72 cases in 2021, and 83 cases in 2022. (Overall, cases nearly tripled in Michigan in 3 years.)

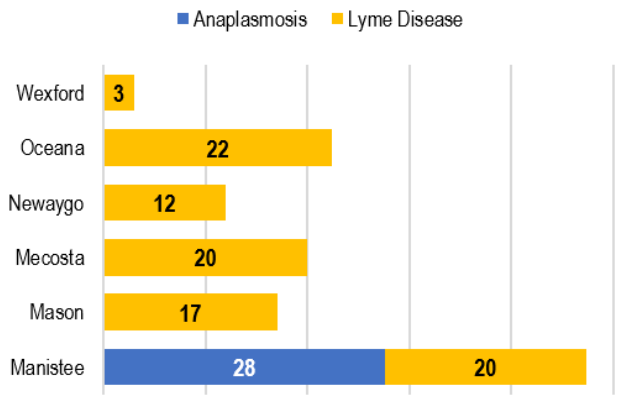
Lyme Disease, the most common tick-borne illness in Michigan, is also a tick-borne disease spread to people by blacklegged ticks. Symptoms are similar to anaplasmosis but also include am erythema migrans skin rash that is characteristic of Lyme disease. Lyme disease can cause a variety of more severe symptoms the longer it is left untreated including facial paralysis, arthritis, heart palpitations, nerve pain, and inflammation of the brain and spinal cord. Rates of Lyme disease for the US is about 5.5 cases per 100,000 people, and for Michigan it's about 8 cases per 100,000 people, while in DHD#10 it is slightly lower at 7.4 cases. Cases are highest in northeastern US states, peak cases are normally in June and July, and most common among men, children under 15, and adults aged 45 to 65 years.

Communicable Disease	2018	2019	2020	2021	2022	2022 Rate per 100,000	5-Year Rate per 100,000
Anaplasmosis	0	0	0	6	7	2.6	**1**
Lyme Disease	13	22	11	21	31	11.7	**7.4**
Total	**13**	**22**	**11**	**27**	**38**	**14.4**	**8.4**

Vector Borne Diseases Trend by Sex, 2018-2022



VBD Rate per 100,000 by County, 2022

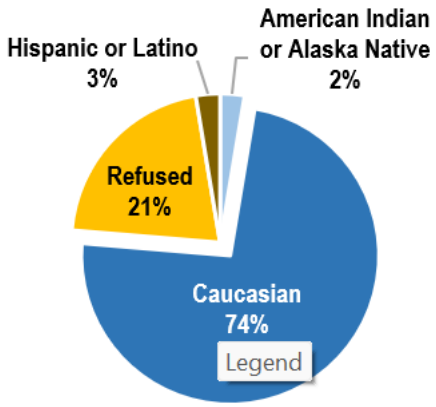


In DHD#10, Manistee County has the highest amount of vector borne diseases (VPDs) in 2022. A higher number of cases in Manistee is not unusual due to the proximity to Lake Michigan and the Manistee National Forrest. All 7 anaplasmosis cases and 16% of Lyme disease cases occurred in Manistee. In 2021, Manistee County was one of four counties in Michigan with the largest increase in anaplasmosis cases from 2020 to 2021. As in the US, VPD cases are more common among men in DHD#10 but rates in both men and women have been increasing over the last 5 years.

ANAPLASMOSIS & LYME DISEASE

2022	Lyme	Lyme Rate per 100,000
Sex		
Female	13	10.0
Male	18	13.3
Age Group		
0-9 years	5	18.0
10-19 years	3	9.1
20-29 years	2	6.6
30-39 years	4	13.8
40-49 years	3	10.8
50-59 years	3	8.4
60-69 years	7	16.5
70-79 years	4	15.0
80+ years	0	0
County		
Crawford	0	0
Kalkaska	0	0
Lake	0	0
Manistee	5	19.7
Mason	5	17.0
Mecosta	8	20.0
Missaukee	0	0
Newaygo	6	11.9
Oceana	6	22.4
Wexford	1	2.9

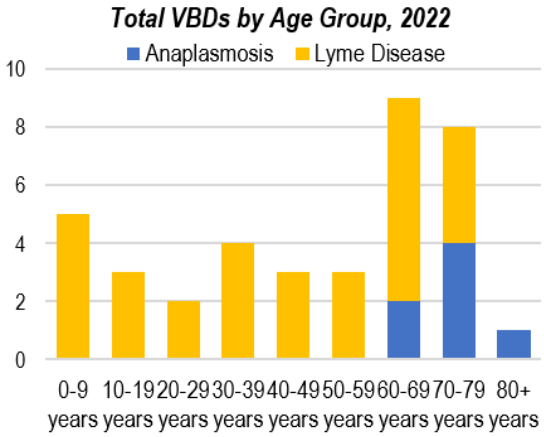
In 2022, there was a high number of cases among the American Indian and Alaska Native population in DHD#10. The AI/AN population makes up about 1% of the DHD#10 total population but accounted for 2% of all VBD cases.

