

2027-04-07 · 80 minutes

Environmental justice debate

Your goal: Argue who bears responsibility when a low-income neighborhood faces higher pollutant exposure than wealthier areas nearby.

One product: One-sentence evidence-based statement on who bears responsibility for unequal pollutant exposure and why.

Question: How can a community act on an unequal exposure indicator while keeping responsibility claims within the evidence?

Start the work

Set the rule before the result, keep failed samples, and limit the claim to what the check measures.

1. Read the briefing comparing exposure data across two adjacent neighborhoods.
2. Choose a stakeholder role such as resident, industry, or regulator.
3. List two reasons your stakeholder's position is fair.
4. Debate in your group, tracking which claims used exposure data.
5. Reflect on how data should guide responsibility decisions.

Save the same record locally, label simulated and solo work, and list missing assignment, board, classmate or official inputs. Do not claim an upload or milestone that has not occurred.

Words you will use

environmental justice

Fair treatment and meaningful involvement in environmental decisions across communities.

pollutant

A substance or agent that can contaminate an environment and cause harm under relevant conditions.

contaminant

A substance present in a medium; its presence alone does not specify risk.

stakeholder

A person or group affected by or involved in a decision.

resident

A person who lives in a place.

industry

Businesses producing goods or services; here a fictional facility role.

regulator

An authority that administers rules; its actual powers must be established.

exposure

Contact with a substance or agent.

concentration

Amount of a substance per amount of medium.

dose

Amount received by an organism, often expressed relative to body mass and time.

medium

Material through which a substance can travel, such as water or air.

exposure pathway

The connection from a source through a medium to contact with a person.

source

The origin of a released substance.

risk

The chance of harm under stated conditions.

burden

A cost, disadvantage or potential harm borne by a group.

equity

Attention to differing burdens and needs when judging fairness.

mean

The sum of values divided by the number of values.

ratio

One quantity divided by another comparable quantity.

mg/L

Milligrams of substance per liter of liquid.

MCL

Maximum contaminant level, an enforceable public-water standard applied with its monitoring rules.

MCLG

Maximum contaminant level goal, a health goal rather than an enforceable limit.

causation

One factor producing an outcome; a difference alone does not prove it.

counterpoint

A reason that challenges a position.

reflection

An explanation of how evidence or criticism affects a judgment.

mitigation

Action intended to reduce a harmful condition or exposure.

serial dilution

Repeated dilution by the same factor, each tube made from the one before it.

sterile control

A plate spread with water that has no bacteria added; growth on it means contamination.

colony

A visible pile of bacteria grown on agar from one cell or a small clump.

carryover

Material from one sample entering another.

BSL-1

Biosafety level 1, the basic practices for well-characterized agents not known to consistently cause disease in healthy adults.

E. coli K-12

A laboratory line of Escherichia coli used in teaching; strain HB101 is one K-12 strain.

SDS

Safety Data Sheet with substance-specific hazards and handling information.

PPE

Personal protective equipment selected for a defined hazard and procedure.

C1: start with the people and the question

This is an original, fictional discussion case. No Cleveland measurements, patient records or personal experiences are used. Use the supplied neighborhoods for every prompt. April 5 work may be unfinished; this case does not require a completed prototype test.

Warm up: name one nearby source that could affect what a fictional resident breathes or drinks. Name one possible reason two neighborhoods could differ. Then list who lives near, works at and profits from a source. A factory, traffic corridor or natural deposit is a possibility, not a proven source in this case.

Your final exit ticket is one evidence-based sentence about responsibility and why. Keep your two fairness reasons, debate record and reflection paragraph with it. The asynchronous branch also requires a 150-word stance and a reply to another stakeholder role.

D1: complete fictional neighborhood briefing

River and Hill are adjacent neighborhoods in this invented case. River has lower household incomes, and Hill has higher household incomes. Both use drinking water from the fictional municipal system. An electronics facility and natural mineral deposits are possible sources in the wider area. There are no source-tracing records. Waste-release records and land-use records are also missing.

The instructional table contains three matched sample rounds at one fixed tap in each neighborhood. All values are arsenic concentration in milligrams per liter, mg/L. Round 1: River 0.012; Hill 0.004. Round 2: River 0.011; Hill 0.005. Round 3: River 0.013; Hill 0.003. These numbers are invented for practice. Nobody collected these samples.

Compute each mean by adding its three concentrations and dividing by three. Compare the means with units and calculate their ratio. Retain every round. Three values at one tap cannot describe every home or a long-term trend.

The case states that River homes have less money for added water costs. It supplies no budgets, disease counts, intake amounts or exposure durations. Income gives context. It does not prove a pollution source or a cause of illness.

