

## Course Learning Outcomes for Unit V

Upon completion of this unit, students should be able to:

1. Assess current public health developments in the community.
  - 1.1 Describe an infectious disease in your community and how it is transmitted.
  - 1.2 Discuss the importance of controlling infectious diseases in the community.
  
3. Discuss the different public health disciplines' impact on population health.
  - 3.1 Explain the effectiveness of public health interventions to diagnose, treat, and prevent infectious diseases.

Course/Unit Learning Outcomes	Learning Activity
1.1	Unit Lesson Chapter 9: The "Conquest" of Infectious Diseases Video: <i>Vaccines: An Unhealthy Skepticism</i> Video: <i>Biotechnology for Better Health</i> Unit V Case Study
1.2	Unit Lesson Chapter 9: The "Conquest" of Infectious Diseases Video: <i>Vaccines: An Unhealthy Skepticism</i> Video: <i>Biotechnology for Better Health</i> Unit V Case Study
3.1	Unit Lesson Chapter 10: The Resurgence of Infectious Diseases Video: <i>Vaccines: An Unhealthy Skepticism</i> Video: <i>Biotechnology for Better Health</i> Unit V Case Study

## Reading Assignment

**Chapter 9:** The "Conquest" of Infectious Diseases

**Chapter 10:** The Resurgence of Infectious Diseases

### Additional Required Materials:

*In order to access the following resources, click the links below.*

Retro Report (Producer). (2015). *Vaccines: An unhealthy skepticism* [Video file]. Retrieved from <https://libraryresources.columbiasouthern.edu/login?auth=CAS&url=http://fod.infobase.com/PortalPlayslists.aspx?wID=273866&xtid=142591>

Please note: There is a curse word at 9:34 in the above video. If you would prefer not to hear this word, please skip ahead.

To view a transcript of this video, click on the "Transcript" tab near the top right corner of the page.

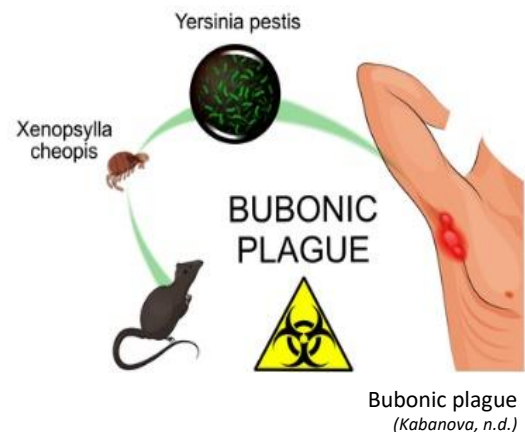
Actuality Films (Producer). (1988). *Biotechnology for better health* (Segment 3 of 7) [Video file]. Retrieved from <https://libraryresources.columbiasouthern.edu/login?auth=CAS&url=http://fod.infobase.com/PortalPlays.aspx?wID=273866&xtid=33055&loid=57770>

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## Unit Lesson

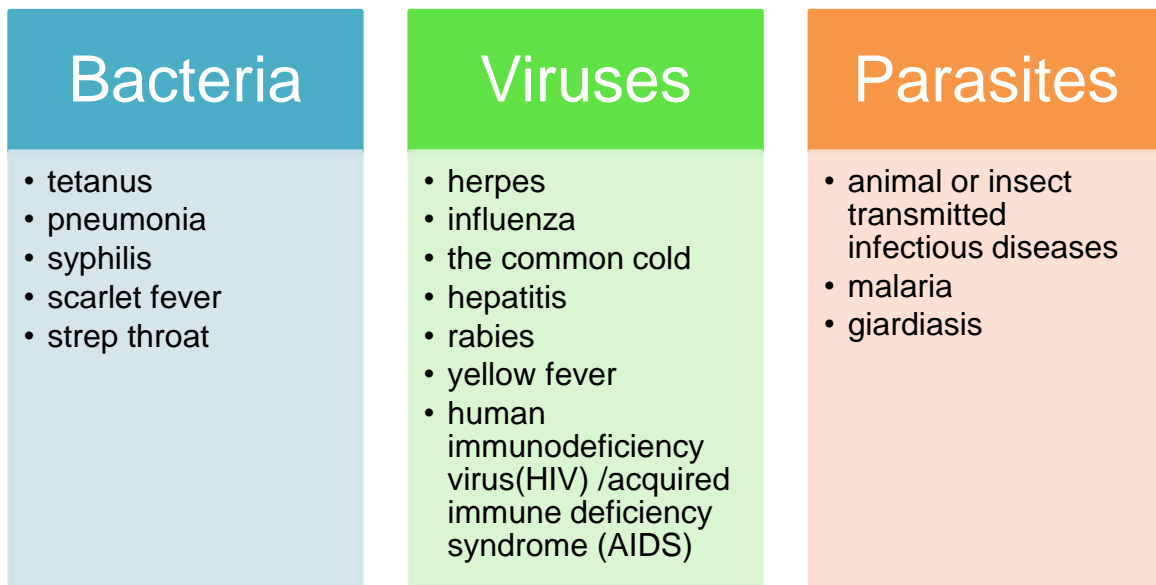
In May 2018, the Centers for Disease Control and Prevention (CDC, 2018) released a report that stated that diseases from flea, mosquito, and ticks bites have increased in the United States between 2004 and 2016. The report explained that over 640,000 cases of diseases and viruses, like Lyme, dengue, and Zika, were reported between those years. Researchers at the CDC further posited that nine new germs that spread by bites from infected ticks and mosquitoes were either introduced or discovered in the local and state communities of the United States (CDC, 2018).