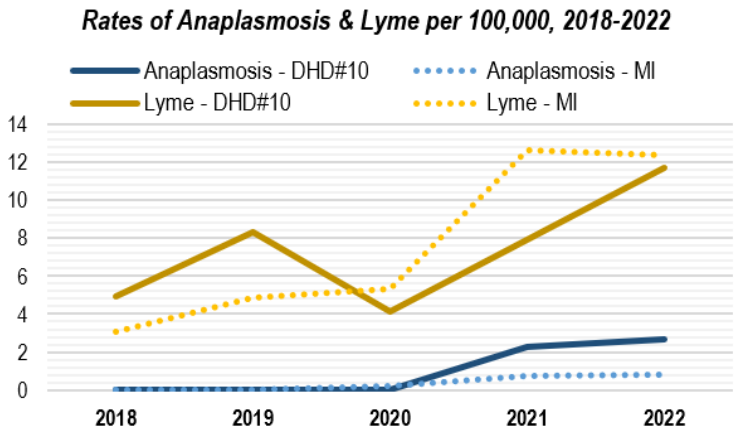


When comparing age groups, the 60-69 and 70-79 age groups had the most VBD cases. All cases of anaplasmosis occurred in those 60 years and older. The largest amount of Lyme disease cases were reported in the 60-69 age group and the 0-9 age group, which is similar to age group trends in the US.

Anaplasmosis is relatively low in Michigan and DHD#10 but DHD#10 has seen slight increases above the state average in the past few years. Anaplasmosis case demographics are suppressed due to potentially identifiable health information but did follow US trends with more cases among men and those over 40 years of age.

Lyme disease is more common and has seen a significant increase in cases over the past 5 years in both Michigan and in DHD#10. The highest rates of Lyme disease in 2022 were found in Oceana county and in the 0-9 age group, while the 60-69 age group has the second highest rate of Lyme disease.





