



From Pathogens to Pandemics: Systems of Control

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This unit's genesis came from hearing students talk about their experiences during the COVID-19 pandemic—a time when everything felt out of control. That feeling was shared by adults and students alike. Even after returning to school, the presence of the disease remained, and the sense of helplessness lingered. This unit is a response to that feeling—that when everything feels out of your hands, there are still things you can do. There are ways to take control back.

The unit will be taught to 11th-grade honors biology students and covers key biological concepts through the lens of infectious respiratory diseases. Students begin with an overview of pathogens, using the story of John Snow and the Broad Street pump to introduce terms like microbes, pathogens, and sanitation. They then investigate three diseases—Influenza, COVID-19, and measles—exploring how each spread, how we can prevent them, how the immune system responds, and how treatment and testing play a role.

Throughout the unit, students engage with models of the immune system, track the spread of disease through a simulated population, and evaluate how national responses differed across countries. The unit culminates with students designing engineering controls to create indoor public spaces that reduce the risk of airborne transmission, using evidence and reasoning to support their designs.

Keywords

Control, pandemic, influenza, COVID-19, measles, transmission, immune system, sanitation, vaccination, ventilation, indoor air, prevention, modeling, public health, engineering controls

(Developed for Honors Biology, grade 11; recommended for Biology, all levels, and Microbiology, grades 9-12)

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