



## Cholera in Haiti

### Handouts:

1. 1-page explainer of cholera outbreak in Haiti

### Assignments

#### Part 1: Developing an Explainer

1. In-class written assignment of societal challenge with cholera in Haiti
2. In-class written assignment of scientific investigation relating to cholera
3. Take-home written assignment: Explainer of cholera (background on disease, societal challenge, scientific investigation)

#### Part 2: Developing a Scientific Question and Experimental Plan

1. In-class written assignment of experimental plan for question “does folding T-shirt provide adequate water filtration to remove bacteria?”
2. In-class written assignment of experimental plan for question “does providing T-shirts and instructions reduce incidence of bacterially-borne disease in a community?”
3. Take-home written assignment: develop scientific question and experimental plan based on scientific investigation identified in part 1.
4. In-class oral presentation of scientific question and experimental plan

### Assessment

- (20 pts) faculty grade on Part 1, assignment #1
- (20 pts) faculty grade on Part 1, assignment #2
- (60 pts) faculty grade on Part 1, assignment #3
- (20 pts) faculty score on part 2, assignment #1
- (20 pts) faculty score on part 2, assignment #2
- (40 pts) faculty score on part 2, assignment #3
- (20 pts) peer score on part 2, assignment #3

### “meta” lessons

- Develop an explainer of societally-relevant science
- Develop a scientific question
- Experiment design, experiment types
- Observational (prospective) vs. retrospective studies and experiments
- Data analysis considerations

### **DAY 1**

#### **Inception (at start of period)**

Students divide into teams of 4 to review the one-page handout on cholera in Haiti

#### **Engagement (during Day 1 period)**

1. Brief (5 minute) discussion of concept of *Explainer*



2. Student teams begin work on Part 1, assignment #1 (15 minutes)  
\*During this time, Instructors canvass the room, offer guidance and importantly, grade the assignment (this will be hard)
3. Student teams begin work on Part 1, assignment #2 (15 minutes)  
What is meant by **scientific investigation**?  
\*During this time, Instructors canvass the room, offer guidance and importantly, grade the assignment (this will be hard)
4. Part 1, assignment #3 is described. Students must complete and hand in assignment at start of next class period.

## END OF DAY 1

## DAY 2

- 4 (continued). Student teams hand in Part 1, assignment #3

### Research

1. Brief (10 minute) discussion/mini-lecture on scientific questions (see ppt)  
Explain: A scientific question relies on fundamental scientific principles or concepts to interpret a system or phenomenon. A well-crafted one implies a specific hypothesis, and suggests specific measurements, observations, or data-collection that could be done to answer the question.

5 components:

1. Restatement of the scientific question
2. Description of the action(s) taken in the experiment (what you will do, what equipment you will need)
3. Description of the test or analysis that will answer your questions, including a list of any tools or equipment this test would need.
4. Description of the expected outcome of this experiment, including the types of data, the number of data, how many tests would be performed, and how data would be analyzed
5. Confirmation of results, to indicate how results from this experiment serve to answer your scientific question.

Separately, present the class with the following two questions.

2. Good, easy scientific question: *“Does draining water through a triple-folded piece of cotton cloth (i.e. a clean T-shirt) effectively remove bacteria from drinking water?”*  
(Why is this easy – implies a feasible action and test, specific types/kinds of data, a result that is verifiable.)

Ask: What would you (students) do if presented with this question? What kind of activity would you do? What kind of tools would you use? What would be your method, your approach?

Students work in teams (teams from Part 1) to complete Part 2, assignment #1. 20 minutes, handed-in during class period.



3. Next, present a good societal question, but one that is more problematic scientifically: “Does providing T-shirts and instructions to a community reduce the incidence of bacterially-born disease in that population?”

Ask: Why is this more problematic? What would you (students) do if presented with this question? What kind of activity would you do? What kinds of tools would you use? What would be your method, your approach? How would you obtain data, and how would you assess if those data answer your question?

Students work in teams to complete Part 2, assignment #2. 20 minutes, handed in.

Afterwards, discuss the difference between the two questions. What is different between them? Do they imply a feasible action and feasible test? Do they imply specific types/kinds of data? How much data would be sufficient to answer these questions?

4. Part 2, assignment #3 is described. Due at start of next class

5. Alert students to next day’s oral presentation activity.

## **END OF DAY 2**

## **DAY 3**

### **Research → creation**

Part 2, assignment #3 due at start of class

Each team takes 15 minutes to prepare a summary of their scientific question and experimental plan for the rest of the class. Use large sheets of paper and markers provided. Hang on wall, or post on desk tops, with team ID and members clearly indicated.

Part 2, assignment #4. teams separate, and reorganize into groups of 10 (or 11); each group will have one member from each team. Groups will rotate through the posted experimental plans. At each plan, the team member whose team developed the plan presents the plan to the rest of the group. Take 5 minutes to do this. The remainder of the group will grade each experimental plan, using the provided worksheet.

These grade sheets are handed in at end of class

## **END OF DAY 3**