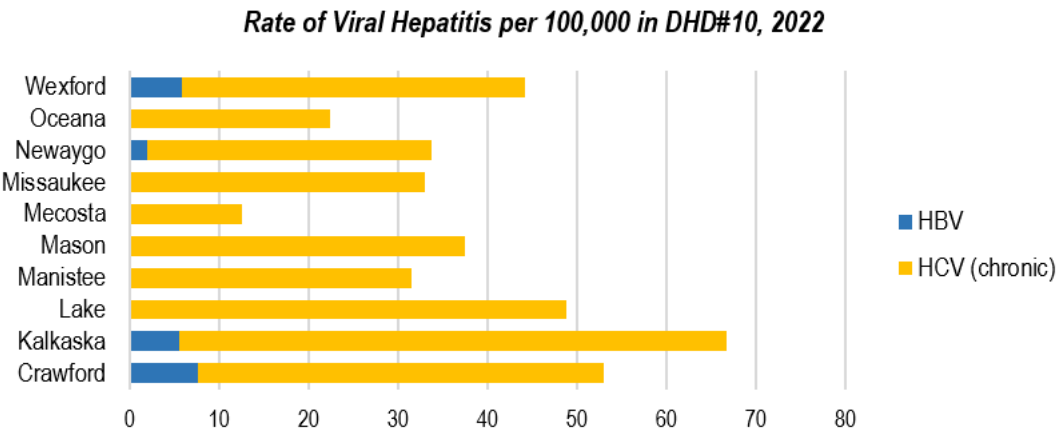
VIRAL HEPATITIS

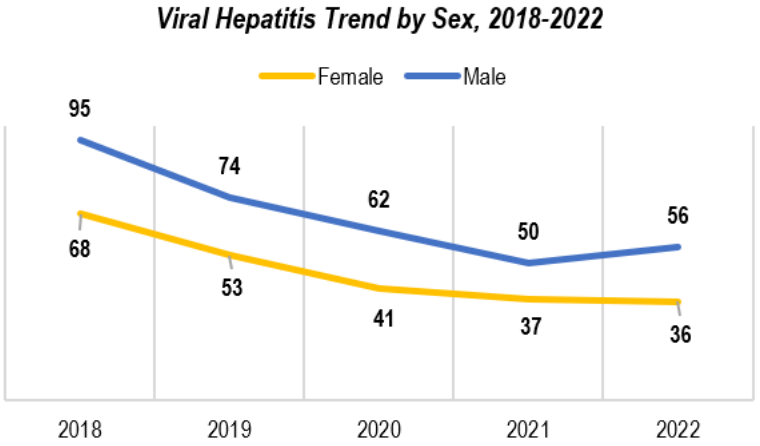
Hepatitis A (HAV) is a virus that infects the liver causing fatigue, nausea, stomach pain, and jaundice, that lasts about 2 months. HAV lives in stool of an infected person, is highly contagious, and transmitted through the fecal-oral route. Vaccines are available to prevent the disease for anyone over a year old. According to the CDC, while anyone can be at risk of HAV, most outbreaks occur among adults experiencing homelessness and adults using injection drugs. As of 2020 the rate of hepatitis A in the US was about 3 cases per 100,000. The most recent 5-year average rate for Michigan and DHD#10 was about 1 case per 100,000 population.

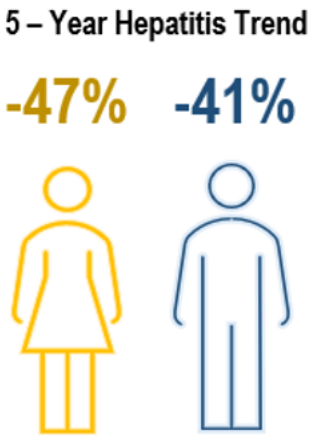
Hepatitis B (HBV) is also a vaccine preventable virus that causes liver infection and can cause symptoms similar to HAV, but most often new infections cause no symptoms at all. There is no cure for HBV and infections can be long lasting, or chronic, leading to increased risk of liver cancer, cirrhosis, and death. HBV is found in blood and some other bodily fluids. The virus can be sexually transmitted and transmitted from parent to fetus during pregnancy. Transmission is also common among those who use injection drugs or those sharing needles or syringes. The rate of HBV in the US is about 5 cases per 100,000 people. The average rate in DHD#10 is much lower than the US at about 2 cases, but in Michigan the rate is much higher at about 10 cases per 100,000 people.

Condition	2018	2019	2020	2021	2022	2022 Rate per 100,000	5-Year Rate per 100,000
Hepatitis A	5	7	1	2	0	0	**1.1**
Hepatitis B	5	2	4	6	5	1.9	**1.7**
Hepatitis C (Chronic)	146	116	85	75	82	31.0	**38.1**
Total	**156**	**125**	**91**	**84**	**87**	**32.9**	**41.1**

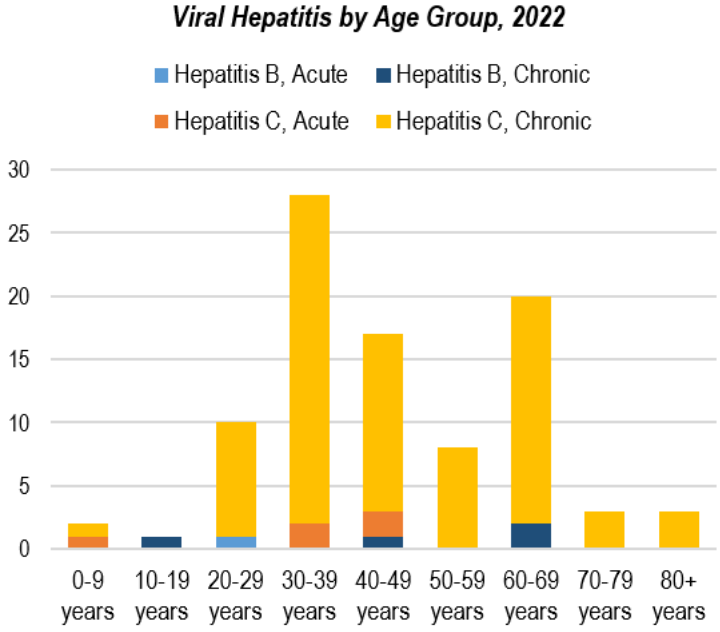
Kalkaska county had the highest burden of viral hepatitis cases with a rate of 67 viral hepatitis cases per 100,000, which is similar to the average rate in Michigan (68 cases per 100,000). Crawford and Lake counties had the next highest rates in DHD#10 with 53 and 49 cases per 100,000, respectively.