E1: what the arsenic benchmark says

EPA lists an arsenic maximum contaminant level, or MCL, of 0.010 mg/L for public drinking-water systems. Its listed health goal, MCLG, is zero. A goal and an enforceable limit are different entries. EPA lists natural deposits and some industrial or agricultural sources as possible arsenic sources.

Use 0.010 mg/L as a public reference for D1 comparisons. Do not turn these fictional samples into a finding about a real system. A legal finding needs the proper sampling and decision rules. A value below a limit does not rule out every hazard.

EPA lists possible health effects from arsenic exposure. D1 has no personal dose or health results. It cannot show that anyone is ill. Arsenic is the supplied debate example only; the April 8 lab cultures bacteria and does not test arsenic.

E2: concentration, exposure and responsibility

EPA exposure assessment connects a substance in a medium with how people contact it. A scenario needs the amount per liter and how much people take in. It also needs how often and how long contact occurs. A water concentration alone is not the amount absorbed by a person.

D1 shows a gap in the water readings. It gives a reason to study possible exposure. It does not name the source. Nor does it show that income caused the gap or measure disease risk. Natural and human sources remain possible.

HHS describes environmental justice through fair treatment and meaningful involvement across communities. Ask who bears the burden. Include those residents in decisions. Use this to discuss fairness. It does not state who has a legal right or who must pay.

A fair plan can put protection first while tracing the source. Others may want source proof before charging one group. Explain the facts and the value behind your plan. The numbers limit a claim. They do not choose the only fair plan.

R1: three genuine stakeholder positions

Resident position: ask the public water authority to fund temporary protection in River first, then recover costs from any source later established as responsible. Reason 1: River has the higher water readings. Reason 2: added water costs would be harder for its lower-income homes to bear. Limit: the table does not prove the electronics facility caused the difference.

Industry position: support an initial shared public investigation and temporary protection fund, with later costs assigned using source evidence. Reason 1: the facility is not established as the source. Reason 2: costs should follow source proof. This avoids blaming one group without that proof. Limit: source uncertainty does not erase River's higher readings or justify waiting to discuss protection.

Regulator position: prioritize River in a public response and monitoring plan, include both neighborhoods, and publish how final funding will be decided. Reason 1: the sampled burden is unequal. Reason 2: open data rules and a role for residents let people challenge decisions. Limit: this case gives no actual powers or budget. It does not show legal fault.

Choose a role and defend two reasons. You may change its plan or suggest another fair plan. Use the data correctly. The roles differ on when to pay and how to split costs. All treat lower-income residents as people who matter. Do not invent motives or guilt for real people.

X1: debate, solo recovery and asynchronous work

Group route: each role gives its two reasons and cites at least one D1 number with units. A listener records the role, claim and exact number. Add the evidence ID and one limit. Take turns so each role answers a counterpoint. In the class debrief, name the strongest counterpoint. Explain why it was hard to answer.

Solo route when partners are unavailable: choose one R1 role, then use a different supplied role as the opposing position. Record both claims with numbers and limits. Write your reply. Name the strongest counterpoint. Label this a solo comparison of supplied roles, not a conversation that happened.

Asynchronous route: write a 150-word stance on who should pay to reduce the unequal exposure burden. Name your role, cite D1 and E1, explain two fairness reasons, and address an opposing role. On the teacher-provided board, post it and reply to a classmate from a different role.

If the board or classmate is unavailable, save the same stance and reply to a different R1 role locally. Mark actual posting and classmate reply pending. The supplied-role reply supports recovery. It does not show a real peer exchange.

Remediation: write three sentences stating who bears the potential exposure burden, which number shows the difference, and what the evidence leaves unknown. Then produce the required one-sentence exit and complete the applicable discussion and reflection branches. Extension: argue a challenging opposing position honestly and name evidence that could change your conclusion.

Self-check: why could a resident and owner reach different payment conclusions from the same chart? Explain how their values or interests differ while the numbers stay fixed. A claim that the facility is guilty, or that River residents caused the readings, lacks supporting source evidence.

P1: reflection, route and authentic work

Write a reflection paragraph explaining how the data should guide who pays. Include the hardest counterpoint and a limitation. Then write the one-sentence evidence-based responsibility statement. Keep all supporting work in the same dated record; the exit sentence remains the named daily product.

For either BI section, use the teacher-confirmed April 7 assignment in Exit Tickets. Keep the record locally until your section's route is confirmed. Do not use an HBS assignment.

Today you hold a Problem 4 environmental justice discussion and write a reflection; April 8 is the water culture lab. Ask your teacher for today's stopping point. If assigned, attach the actual reflection and check only the milestone genuinely completed.

