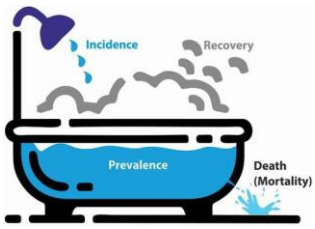
SPARTA PROJECT:
INFECTIOUS DISEASE EPIDEMIOLOGY & SURVEILLANCE CHEAT SHEET

MEASURES OF DISEASE FREQUENCY[1]

The 'epidemiologists bath tub' is a visual to help understand these terms



COUNTS – the most basic measure of disease frequency are counts, which are simply the number of cases of a disease reported or diagnosed
e.g. 'B.C. mpox case count' is number of mpox cases diagnosed in B.C. in total

RATE – a measure of the occurrence of events over a specific interval of time in a specific population
e.g. 'annual mortality rate' is number of deaths per 10,000 population in one year

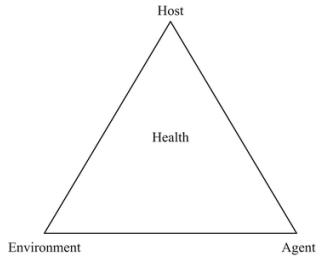
INCIDENCE – a measure of the number of new cases of a disease reported or diagnosed during a period of time
e.g. number of new cases of disease per year

INCIDENCE RATE – a measure of the number of new cases of a disease reported or diagnosed during a period of time in the population of people at risk for the disease
e.g. number of cases of disease per 100,000 people, per year

PREVALENCE - a measure of the total number of cases of a disease at a given point in time (point prevalence) or during specified period of time (period prevalence), expressed as a proportion of the estimated total population at that time
e.g. point prevalence – number of cases of disease, divided by total population as of the 31st December 2018 x 100
e.g. period prevalence - number of cases of disease reported during 2018, divided by total population during 2018 x 100 (only used for diseases that can be cured or resolve)

UNDERSTANDING DISEASE OCCURRENCE & SPREAD[2]

The 'epidemiologic triangle' is a basic model used to explain the causes of outbreaks or epidemics



HOST – Host factors that are often related to outbreaks or epidemics of infectious diseases are; age, sex/gender, race/ethnicity, previous or co-existing diseases, immune status, occupation, sexual behaviors, substance use patterns, number & degree of connectedness of contacts within sexual or drug use networks, etc.

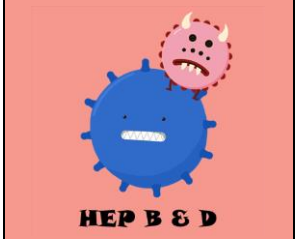
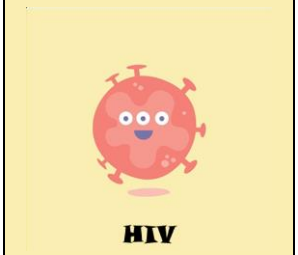
ENVIRONMENTAL – Environmental factors that are often important or related to infectious diseases are; crowded housing, access to testing/treatment, availability of harm reduction, stigma, discrimination, marginalization, poverty, sexism, homophobia, houselessness, local prevalence/probability of exposure, policy/legislation (e.g. criminalization of substance use or sex work), etc.

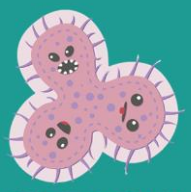
AGENT OR PATHOGEN – how the infection is transmitted (e.g. blood to blood contact), the incubation period (e.g. how long from exposure to symptoms developing), the attack rate (e.g. infectivity or how many people exposed get infected), how long treatment takes or how long people are infectious for, how quickly disease progresses, how long infections last for, the environmental resistance of the agent (e.g. how long it can survive outside a host)

By identifying changes in measures of disease frequency, and the combination of host, environmental, and agent factors that are related to these changes, we aim to identify positive health actions that may be taken or implemented to mitigate or reduce the impact of that disease on the health of both individuals and the population.

[1] https://doi.org/10.1080/24733938.2022.2062897
[2] https://link.springer.com/referenceworkentry/10.1007/978-0-387-09834-0_42

INFECTIOUS DISEASES COVERED BY THE CLINICAL PREVENTION SERVICES SURVEILLANCE & EPIDEMIOLOGY TEAM AT THE BC CENTRE FOR DISEASE CONTROL