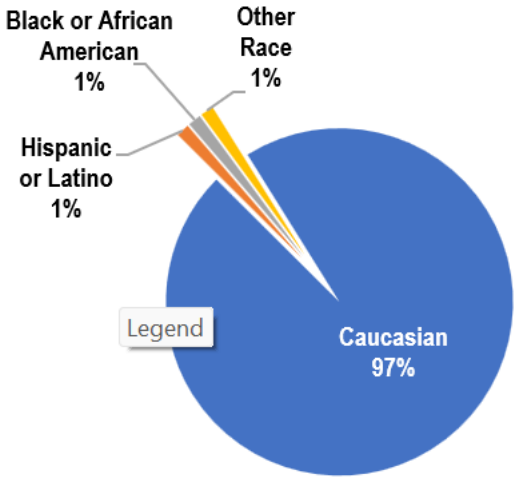






Cases of viral hepatitis tend to be more common in men than women but cases for both men and women have seen a decreasing trend over the past 5 years. From 2018 to 2022, DHD#10 has seen an overall decreasing trend in viral hepatitis incidence. Cases among women have been nearly cut in half since 2018 and cases among men have decreased by 41%. When looking at the difference between age groups, the majority of cases occurred in those aged 20 to 59 years, but the highest rates were actually among those age 60 years and older. Associations between race/ethnicities are not able to be determined due to low case counts and small minority population sizes.





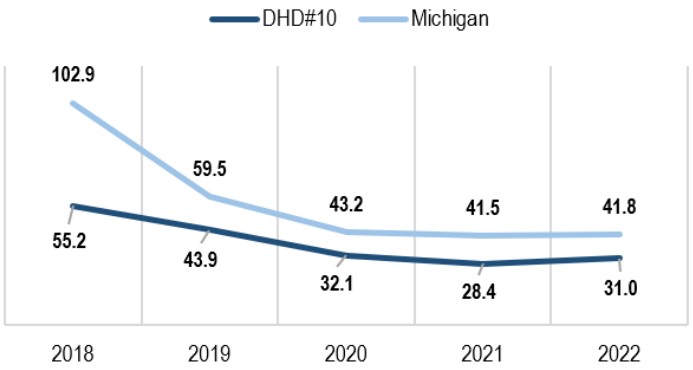
CHRONIC HEPATITIS C

Hepatitis C (HCV) also results in liver disease and is found in the blood, but not other body fluids. Most of the transmission occurs when sharing needles and syringes contaminated with HCV, mostly during injection drug use. Some people develop acute illness, but more than half develop a chronic infection, according to the CDC.

Chronic HCV is a serious health condition as it can result in cirrhosis, liver cancer, and death. There is treatment available that is highly effective in curing most cases of HCV but there is no vaccine to prevent it. HCV is very common in the US, related to the opioid epidemic, with a rate of about 41 cases per 100,000 people. The rate is much higher in Michigan at 58 cases per 100,000. The rate in DHD#10 is lower than the US and Michigan rate at 38 cases per 100,000 people. While these rates are still high, chronic HCV has been decreasing when compared to rates before 2019, which averaged more than 100 cases per 100,000 people in DHD#10. As with other diseases discussed in this report, the rates may have decreased during the pandemic due to decreased testing.

2022	Chronic Hepatitis C	2022 Rate per 100,000
Sex		
Female	36	27.8
Male	56	41.5
Age Group		
0-9 years	1	0.7
10-19 years	0	0.0
20-29 years	9	6.7
30-39 years	26	19.3
40-49 years	14	10.4
50-59 years	8	5.9
60-69 years	18	13.3
70-79 years	3	11.2
80+ years	3	25.4
County		
Crawford	6	45.4
Kalkaska	10	55.6
Lake	6	48.7
Manistee	8	31.6
Mason	9	30.6
Mecosta	3	7.5
Missaukee	5	33.0
Newaygo	16	31.8
Oceana	6	22.4
Wexford	13	38.3

Chronic Hepatitis C Rate per 100,000, 2018-2022



OTHER REPORTABLE CONDITIONS

Carbapenemase Producing – Carbapenem Resistant Enterobacterales (CP-CRE) is an antibiotic-resistant healthcare-associated infection and is transmitted through direct contact. Those in an ICU, needing mechanical ventilation, or using other antibiotics are at higher risk. Location of the infection will cause symptoms to vary but in general symptoms include a fever and chills, coughing if in the lungs, and pain with urination if in the urinary tract. In Michigan, there are an average of 3 CP-CRE cases per 100,000 people compared to 0.3 per 100,000 in DHD#10.

