

## Lesson 5 - Introduction to Epidemiology: Spreading Sickness in Middle School

### OBJECTIVES

1. Understand disease transmission patterns with and without vaccination.
2. Learn how pandemics are spread.
3. Learn epidemiological terms: vaccination, pathogens, immunity, herd immunity, epidemic, pandemic

### RESOURCES

### PREPARATION

1. **Note that this lesson will take 75 minutes.**
2. **Email** items to participants to review before the meeting.

[TEDEd Video - How Pandemics Spread](#)

<https://ed.ted.com/lessons/how-pandemics-spread>

**Worksheet:** Pass it On to each youth with instructions to print it out beforehand

- a. <https://ucanr.edu/sites/DiseaseDetectors/Epidemiology/>
- b. Card # and Card Code to each youth (see *L4 Epidemiology - Disease Transmission Assignments Example*)

- c. Assign 1/2 of the students with an "X" code (Vaccinated and Immune)
  - d. Assign 1/4 of the students with an "XY" code (Vaccinated but not Immune)
  - e. Assign 1/4 of the students with an "SZ" code (Unvaccinated)
  - f. Assign 1-2 students with a "S" code (Unvaccinated Sick)
3. Develop a Disease Exchange Sheet for the youth (see *L4 Epidemiology - Disease Exchanges Sheet Example*) and have available during meeting to **screen share**.
  4. Prefill Worksheet: Pass it On Table 2 with vaccinated status for each youth Card #.
  5. Review and have L4 Epidemiology Slide Deck available to **screen share**.
  6. Have Pass it On worksheet, Tables 1 & 2, and Figure 1 available to **screen share**.



## INSTRUCTIONS

Today we will learn about disease transmission from person-to-person. So, we will need to think like an Epidemiologist.

### 1. Welcome everyone back and check in with the youth. (3 minutes) Slide 1

### 2. Review the group agreements if necessary (2 minutes)

You can either screen share and show the image you took from last week, or you can create a new image using a Google or Powerpoint slide, and display it as your background image.

### 3. Team Builder - Opposite Activity (5 min) Slide 2

In this activity youth “unlearn something old in order to learn something new”.

a. Ask all youth to stand up.

b. Brief the youth. Tell them that you are going to give them instructions on which direction to move their body while staying in place. When I say, “Turn head right”, the youth turn their head to the right. When I say, “Lift left arm”, the youth lift their left arm.

c. Give directions. Give the directions in a random order. Keep giving directions at a fairly rapid pace for about one minute. Provide approximately 10 directions. Use:

- hand/elbow/head
- left/right
- Up/down

d. Change the meaning of the words. Tell the youth that from now on, they should do the opposite of what you say. So that right means left and up means down (and vice versa). So when I say “Turn head right”, the youth turn their head to the left. Announce the end after about one minute.

e. Debriefing. Ask the youth about the experience when the meanings of words changed and share any similar experiences they might have had in real life.

f. Learning Points. It is difficult to learn new concepts without unlearning some old concepts; the old way of doing things interferes with learning new things.

### 4. Epidemiology Vocabulary Slide 3

Using the annotate feature, have the youth draw a line from the term to the definition.

### 5. Pass It On Worksheet - (30 min) Slides 4, 5, 6, 7

This lesson can appear complex at first, but if you review the Pass It On Workshop and carefully look over the instructions in advance, you’re sure to have a great lesson!

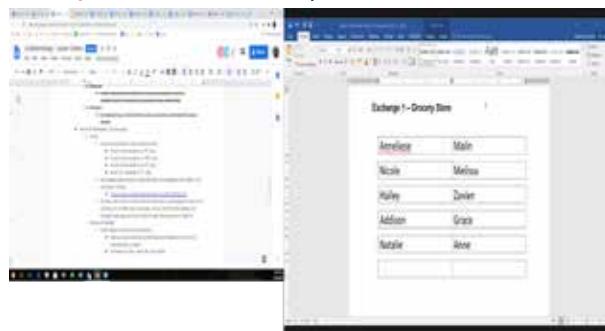
a. Each student should print out or create the Pass It On worksheet with Table 1, Figure 1 and Table 2.

b. Discuss with all youth in main Zoom room - Table 1 Exchanges





- i. Demonstrate Table 1
  - Show the Table 1 image on **screen share**.
  - Call on someone randomly.
  - Ask for the information to show an example of the first three columns for name, card # and card code.
  - Repeat with three more members.
- ii. Table 1 - Exchanges 1 through 4
  - Show the Disease Exchange Sheet on **screen share**.
  - For each of the 4 exchanges, have each member **privately chat** their Card # and Card Code to the person shown for Exchanges 1-4.
  - Only share one exchange at a time to allow youth to enter their exchange information in Table 1.
  - Confirm each youth has their card code and number before proceeding to the next exchange. Send in a **private chat** if they do not have it.