	Hepatitis C virus (HCV) - also known as 'hep C', is a virus that can infect the cells in the liver and can cause liver scarring ('fibrosis'), deterioration of liver function ('cirrhosis'), liver failure, and liver cancer. HCV infection can be cleared naturally by about 25% of adults who are exposed. HCV is transmitted through blood-to-blood contact. Prior to 1992, many people who received blood transfusions or blood products were infected with HCV in Canada. Nowadays, the main way HCV is transmitted is through sharing of injecting drug use equipment (including needles/syringes, spoons, drug mixes, etc.). There are medications (called 'DAAs') that can cure HCV infection in as little as 8-12 weeks in almost everyone who is treated. There is no vaccine to prevent HCV infection.
	Hepatitis B virus (HBV) and hepatitis D virus (HDV) - also known as 'hep B' and 'hep D', are both viruses that can infect the cells in the liver. Similar to hep C, infection causes liver damage. HBV infection can be cleared naturally by about 90% of adults who are exposed, even without vaccination, but only 10% of children can clear the infection without prior vaccination. If viral load is detectable, HBV and HDV can be present in both blood, semen, and vaginal fluids, and can be transmitted through unprotected sex, during pregnancy, and through sharing needles, syringes, or other injecting drug use equipment (e.g. spoons, drug mixes, etc.). Hep D cannot infect someone unless they also have hep B infection. When someone has both hep B and hep D infection, liver damage progresses much faster. There is a vaccine to prevent HBV, and medications that can suppress HBV and HDV, but can't cure the infection.
	Human immunodeficiency virus (HIV) causes acquired immune deficiency syndrome (AIDS) if infection is not treated. This is because HIV infects the cells in the immune system, and eventually kills them if virus replication isn't suppressed. If viral load is detectable, HIV can be present in blood, semen, vaginal fluids, and human milk, and it can be transmitted through unprotected sex, during pregnancy, birth, or chest feeding, and through sharing needles, syringes, or other injecting drug use equipment (e.g. spoons, drug mixes, etc.). There is no vaccine to prevent HIV, but there are medications that can prevent infection if taken prior to or immediately after exposure (PEP or PrEP). For people who acquire HIV infection, there are medications that can suppress the virus, but can't cure the infection, and there is no vaccine.
	Syphilis is caused by a bacteria called *Treponema pallidum pallidum*. Syphilis infection occurs in stages: primary, secondary, early latent and late latent. It is infectious and can be passed on during primary, secondary and early latent, but not during late latent stage. Syphilis is often called the 'great imitator' because it appears to be like many other infections or conditions, and is difficult to diagnose. Exposure to body fluids when there are tiny cuts, or breaks in the skin or mucous membranes of the external genitalia or mouth and unprotected sexual contact can transmit syphilis infection. Syphilis can also be passed on from sharing contaminated needles, direct contact with a skin lesion on an infected person, and during pregnancy or birth. Syphilis infection was rare in Canada for many decades, but made a resurgence in the early 2000s, particularly among among gay, bi, and queer men. Infectious syphilis cases have increased among heterosexual people in recent years, and congenital syphilis cases have more than quadrupled in Canada between 2017 and 2020. While syphilis can be cured with antibiotics, if untreated, irreversible damage to the brain, nerves and other organs may occur.

	Chlamydia is caused by a bacteria called *Chlamydia trachomatis*, and is one of the most prevalent STIs in Canada. Symptoms are usually relatively mild and can often go unnoticed. It is transmitted through unprotected sex and can occur in the penis or external genitals, vagina or internal genitals, anus, throat and eye. The bacteria can also be found in body fluids such as semen, pre-ejaculate, vaginal fluids, and anal fluids. If left untreated, chlamydia can cause serious complications, and infection during birth can result in complications for the infant. There is no vaccine to prevent chlamydia infection but it is treated easily with antibiotics.
	Lymphogranuloma venereum (LGV) is a disease caused by a rare but aggressive form of the same bacteria that causes chlamydia. Unlike chlamydia, LGV symptoms are very noticeable and painful. Fortunately, LGV is rarer than regular chlamydia. It can be a nasty infection and impact long-term health if untreated. Recently, large cities like Vancouver have seen a sharp increase in LGV cases exclusively among gay, bi, and queer men, particularly among those who are living with HIV. Treatment for LGV takes a little bit longer than treatment for chlamydia, but also involves antibiotics. There is no vaccine against LGV.
	Gonorrhea is an infection caused by a bacteria called *Neisseria gonorrhoeae.* Many people who have gonorrhea experience no or very mild symptoms. It is transmitted through unprotected sex and can occur in the penis or external genitals, vagina or internal genitals, anus, and eye. The bacteria can also be found in body fluids such as semen, pre-ejaculate, vaginal fluids, and anal fluids. If left untreated, gonorrhea can spread to the blood and cause a systemic infection called disseminated gonococcal infection (DGI). DGI may result in joint pain and skin rashes, and may be life threatening. There is no vaccine to prevent gonorrhea infection but it can be treated easily with antibiotics.
	Mpox (formerly known as 'monkeypox') is an illness caused by a virus. Mpox infection generally resolves on its own without treatment, although people may require pain management. Transmission of mpox can occur from direct contact with the blood, bodily fluids, wounds, or mucosal lesions of infected animals whether they are dead or alive. Transmission from human to human of mpox can occur from close contact with respiratory secretions and skin lesions of infected people or contaminated surfaces. The smallpox and monkeypox viruses are both orthopoxviruses, and the smallpox vaccine is effective against mpox for 3–5 years after vaccination.
	Tuberculosis (TB) is caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually infect and damage the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. There is a vaccine against TB, but it is not broadly effective, therefore it is usually only administered in settings with very high TB prevalence or risk of infection. Treatment is available for both TB disease and LTBI. If not treated properly, TB disease can be fatal.
	Creutzfeldt–Jakob disease (CJD) is caused by accumulation in brain tissue of a type of abnormal misfolded protein known as a "prion". Most CJD cases arise spontaneously in a person, known as 'spontaneous CJD' (sCJD) or due to inherited mutations, known as 'familial CJD' (fCJD). Consuming products from a cow with Bovine spongiform encephalopathy (BSE) (commonly known as 'mad cow disease') can result in developing 'variant CJD' (vCJD). If a person is exposed to the blood, brain or spinal tissue of a person with any form of CJD, they may also develop it, which is known as 'iatrogenic CJD' (iCJD). There is no treatment for CJD and it is always fatal.