Creutzfeldt-Jakob Disease (CJD) is a prion disease that is always fatal within about one year after illness onset. A prion disease is a disease caused by incorrectly folded proteins that build up in the brain and cause damage. According to the CDC, about 85% of CJD cases are random without a known cause of transmission, the remaining 15% of cases occur due to inherited gene mutations. Symptoms include progressive loss of brain function and mobility, changes in personality, loss of balance and coordination, slurred speech, and vision problems. In Michigan, there are an average of 0.2 cases per 100,000 people while the rate in DHD#10 is even lower as there has only been 1 confirmed case in the last 5 years.

Condition	2018	2019	2020	2021	2022	2022 Rate per 100,000	5-Year Rate per 100,000
MIS	0	0	3	4	4	1.5	**0.8**
Encephalitis	1	0	0	0	1	0.4	**0.2**
Meningitis	19	13	7	5	8	3.0	**3.9**
Streptococcal	50	52	29	25	34	12.9	**14.4**
CP-CRE	0	3	0	0	1	0.4	**0.3**
Creutzfeldt-Jakob Disease	0	0	0	1	0	0	**0.1**
Rabies (Animal)	8	1	1	2	1	0.4	**1**
Rabies (Potential Exposure/PEP)	283	100	42	42	18	6.8	**36.7**
Total	**361**	**169**	**82**	**79**	**67**	**25.4**	**57.4**

**Streptococcal includes invasive Group A and streptococcal pneumoniae*

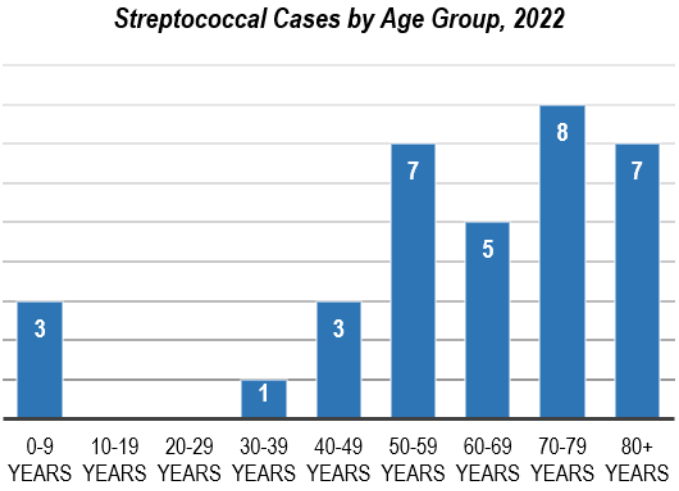
Primary Encephalitis is inflammation and damage of the brain typically caused by one of many viruses. Multiple viruses have been identified that can cause encephalitis, including arboviruses, enteroviruses, herpesviruses, retroviruses, coronaviruses, influenza, vaccine preventable diseases, and others. Symptoms include fever, seizures, headache, sensitivity to light and sound, stiff neck, and loss of consciousness. There are an average of 0.5 primary encephalitis cases per 100,000 in Michigan, and only 2 cases in DHD#10 in the last 5 years.

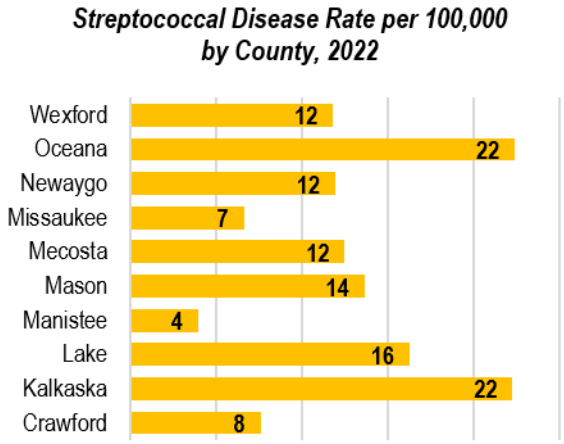
Meningitis can be caused by many different bacterial or viral infections, fungal infections, cancer, and certain drugs. Certain types of bacterial meningitis is potentially deadly within a few hours if not given immediate medical attention. Viral meningitis is the most common and most people get better on their own without complications. Young children, older adults, and those with weakened immune systems are the most at risk for meningitis infections. Symptoms include stiff neck, headache, fever, light sensitivity, drowsiness, and seizures. Rates of meningitis in Michigan and DHD#10 are the same with about 4 cases per 100,000 people.