Infectious diseases have existed as far back as anyone can imagine with the continuous rise of more pathogens being discovered as seen above. One of the major infectious diseases of all time was from the Black Death or the bubonic plague in the 14th century that killed at least 75% of Asians and Europeans, and later there was the tuberculosis plague of England in the 19th century (Schneider, 2017). The 19th century was particularly plagued with other diseases, like smallpox, cholera, and typhoid. However, with the emergence of public health interventions, including the creation of antibiotics, water purification, milk pasteurization, immunization, and proper sewage disposal, infectious disease outbreaks have been reduced tremendously. Epidemiologists and researchers work tirelessly to ensure that with the emergence or reoccurrence of any disease, they have the information possible to stop the disease from spreading.



## Emergence of Infectious Diseases

Major infectious diseases are caused by parasites, bacteria, and/or viruses. The below graphic outlines examples of these types of infectious diseases.



Examples of types of infectious diseases  
(Schneider, 2017)

There are various routes in which infectious diseases are transferred. It can result from direct contact or indirect through infected food, water, or vectors, such as animals and insects. Other infectious diseases are transmitted by air through sneezing, coughing, or water droplets, especially diseases like tuberculosis. Individuals could also be infected through infected objects touched by infected people, like sharing utensils with an infected tuberculosis patient. Other gastrointestinal infections are transferred from fecal to oral, such as diphtheria and cholera; these infectious diseases are mostly common when people come in contact with contaminated water. Vector-borne diseases, like yellow fever and malaria, are also common, especially in tropical areas.

One particular detail to note is that some people are carriers of diseases without being physically sick themselves. One particular story in the early 20th century was that of Mary Mallon, a cook in New York (Schneider, 2017). After resisting medical tests, it was proven that Ms. Mallon was an asymptomatic typhoid fever carrier. Her victims were rich clients in New York who fell sick or died, and as a result, she was quarantined for the rest of her life.

Epidemiologists have to be mindful of the chain of infection in infectious diseases. The pathogen is the parasite, virus, or bacterium. The *reservoir* is the place of residence of the pathogen. For example, raccoons are a reservoir for rabies, and contaminated food and water are reservoirs for cholera.

Pathogens also need to have a method of transmission from the host to another host. For example, the infectious disease gonorrhea's method of transmission is through sexual contact. If an infectious disease has to be transmitted, there needs to be a susceptible host. Some people encounter infected people with diseases, such as HIV, but for some reason are not infected themselves. In addition, some people may not be susceptible hosts due to immunization. People who are vaccinated from the hepatitis B virus have a lower chance of contracting the disease from an infected person.

## Curbing Infectious Diseases

Public health officials try to control the spread of infectious disease by encouraging routine checkups and exercising preventive measures. These include keeping the environment clean, using protective measures during sexual contact, reporting infectious disease diagnosis to either a provider or partner, and getting

immunizations, among other behaviors. In the United States, for example, many states have implemented laws that impose a jail and fine penalty on anyone who knowingly does not disclose HIV status to his or her partners (CDC, n.d.-b). This is a public health attempt to reduce the spread of the disease.

Additionally, in all hospitals and clinics, contact tracing is recommended whereby all partners of the newly diagnosed patient are contacted for testing and reporting. Some of these notifiable diseases include syphilis and gonorrhea. Another popular method of trying to curb a disease is through quarantine, whereby the host or infected person with a disease, such as the Ebola virus, tuberculosis, or severe acute respiratory syndrome (SARS), is quarantined.

As a result of public health surveillance and drastic measures, several diseases have been eradicated or contained. Some of these infectious diseases are severe acute respiratory syndrome (SARS) in 2003, Ebola in 2014, and smallpox in 1977 (Schneider, 2017). Some other diseases, such as measles and polio, could also be contained or eradicated in a couple of years. Polio, for example, is still found in three countries, including Nigeria, where individuals are reluctant to be vaccinated due to superstitious beliefs.

### **The Problem With Vaccinations**

It is obvious to public health officials how beneficial immunization is in reducing the spread of several infectious diseases. It is, however, no mistake that immunization is still a widespread controversial topic as seen above with the Nigerians who reject the polio vaccine for fear that it causes infertility. Another controversial setback in the United States is a fear that immunizations, such as the measles, mumps, and rubella (MMR) vaccine, cause autism (Schneider, 2017). Other parents have resisted the whooping cough or pertussis vaccine for fear that it causes sudden infant death syndrome (SIDS).