This week may also include prototype validation and public-health work. Preserve unfinished actual projects and obtain the assigned weekly packet and tracker. This original debate does not complete a prototype test, an outbreak spreadsheet or an official Problem 4 activity.

Before this class, complete a 25-minute tracker audit in Class Records. List actual completed evidence and missing work; invent no tracker entries. Note which coded water sample you expect to test on April 8 without claiming any result yet.

L1: pre-lab knowledge for the April 8 culture lab

Today's April 7 lesson is a debate. April 8 is a culture lab with a teacher-prepared mock water sample. Prepare the concepts below on paper; this lesson does not authorize handling bacteria, collecting water or starting a test.

A tenfold dilution mixes 1 part sample with 9 parts sterile water, so each step holds one tenth as many bacteria per mL as the tube before it. Original arithmetic example: a sample with 20,000 bacteria per mL becomes 2,000, then 200, then 20 bacteria per mL. These are math inputs, not measured results.

On April 8 each group also spreads a sterile control, labeled N: water with no bacteria added, handled exactly like the samples. If N grows colonies, bacteria from somewhere other than the coded sample reached the plates, and the counts from that set cannot be trusted.

Fresh tips at each transfer reduce carryover from an earlier tube. A reused tip carries extra bacteria forward and makes a weaker tube look stronger than it is. Thermo Fisher explains sample-to-sample carryover. These rules do not give the full lab procedure.

The only organism on April 8 is *E. coli* K-12 strain HB101, prepared by your teacher and handled with BSL-1 practices, which CDC and NIH describe for well-characterized agents not known to consistently cause disease in healthy adults. Students who are immunocompromised, or sensitive to bleach or latex, tell the teacher before the lab. Bring one safety question: which PPE and which bleach decontamination route does the teacher-prepared *E. coli* K-12 culture require?

Keep the actual protocol, sample letters, plate labels, timing and safety directions as teacher-provided inputs. Nothing grows during the April 8 class, so no colony count exists until the plates are read on April 9. Never culture any other water or sample based on this practice.

M1: different worked allocation for fictional shade access

Original model: a town has six movable shade canopies. Site East has zero covered waiting areas; Site West has two. These counts are given for practice. They do not measure temperature, exposure or health. Both sites request more shade. Costs and visitor counts are unknown.

Resident proposal: place four canopies at East and two at West. Reason 1: East begins with fewer covered areas. Reason 2: both sites receive some added capacity. A budget officer counters that visitor counts should guide the final allocation.

Worked reply: I favor the four-two initial allocation because the zero-versus-two count identifies unequal starting access, while a later visitor count could justify revision. That is a fairness judgment based on a count. It does not prove less heat illness.

Reflection: the counterpoint identifies missing use data, so I would review the allocation after obtaining it. Use that separation of facts, fairness and limits with D1. Do not copy the canopy numbers into the water debate.

Try the decision

River's fictional mean exceeds Hill's, but no source tracing or health records are supplied. Which conclusion fits the evidence?

- Prioritize a response to the sampled gap and explain a fair funding proposal while investigating the source.
- Charge the electronics facility as the proven source because River's mean is higher.

- Dismiss the gap by checking only Hill's mean against the arsenic limit.

Explain your choice using the reading. Discuss it or say it to yourself. This practice does not add another submission.

Your 80-minute flow

0–5 minutes	Warm-up: name one way where a fictional person lives might affect their health
5–20 minutes	Read briefing; choose stakeholder role and list two reasons your position is fair
20–40 minutes	Small-group debate tracking which claims cite exposure data; use X1 solo comparison if partners are unavailable
40–55 minutes	Full-class debrief: which stakeholder argument was hardest to refute?; identify the strongest supplied counterpoint when solo
55–70 minutes	Reflection: how should data change who pays for exposure reduction?
70–80 minutes	Exit ticket: one sentence on what counts as fair based on the data

Your response record

Use these labels on paper or in your document. The space below also works when this page is printed.

Identify the players

Answer C1's warmups and list who lives near, works at and profits from a possible source.

Use the fictional case; no personal experience is required.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Read and compare

Use all six D1 values. Find both means, their difference and ratio. Compare the means with E1's limit. Choose a role and state two fairness reasons.