INVASIVE GROUP A STREP AND STREPTOCOCCAL PNEUMONIA

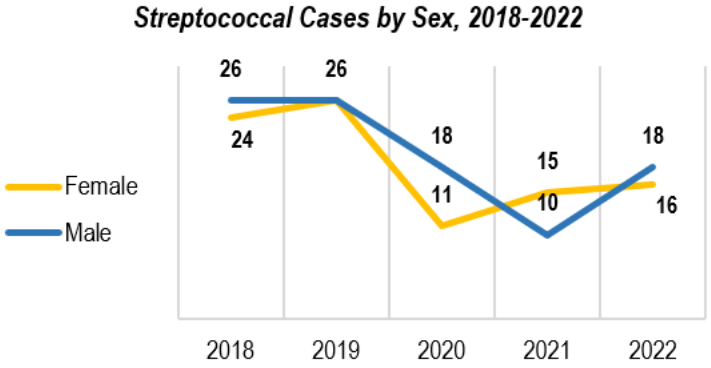
Streptococcal Disease in this report refers to both invasive Group A strep (iGAS) and streptococcal pneumoniae. Invasive disease means the bacteria has spread to areas where bacteria should not be found, such as the blood, bone, deep tissue, spinal fluid, and brain. These infections are potentially fatal and require hospital care. Necrotizing fasciitis is a commonly known example of iGAS. Streptococcal pneumoniae is the bacteria that causes pneumococcal disease and group A strep causes strep throat but healthy people, especially children, can carry it in their respiratory track. It is transmitted through respiratory droplets or, if a carrier experiences a weakening of the immune system, they can develop an active infection.

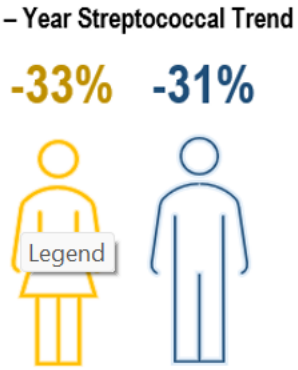
CHRONIC HEPATITIS C





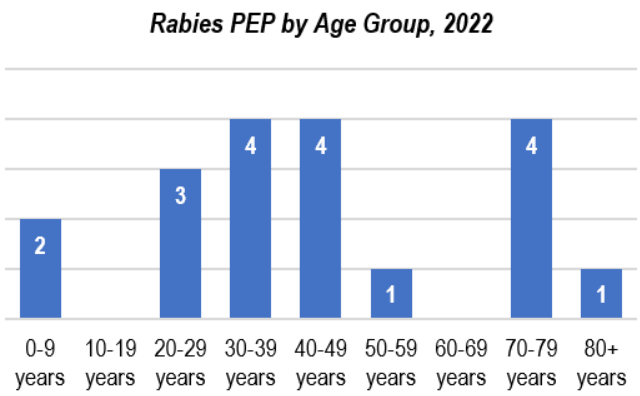
In DHD#10 in 2022, most cases of iGAS and invasive streptococcal infection were reported in Oceana and Wexford counties. The number of cases increased with age, which is likely due to weakening of the immune system. Trends did not differ between men and women. Both sexes have seen an overall decreasing trend of about 30% from 2018 to 2022. Cases were lowest in 2020 and 2021 during the pandemic, increasing slightly from 2021 to 2022. The average rate of these streptococcal diseases in Michigan is

