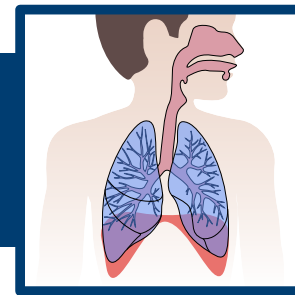


Student Background

LESSON 1: MAPPING PULMO PARK

Activity 1C: *Poster Presentation*



**TEXAS BIOMEDICAL
RESEARCH INSTITUTE**
HEALTH STARTS WITH SCIENCE

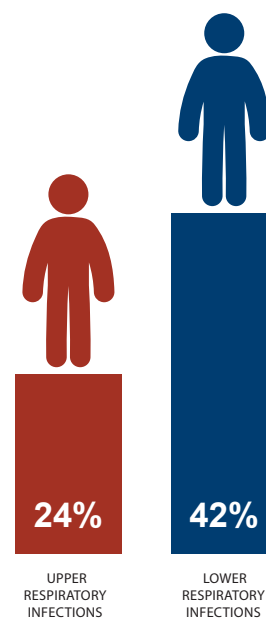
As reported by the World Health Organization, globally more than 1.5 million deaths annually from respiratory infections are attributable to the environment, including at least 42% of lower respiratory infections and 24% upper respiratory infections. Our respiratory and immune systems have defense mechanisms to protect against organisms and foreign matter that enter through the nose and mouth. These “invaders” are trapped by hair or mucus, breathed out again, coughed up, swallowed, passed out through the intestines or destroyed in the digestive system. But when this system fails, things can go wrong in the respiratory system.

Illnesses such as the common cold (caused by over 200 different viruses), influenza (commonly called the flu), and pneumonia (caused by viruses, bacteria, and fungus) contribute to respiratory issues. Of great concern is the virus which causes COVID-19. According to the Center for Disease Control (CDC), this virus is spread from person to person primarily through respiratory droplets. These droplets are produced by infected individuals and spread by sneezing, coughing, or even talking! These droplets are not visible but can be inhaled through the nose and mouth where the virus can move to infect the lungs. The COVID-19 virus is a “community spread” virus, meaning it can easily spread within a community. Health professionals use contact tracing to slow the spread COVID: identifying who infected individuals have been in contact with controls the spread of COVID.

The COVID-19 virus has resulted in a worldwide pandemic which means the disease has spread over a wide geographical area. In this case, COVID-19 has spread around the world. Wearing face masks is important to limit the spread of COVID-19 by reducing the number of virus-carrying droplets released into the air. Masks provide protection against breathing in virus-carrying droplets which remain suspended in the air. These droplets can remain suspended in the air for hours, but also land on surfaces. Our hands touch all types of surfaces which may have been exposed to droplets carrying COVID-19. Washing hands regularly throughout the day is also an important preventative measure. To remove the COVID-19 virus, wash your hands for 20 seconds with warm water and soap. Other protective measures include maintaining social distancing, avoid touching your face with your hands, and if eligible, get vaccinated.

Another common lung illness is bronchitis in which the membranes lining the larger bronchial tubes become inflamed causing an excessive amount of mucus to be produced. Bronchitis is caused by the same viruses that cause colds but can also be caused by bacteria. Bronchitis can be acute (short-term) or chronic (long-lasting). In an attempt to get rid of excess mucus, the body generates a strong cough. Although rare, there have been documented cases of strong, prolonged coughing which have caused cracked ribs.

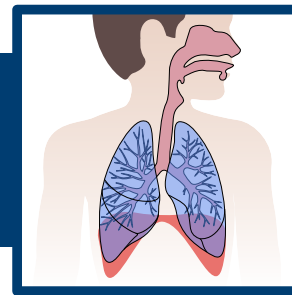
**1.5 MILLION DEATHS ANNUALLY
FROM RESPIRATORY INFECTIONS**



*As reported by the [World Health Organization](https://www.who.int)

LESSON 1: MAPPING PULMO PARK

Activity 1C: *Poster Presentation*



Sometimes family genetics or home environments make people more susceptible to lung issues, such as cystic fibrosis and asthma. Cystic fibrosis is a genetically inherited disease in which the body produces thick, sticky mucus. The mucus clogs bronchioles and alveoli which decreases oxygen diffusion. The thick mucus traps bacteria. These bacteria cause chronic lung infections and can even lead to respiratory failure.

Respiratory issues, such as asthma, can be triggered by the environment. According to the CDC, nearly 25 million people in the United States have asthma. It is the number one reason students chronically miss school. Asthma flares involve contraction and swelling of the muscles around the tiny airways. The resulting narrowing of the airways prevents air from flowing properly, causing wheezing and difficulty breathing, sometimes to the point of being life-threatening.



Cigarette use and vaping can damage lung tissues causing lung diseases which can lead to death. Two such diseases are chronic obstructive pulmonary disease (COPD) and lung cancer. COPD is a term that describes two lung diseases: chronic bronchitis and emphysema. Unlike acute bronchitis, chronic bronchitis can last for months or years. The constant inflammation of bronchial tubes generates more mucus which can lead to frequent lung infections and decreased airflow. Emphysema is associated with long term smoking. Smoking damages the alveoli which decreases oxygen diffusion. The body has a tremendous capacity to heal, but as we age, the body's ability to repair itself is reduced. Often, people who have COPD or emphysema need oxygen support for the rest of their lives, impacting their quality of life and limiting their ability to engage in physical activities.

Cigarettes are a known carcinogen, meaning smoking has been scientifically proven to cause of cancer. Lung cancer is caused when cells, damaged by particulates and chemicals within cigarette smoke, undergo abnormal growth. These cancerous cells continue to multiply, creating tumors which interfere with or block normal respiration. Symptoms of lung tissue damaged by cancerous tumors may include a persistent cough that may bring up blood, chest pain, hoarseness, and shortness of breath.

Another disease most frequently associated with the respiratory system is tuberculosis (TB). TB is caused by a bacterium (*Mycobacterium tuberculosis*) which usually attacks the lungs but can attack other body parts, including kidneys, spine, and brain. Like other respiratory infections, TB is spread through the air when infected individuals cough, speak or sing! Most people's immune system can fight the TB bacteria, preventing it from growing without making you sick (latent TB). Active TB symptoms include chest pain, a bad cough lasting more than 3 weeks which contains blood. Other symptoms include fever/chills, fatigue, and weight loss. Treatment for active TB includes several drugs taken over 6 to 9 months. Taken as prescribed, these medications can kill all TB bacterium. Without treatment, active TB can be deadly.

Although some respiratory diseases can't be prevented, many can be avoided by adopting healthy habits such as not smoking cigarettes and e-cigarettes, not abusing inhalants, wearing masks as directed, and washing your hands frequently to reduce bacterial and virus transfer.