

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
- 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)

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)

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

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

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”.

- Ask** all youth to stand up.
- 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.
- 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
- 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.
- 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.
- 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

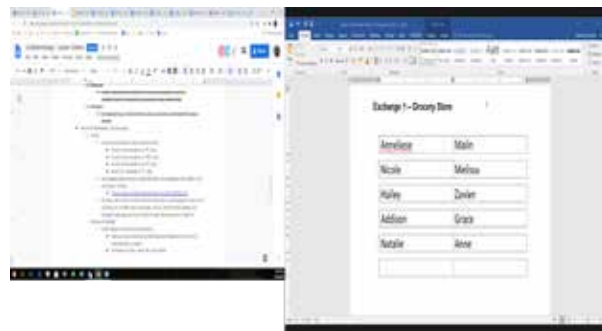
This lesson can appear complex at first, but if you review the [Pass It On Workshop](#) and carefully look over the instructions in advance, you’re sure to have a great lesson!

- Each student should print out or create the [Pass It On worksheet](#) with Table 1, Figure 1 and Table 2.
- 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



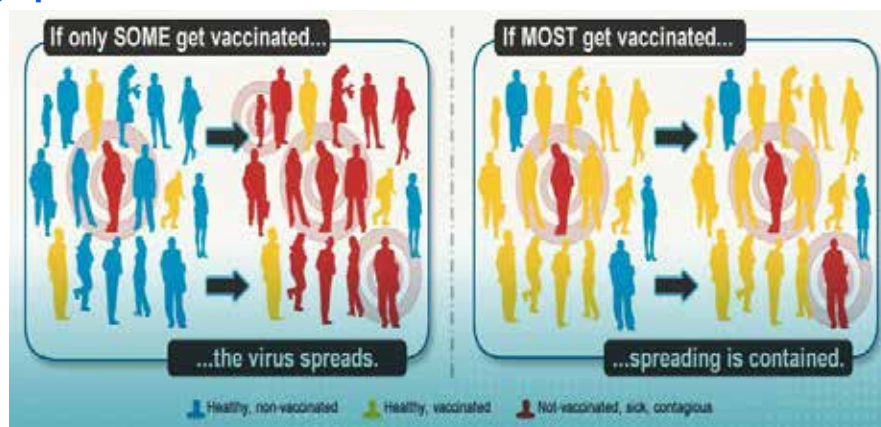


- d. **Close breakout rooms.** When all youth return, work on Table 2: Class Exchange Data
 - i. **Share screen** Table 2, with prefilled vaccine status.
 - ii. Go line by line and ask each participant in order of card number if they are sick or healthy. Check the correct box as they give you their status.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

6. Analysis questions (10 minutes) Slide 8

- a. 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).
- b. Explain how a student could stay healthy, although he or she exchanged with one or more sick persons.
 - i. Got vaccinated, but did not develop an immunity, and then was never around a sick person.
 - ii. Was not vaccinated, and never met a sick person.
- c. Explain how a student could be sick, although he or she started as healthy.
 - i. Got vaccinated, but did not develop an immunity, and then encountered a sick person.
 - ii. Was not vaccinated, and met a sick person.
- d. What do you think might have happened if certain students had not been vaccinated?
- e. 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

- a. **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>