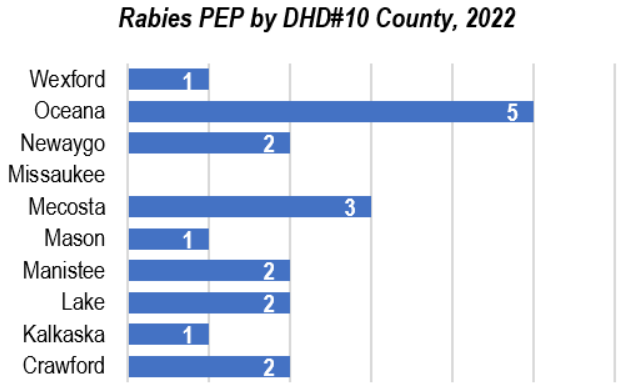




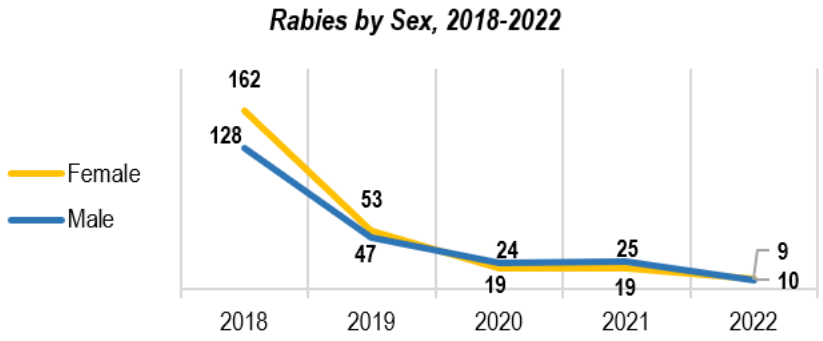
RABIES (ANIMAL & POTENTIAL EXPOSURE/PEP)

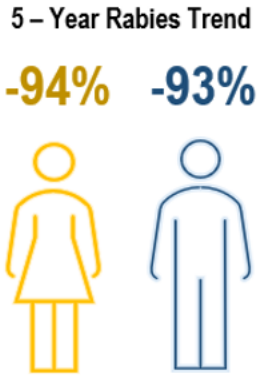
Rabies is a viral disease affecting only mammals, most commonly occurring in bats, raccoons, skunks, and foxes. In the DHD#10 area, the only animal that naturally carries rabies is bats. Although 90% of rabies cases occur in wild animals and cases in humans are rare, contact with bats accounts for 7 out of every 10 deaths from rabies in the United States. Rabies is transmitted most often through the bite of an infected animal to another but can spread through any direct contact with saliva or brain/nervous system tissue from an infected animal. Rabies infection affects only 1 to 3 Americans each year according to the CDC. However, rabies is considered to be uniformly fatal in humans after symptom onset. If exposed to rabies, infection can be prevented with a series of vaccinations and injections of immunoglobulins, known as post-exposure prophylaxis (PEP). Nearly 60,000 people in the US seek post-exposure prophylaxis (PEP) treatment each year.





In DHD#10 in 2022, there was 1 case of rabies reported in an animal and 18 residents were reported to have been given PEP treatment for potential exposure to rabies. Most cases of rabies in animals and potential exposures in DHD#10 occurred in people under the age of 50 in 2022, the largest number of cases was in Oceana county, and no cases or exposures were reported in Missaukee county. There has been significant declines in cases in the past five years, with the largest decrease in cases occurring in 2019 where there were 190 fewer reported cases or exposures than the previous year, and reported exposures have remained low since then, likely due to the COVID-19 pandemic.





CONCLUSION

Excluding cases of COVID-19 and seasonal influenza, total communicable disease decreased from 2018 to 2022 in DHD#10 by about 30% or 600 cases. The emergence of the COVID-19 pandemic in 2020 and the implementation of strategies to decrease the spread of COVID-19, also decreased the spread of other communicable diseases. To an extent, this accounts for part of the decrease in communicable disease from 2020 through 2022. However, DHD#10 reported nearly 200 fewer communicable disease cases in 2019 compared to 2018. This means that although communicable disease was declining slightly before the pandemic, ultimately it was the strategies that were put in place to reduce the negative effects of COVID-19 that caused the decrease in communicable disease rates over the past few years.

Respiratory conditions are the most commonly reported conditions in DHD#10, followed by STIs. This was to be expected due to the COVID-19 pandemic. Excluding COVID-19, STIs were the most reported conditions. The total number of reported conditions in DHD#10 were the highest in the 20-29 age group. This is largely due to the high rate of STIs in this age group specifically. When looking at differences between race or ethnicities, DHD#10 African American and Hispanic or Latino populations are disproportionately more affected by communicable disease. The Hispanic or Latino population saw a significant increase in communicable disease cases from 2021 to 2022 which was attributable to an increase in influenza cases reported in this population in 2022.

