

# Infectious Disease

## Introduction

An infectious disease is an illness that is caused by microorganisms such as viruses, bacteria, fungi, protozoa, or worms. These microorganisms normally live in us and around us, but in some scenarios they are pathogenic, meaning they can cause infection. An infectious disease is communicable, meaning it can be transmitted, or spread, to susceptible people. Direct and indirect transmission are the two ways infectious diseases can be spread. Direct contact includes any scenario where a susceptible person has direct contact with an infected individual. Indirect transmission includes scenarios where an infected individual coughs, sneezes, or otherwise sends infectious droplets into the air or on surfaces, that a susceptible person comes in contact with. Chicken pox, tuberculosis, influenza, SARS, and the common cold are all infectious diseases. Some have vaccines for prevention or treatment for infection, but the large number of infectious diseases that cannot be prevented or treated pose a significant threat to human health.

[The Reportable Infectious Diseases in Maine 2019 Summary](#) recorded *Chlamydia trachomatis* infection, chronic Hepatitis C, and Lyme disease as the top three reportable infectious diseases in Cumberland county in 2019, at rates of 352.2, 173.2, and 120.0 per 100,000 people, respectively. There were 225 confirmed reportable infectious disease outbreaks in Maine in 2019, which is comparable to the [254 in 2018](#) and [230 in 2017](#).

## Emerging Infectious Disease

A particularly alarming threat to human health is emerging Infectious diseases (EID). An EID is classified as an infectious disease that is novel or is increasing in severity, geographic range, or frequency ([McArthur, 2019](#)). Often, emerging infectious diseases are zoonotic, meaning they can be spread between humans and animals. Commonly known EIDs include vector borne diseases like Zika, Dengue, Yellow Fever, and Chikungunya. Notably, EID occurrence has increased in frequency and severity over the past several decades, in part as a result of increased population density, poverty and social inequality, climate change, globalization, and land use changes ([McArthur, 2019](#)). The increased risk of infectious diseases and EIDs pose a significant threat globally, and Mainers are not exempt; thus, strengthening plans for outbreak and capabilities to prevent, respond to, and recover from outbreaks will be vital to protect Maine residents.

## Infectious Disease Vulnerability

In the most basic sense, an individual is susceptible to an infectious disease when immunity has not been established against the pathogen. There are many host, agent, and environmental factors that influence vulnerability to infectious diseases. At the host level, age, sex, immune function, and infection history all influence susceptibility and the severity of infection ([Casadevall and Pirofski, 2018](#)). The agent's ability to cause infection, referred to as pathogenicity, relies on a number of factors, but additively influence the risk of an individual becoming infected. Lastly, many environmental factors have been shown to affect vulnerability to disease. For example, climate change and land use changes have increased risk of pandemic influenza outbreaks ([Vandegrift et al., 2010](#)). Additionally, infectious disease threats increase in the wake of natural disasters such as hurricanes and floods ([Watson et al., 2007](#)). Research on vulnerability to infectious diseases is becoming increasingly available and are a vital resource in identifying risks among the population in order to create pandemic of infectious disease plans.

## COVID-19 Pandemic

The COVID-19 pandemic, caused by the virus Sars-CoV-2, began to take the world by storm in late 2019, and in March 2020, Maine began its shutdown. Information about COVID-19 and strategies to combat it have been regularly evolving in the past year, meanwhile 729 Mainers (184 Cumberland County residents), and 2.73 million people worldwide have died as a result of the virus ([New York Times, 2021](#)). Infectious disease plans, at least in the most basic sense, exist at the local, state, national, and global level; however, the lack of information about Sars-CoV-2 at the start of the pandemic created many challenges in responding to it. Although the pandemic is still affecting most of the world, we have already identified strengths and weakness in planning, response, and recovery to be addressed moving forward.

The Cumberland County Pandemic/Infectious Disease Annex 2020 was drafted just before the pandemic took hold of the state. The purpose of this document was to plan to address potential challenges that would come with a pandemic, using guidelines from the World Health Organization, the U.S. Centers for Disease Control and Prevention, and the Maine CDC. The Pandemic Plan outlined strategies to work closely with the U.S. CDC and Maine CDC to disseminate information; support communities, critical infrastructure, and local EMA directors; provide guidance for recovery efforts; support operational plans for pandemics, including a chain of leadership from the federal level down to the local level; and assist in acquiring resources. In the scope of pandemic response, the Cumberland County Emergency Management Agency's (CCEMA) role is to provide logistical support to the municipalities and partners of the county by acting as a central coordinator. The U.S. and Maine CDC, in conjunction with state leadership, outline guidelines and strategies and impose mandates, which the CCEMA disseminate and support. As an agency that specializes in logistics, the CCEMA has strong capabilities to fulfil their role in pandemic response and recovery; but still, there were challenges that came with the novel pandemic that can be used to create future plans.

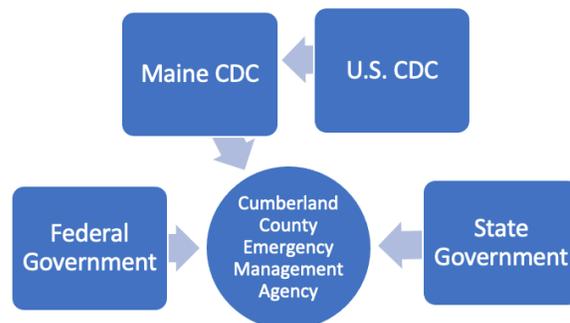


Figure 1. The dissemination of COVID-19 guidelines from federal and state agencies to CCEMA.

As outlined in CCEMA's 2020 Annual report, there were many agency successes in 2020 relating to COVID-19 response. For example, CCEMA processed 647 Personal Protective Equipment (PPE) requests, which served 382 different agencies in Cumberland County. Additionally, CCEMA provided assistance to municipalities in navigating the FEMA public assistance reimbursement program, convening workshops to prepare to activate an alternate care site for COVID-19 patients, and by supporting EMS departments

in vaccinating county safety personnel. On the other hand, if weakness in planning and response could be identified and reflected on, perhaps in the form of an After-Action Report (AAR) post-COVID-19 Pandemic, CCEMA could use those reflections to build stronger pandemic plans in the future.

### Strategies for Mitigation

As infectious disease outbreaks become more severe and frequent, the production and dissemination of evidence-based research concerning infectious diseases is improving. This information will be an important research in hazard mitigation and pandemic planning moving forward. For instance, as more research on COVID-19 is conducted, the World Health Organization and U.S./Maine CDC updated guidelines and strategies that CCEMA can disseminate and support. The many successes and shortcomings that the county experienced in planning for a pandemic and responding to COVID-19 can, and should, be used to improve these capabilities, as future infectious disease outbreaks are inevitable.