After several researches done in the United Kingdom and Denmark, these claims were proven to be false (Schneider, 2017). Vaccines do have side effects; the most common being mild fever or swelling at the site of the vaccine. However, the benefits of vaccination have always outweighed the devastation the disease can cause in case of an outbreak. Whooping cough, for example, could be extremely deadly among infants.

Public health officials in various states have developed laws that children should be vaccinated before starting school. Some states have exemptions, including religious and personal beliefs, but a few communities are rethinking those laws. In Orange County, California, for example, there was a measles outbreak at Disneyland, which was not strange considering that only 60% of children have been vaccinated in that county (Schneider, 2017). As a result, the personal belief exemption was abolished in Orange County in 2015.



Child vaccinations  
(Perutskyy, 2016)

### **Reoccurring Infectious Diseases**

In spite of public awareness, many are still exposed to HIV through sexual contact or needle sharing. Needle sharing could be from people using recreational drugs or from developing countries where one needle is used for many patients due to poverty. The World Health Organization (WHO; as cited in Schneider, 2017) posits that more than 4% of injections worldwide are done using unsterilized needles, exposing many people to infectious diseases, especially HIV.

The first antiviral medication for HIV was approved in 1987, and since then, there have been tremendous improvements in antiviral medications for HIV (Schneider, 2017). Researchers are working on a vaccine to prevent the spread of the disease, especially in developing countries and with minority groups where the prevalence is extremely high. Public health educators are also working tirelessly to continue to educate communities on healthier behaviors and routine check-ups.

Another reoccurring disease that seems to emerge and vanish is the Ebola virus. The deadly disease was first noticed in 1976, silently spreading in rural African regions, especially in Sudan and Zaire. The disease

spread like wildfire, killing family members and medical personnel (Schneider, 2017). A major outbreak in 2014 spread in West Africa with Sierra Leone, Liberia, and Guinea being most hit.

The number of recorded fatalities exceeded 11,000 people (Schneider, 2017). Eric Duncan, a Liberian who died a few days after his arrival in Dallas, Texas, unfortunately brought the Ebola virus to the United States. Two of his nurses contracted the disease but survived. Another doctor, Dr. Craig Spencer, who contracted the disease while treating other victims of the virus in Guinea, was brought to the United States and recovered (Schneider, 2017). Another doctor, Dr. Ian Crozier was also brought to the United States from Sierra Leone and recovered after almost losing his eyesight to the disease.

Many believe that the drug ZMapp may have assisted the nine patients who recovered in the United States, but this was not the case in African countries. The disease seemed to have been contained, but people still fear the reoccurrence of the disease, especially since it was widespread among monkeys (Schneider, 2017). Many people are also beginning to rethink exotic pets.

Influenza virus is another difficult infectious disease because of its constant mutation (CDC, n.d.-c). One common location of the influenza virus is China because of the many pigs and birds found in that part of the continent. Influenza was initially discovered around 1918 after it claimed the lives of over 35 million people worldwide (Schneider, 2017).

Other viruses in the influenza family include the bird flu and avian flu. Influenza is one of the diseases that epidemiologists are constantly reviewing and encouraging people to get the immunization every year. The CDC, for example, reported that influenza is underreported on death certificates, and many patients do not get tested for seasonal influenza infections (CDC, n.d.-a). Child-related deaths are the only influenza deaths that are considered notifiable diseases, so it is difficult to figure out exactly how many people die from influenza in the United States.

## Conclusion

The Institute of Medicine and other public health agencies are constantly addressing social, demographic, and environmental factors that could lead to the emergence or reoccurrence of infectious diseases. Global surveillance is particularly important considering that the world has become a small village; people could be in three or more continents in one week.

## References

- Centers for Disease Control and Prevention. (n.d.-a). Estimating seasonal influenza-associated deaths in the United States. Retrieved from [https://www.cdc.gov/flu/about/disease/us\\_flu-related\\_deaths.htm](https://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm)
- Centers for Disease Control and Prevention. (n.d.-b). HIV-specific criminal laws. Retrieved from <https://www.cdc.gov/hiv/policies/law/states/exposure.html>
- Centers for Disease Control and Prevention. (n.d.-c). How the flu virus can change: "Drift" and "shift." Retrieved from <https://www.cdc.gov/flu/about/viruses/change.htm>
- Centers for Disease Control and Prevention. (2018). Illnesses on the rise. Retrieved from <https://www.cdc.gov/vitalsigns/vector-borne/>
- Kabanova, V. (n.d.). *Bubonic plague (ID 81459996)* [Image]. Retrieved from <https://www.dreamstime.com>
- Perutsky, P. (2016). *Child vaccinations (ID 83813211)* [Photograph]. Retrieved from <https://www.dreamstime.com>
- Schneider, M.-J. (2017). *Introduction to public health* (5th ed.). Burlington, MA: Jones & Bartlett Learning.