

NAME _____
Human Health and Risk

APES
Mrs. Kaidy

EPIDEMIC SIMULATION

Background

In an epidemic, a disease spreads through a group of people quickly and often surreptitiously. In this exercise, an acid (HCl) and a base (NaOH) demonstrate the role of body fluids in disease transmission, and a pH indicator provides the means to identify the carrier. These are important steps toward interrupting the lines of disease transmission.

Epidemiologists (scientists who fight infectious diseases) study *causative agents* of disease (commonly viruses, bacteria, fungi, protozoa, and helminthes). An epidemiologist's other key considerations include sources and reservoirs of diseases, host and environmental factors leading to transmission in certain population demographics, and strategies to control outbreaks or even eradicate diseases.

One common mode of infectious disease transmission is through *contact transmission*, the physical meeting of a source and a new host, often through person-to-person transmission. Touching, shaking hands, and kissing are all common examples of this kind of contact. Other examples include direct contact with secretions or body lesions (such as herpes and boils), and transmission from mother to infant via breast milk. Many disease organisms such as *Salmonella* can be transmitted through direct contact with animals, animal eggs, or animal products.

Indirect contact, a second common mode of disease transmission, refers to transmission from a source to a new host through an intermediary – chiefly an inanimate object. Thermometers, eating utensils drinking cups, and bedding are all common intermediary objects.

A third mode of transmission, *droplet spread*, occurs when a pathogen is carried on a particle larger than 5 micrometers. Because this is a large particle, it quickly settles out of the air; therefore *droplet spread* depends upon the proximity of a new host to a pathogen source, such as a person sick with measles. Sneezes and coughs typically generate the droplets.

Procedure

1. You will be given a vial and a pipet.
2. Record all the students and the numbers on their vials on your data sheet.
3. There will be several rounds directed by the instructor where you will exchange 5 drops of fluid with a random classmate.
4. Record the number of the classmate's vial on your data sheet.
5. Repeat as directed, but DO NOT exchange with the same student.

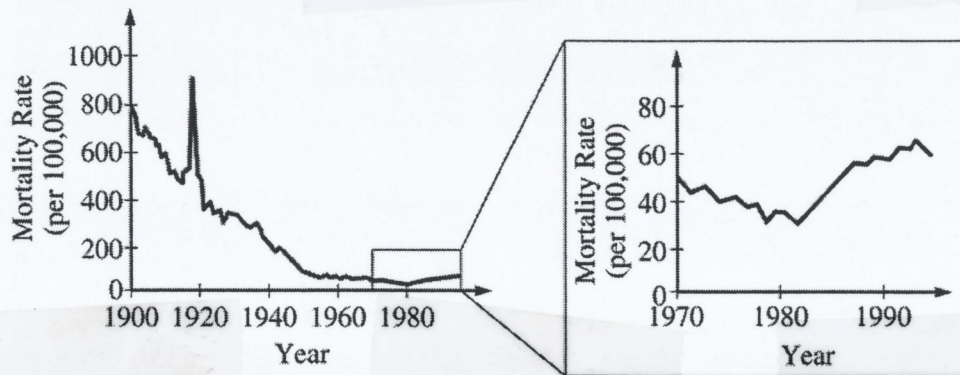
6. The instructor will add an indicator to each vial. If you are "positive" for the disease, your fluid will be red, if you are "negative," your fluid will be yellow.
7. Trace the path of each student's contact with other students to determine the route of the infection's transmission and the original source of the infection.

DATA

Epidemic Simulation Kit Data Sheet				
Student Vial #	1st Contact	2nd Contact	3rd Contact	Test Result
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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22				

4. Explain why it is not possible to protect the health of Americans without addressing the problems of infectious disease on a global scale, i.e., by what mechanisms to diseases spread?

INFECTIOUS DISEASE MORTALITY IN THE UNITED STATES, 1900–1996



5. The graphs above show the mortality from infectious diseases in the United States since 1900. Identify an infectious disease that made an important contribution to the trend of increasing mortality rates that began in about 1980 and explain one major cause of the increased rate of mortality from that disease.