Keep mg/L with concentrations. Separate water concentration from dose or illness.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

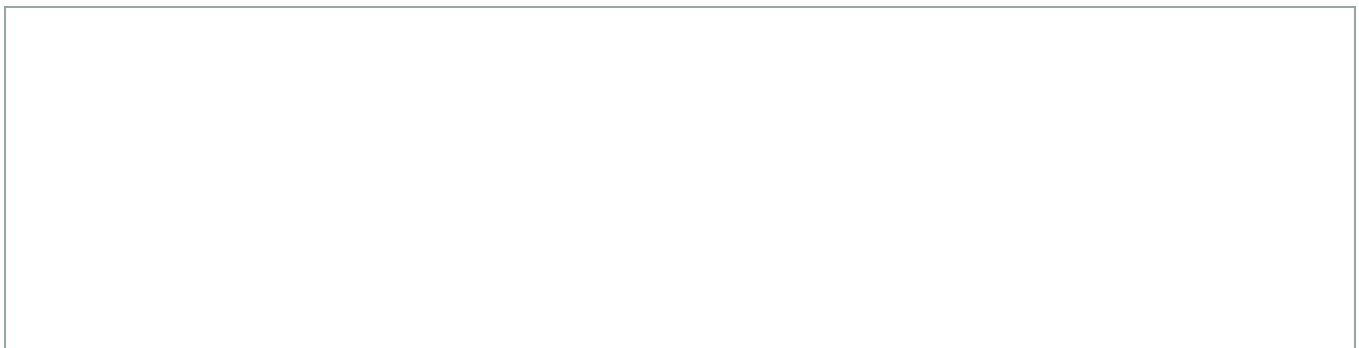


Track evidence and answer a counterpoint

Use the X1 group debate or label your solo comparison. Record claims, numbers, IDs and limits. Name the hardest counterpoint. Explain it in the class debrief or your solo response.

The same numbers can support different payment proposals without supporting false source claims.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Reflect and complete the async branch

Write the reflection paragraph. For async work, write the 150-word stance. Reply to a real classmate from another role when available. Otherwise, label the supplied-role fallback and pending board work.

State what data should change who pays, not only which role you chose.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Write the named product

Answer the X1 self-check. Write one evidence-based sentence on who bears responsibility and why. Add remediation or extension when applicable.

Keep the supporting record; a short exit does not erase authentic pending tasks.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Prepare and record status

Complete L1's tenfold dilution math. Explain the sterile control N and fresh tips. Write a safety question. List missing lab inputs. Add P1 tracker work and submission status.

L1 arithmetic and the fictional readings do not replace the actual April 8 culture or its results.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Check your product

- You can defend a stakeholder position using exposure evidence.
- You explained how environmental burdens can be unequally distributed.
- I used a numerical comparison with units and separated a proposed payer from a proven pollution source.
- I retained a reflection, applicable async work and honest official-task status.

Keep the limit: Invented water readings support a sampled comparison and bounded fairness arguments. They show no real exposure, illness or pollution source. They cannot prove legal fault, compliance or official course completion.

Turn in your work

For either BI section, use the teacher-confirmed April 7 Exit Tickets assignment. Submit the one-sentence exit. Keep the reflection and supporting record. Use the confirmed board for the async post and reply. The dated BI assignment is linked below; confirm access in your enrolled section.

Save the same record locally, label simulated and solo work, and list missing assignment, board, classmate or official inputs. Do not claim an upload or milestone that has not occurred.

[Open this assignment in Schoology.](#)

Carry forward

Use the exposure pattern to guide protection, and separate a fair funding proposal from proof of who caused the pollution.

Tomorrow you culture a coded mock water sample. Review how a tenfold dilution changes bacteria per mL and why the sterile control N is spread with the samples. What would growth on plate N tell you?

Sources and resources

[Open today's page](#)

EPA-WATER · National Primary Drinking Water Regulations

U.S. Environmental Protection Agency

<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>

EPA-EXPOSURE · Exposure Assessment: Indirect Estimation

U.S. Environmental Protection Agency

<https://www.epa.gov/expobox/exposure-assessment-tools-approaches-indirect-estimation-scenario-evaluation>

HHS-EJ · Facilities Manual, 10.3 Environmental Justice

U.S. Department of Health and Human Services

<https://www.hhs.gov/about/hhs-manuals/hhs-facilities-manual/safety-environmental-management/index.html>

TF-TIPS · Preventing Cross-Contamination

Thermo Fisher Scientific

<https://www.thermofisher.com/us/en/home/life-science/lab-plasticware-supplies/lab-plasticware-supplies-learning-center/lab-plasticware-supplies-resource-library/fundamentals-of-pipetting/proper-pipetting-techniques/preventing-cross-contamination.html>

BMBL · Biosafety in Microbiological and Biomedical Laboratories, sixth edition overview

CDC and NIH

<https://www.cdc.gov/labs/bmbl/index.html>