- c. Send youth into Zoom **breakout rooms** (1 adult per breakout room) to complete Figure 1 Disease Transmission.
  - i. Using information from Table 1, youth complete Figure 1.
    - One-by-one for each of the exchanges, have youth complete the Card # and Card Code.
    - Disease Transmission - for each of the exchanges determine if the student became sick or made someone else sick. Circle the sick/healthy section. Discuss who got sick and why. If a youth became sick on one Exchange, they could transmit the disease on future exchanges.
    - **Share screen and post in chat** the Card Code information so youth may determine if they are carriers of the disease and/or had exchanges with carriers of the disease.

**X** = Vaccinated and Immune

**XY** = Vaccinated but not Immune

**SZ** = Not vaccinated

**S** = Not vaccinated and Sick



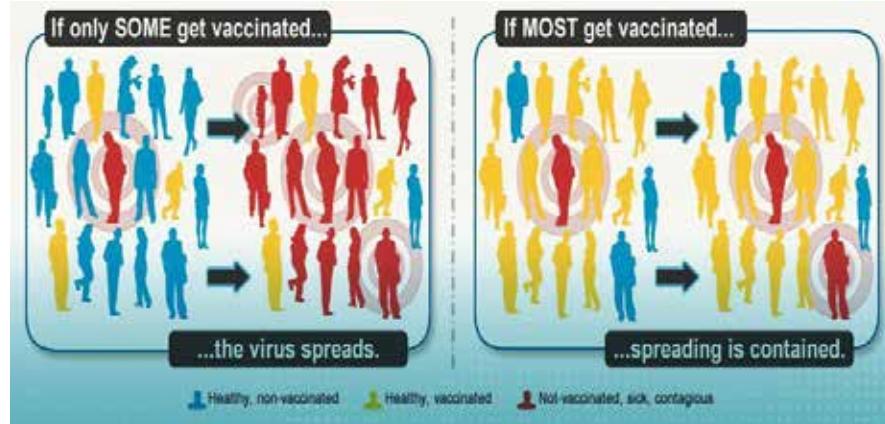


- d. **Close breakout rooms.** When all youth return, work on Table 2: Class Exchange Data
- Share screen** Table 2, with pre-filled vaccine status.
  - Go line by line and ask each participant in order of card number if they are sick or healthy. Check the correct box as they give you their status.
  - Once filled in, ask participants if they made anyone sick that was not already identified.

## 6. Analysis questions (10 minutes) Slide 8

- What is the proportion of students that are sick compared to those that are healthy?
  - To calculate the proportion of sick students, divide the number of sick students (numerator) by the total number of students (denominator).
- Explain how a student could stay healthy, although he or she exchanged with one or more sick persons.
  - Got vaccinated, but did not develop an immunity, and then was never around a sick person.
  - Was not vaccinated, and never met a sick person.
- Explain how a student could be sick, although he or she started as healthy.
  - Got vaccinated, but did not develop an immunity, and then encountered a sick person.
  - Was not vaccinated, and met a sick person.
- What do you think might have happened if certain students had not been vaccinated?
- How does this relate to disease transmission and herd immunity?

### Show graphic:



## 7. Disease transmission knowledge check (5 minutes) Slides 9, 10, 11, 12, 13, 14

- Screen share** slide deck for each of the following statements:





- i. Which statement is True about Pathogens
- ii. Which statement is True about Immunity
- iii. Which statement is True about Herd Immunity
- iv. Which of these statements is True about Outbreak
- v. Which of these statements is True about Epidemics and Pandemics

## 8. Debrief (5 min) Slide 15

- a. What are the take-aways you learned today?
- b. How does this relate to current outbreaks and pandemics?

## 9. Preparation for next lesson (5 min)

- a. Visit the [Disease Detective website](#) for instructions - Activities to Complete Before the Group Meeting
- b. Look up and read your local public health department [COVID-19 recommendations](#)

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**Credit:** These materials were adapted from the CDC Science Ambassador Workshop 2015 [Lesson Plan: Spreading Sickness in Middle School](#) (especially the worksheet used called Pass it On) <https://www.cdc.gov/careerpaths/scienceambassador/documents/ms-spreading-sickness-in-middle-school-2015.pdf>