Using information such as what is provided in this report, DHD#10 staff continually work to reduce and prevent the spread of communicable diseases in our communities by educating on how to prevent them, investigating cases, and providing testing services.

Food & Waterborne Illnesses

Changes to Be Aware of:

- Higher rate of Cryptosporidiosis in DHD#10 than in Michigan when comparing 5-year average rates
  - 47% decrease in cases from 2021 to 2022
- Campylobacter has been a problem historically for DHD#10. While rates in DHD#10 remain slightly higher than the Michigan average, the difference is not significant and are slightly below the US average
  - 20 cases reported in 2021 compared to only 3 in 2022
- Michigan and DHD#10 have seen increasing cases of Yersinia Enteritis over the past 5 years
  - 0 cases in 2018 and 2019; 8 cases in 2022
  - 76 case in MI in 2019 and 202 in 2022
  - Increasing trend in Salmonellosis in DHD#10 where trend in Michigan is decreasing slightly

Highest Rates:

- Kalkaska County
- Women (varies year-to-year)
- Ages 40 to 69 years (48% of all FBI)

Sexually Transmitted Infections

Changes to Be Aware of:

- 19% decrease in Chlamydia in DHD#10 (17% decrease in Michigan)
- 20% decrease in Gonorrhea in DHD#10 (4% decrease in Michigan)
- High proportion of cases in African American and Hispanic or Latino populations for their population size (18% of all cases, 7% of total population)

Highest Rates:

- Mecosta County
- Chlamydia (most reported condition of any type outside of COVID-19)
- Ages 20-29 years (62% of all STIs)

Respiratory Infections

Changes to Be Aware of:

- Increase in LTBI, especially in women in which cases doubled from 2018 to 2022
  - Ages 40-49 had the highest rate
- High proportion of cases among African American and American Indian or Alaska Native populations
- COVID-19 cases down from 2021
  - Highest COVID-19 rates: Women, 30-39 age group, Mason County population)

Highest Rates:

- Oceana County
- LTBI is most prevalent (excluding COVID-19)
- Men

Vaccine Preventable Diseases

Changes to Be Aware of:

- Decreasing trend in H. influenzae in DHD#10
- Overall decrease in Mumps since 2020 in Michigan
- 65% decrease in overall VPD rate in men from 2018-2022
- Only 2 cases of Chickenpox in 2022, both were in Wexford, no probable or suspect cases supported
- 4 cases of pertussis; occurred in Newaygo and Wexford

Highest Rates:

- Missaukee and Mason counties
- Women
- Ages 0-9 years

Vector Borne Diseases

Changes to Be Aware of:

- Anaplasmosis cases have nearly tripled in Michigan in 3 years
  - In DHD#10 there were 0 cases in 2020 and 7 in 2022
- Increasing trend in Lyme Disease
  - 5-year average rate of 8.4 per 100,000; incidence rate in 2022 was 14 per 100,000
  - Highest rates in men, ages 0-9 and 60-69 years, and in Oceana County

Highest Rates:

- Missaukee and Mason counties
- Women
- Ages 0-9 years

Viral Hepatitis

Changes to Be Aware of:

- Highest reported cases in Kalkaska, Lake, and Crawford
- Mecosta county had 67% lower HCV rate than other DHD#10 counties
- Chronic HCV is still high in DHD#10, Michigan, and the US but rates have been decreasing
  - 44% decrease in DHD#10 since 2018, 59% decrease in Michigan
- HBV rate in DHD#10 is significantly lower than the average rate in Michigan
  - 2 HBV cases per 100,000 in DHD#10, 10 cases per 100,000 in

Highest Rates:

- Chronic HCV, Kalkaska
- Men
- Ages 30-39 age group

Other Reportable Conditions

Changes to Be Aware of:

- Oceana and Kalkaska had the highest rate of streptococcal disease in 2022
  - Overall decreasing trend of about 30% since 2018
- Rabies in animals and exposures/PEP have significantly decreased since 2018
  - Only 1 positive rabies case in an animal reported in 2022Michigan

Highest Rates:

- Rabies exposures/PEP and Streptococcal diseases

SOURCES

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Michigan Disease Surveillance System (2023)

District Health Department #10

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