Connecting Social Issues and Human Health Inequities, Lesson 4

Comparing Communities

Alonna Smith, Lindsey Link
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Grade Level	9th – 12th Grade
Subject	Science
Course	Biology, Environmental Science

Essential Question

How do inequitable environmental factors affect human health?

Summary

During this fourth lesson in the Connecting Social Issues and Health Inequities unit, students will view Oklahoma's life expectancy map, identify environmental threats that contribute to these life expectancies, and discuss what these threats mean with regard to air quality and society. Students then compare the Oklahoma City community with that of Washington, D.C., before continuing to work on their project proposals.

Snapshot

Engage

Students view life expectancy maps of Oklahoma county.

Explore

Students use Google Maps to identify environmental threats within Oklahoma county.

Explain

Students discuss what the threats mean in regards to air quality and society.

Extend

Students compare and contrast OKC and Washington, D.C., communities.

Evaluate

Students expand initial proposals.

Standards

Next Generation Science Standards (Grades 9, 10, 11, 12)

HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Oklahoma Academic Standards (Biology)

B.LS1.3 : Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms.
B.LS1.3.1: Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Outside that range (e.g., at too high or low external temperature, with too little food or water available) the organism cannot survive.
B.LS2.2 : Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
B.LS2.2.1: Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease.
B.LS2.2.2: Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.
B.LS2.2.3: A complex set of interactions within an ecosystem can keep its number and types of organisms relatively constant over long periods of time under stable conditions.
B.LS2.2.4: If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient) as opposed to becoming a very different ecosystem.
B.LS2.2.5: Extreme fluctuations in conditions or the size of any populations, however, can challenge the functions of ecosystems in terms of resources and habitat availability.
B.LS2.5 : Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
B.LS2.5.1: Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes.
B.LS2.5.2: The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis.
B.LS2.6 : Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
B.LS2.6.1: A complex set of interactions within an ecosystem can keep its number and types of organisms relatively constant over long periods of time under stable conditions.
B.LS2.6.2: If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient) as opposed to becoming a very different ecosystem.
B.LS2.6.3: Extreme fluctuations in conditions or the size of any populations, however, can challenge the functions of ecosystems in terms of resources and habitat availability.

Attachments

- Driving Question Board—Comparing Communities - Spanish.docx
- Driving Question Board—Comparing Communities - Spanish.pdf
- Driving Question Board—Comparing Communities.docx
- Driving Question Board—Comparing Communities.pdf
- Lesson Slides—Comparing Communities.pptx
- Life Expectancy—Comparing Communities - Spanish.docx
- Life Expectancy—Comparing Communities - Spanish.pdf
- Life Expectancy—Comparing Communities.docx
- Life Expectancy—Comparing Communities.pdf
- Paired Text H Charts—Comparing Communities - Spanish.docx
- Paired Text H Charts—Comparing Communities - Spanish.pdf
- Paired Text H Charts—Comparing Communities.docx
- Paired Text H Charts—Comparing Communities.pdf
- Proposal Rubric—Comparing Communities - Spanish.docx
- Proposal Rubric—Comparing Communities - Spanish.pdf
- Proposal Rubric—Comparing Communities.docx
- Proposal Rubric—Comparing Communities.pdf
- S-I-T Activity—Comparing Communities - Spanish.docx
- S-I-T Activity—Comparing Communities - Spanish.pdf
- S-I-T Activity—Comparing Communities.docx
- S-I-T Activity—Comparing Communities.pdf
- Zip Code Breakdown—Comparing Communities - Spanish.docx
- Zip Code Breakdown—Comparing Communities - Spanish.pdf
- Zip Code Breakdown—Comparing Communities.docx
- Zip Code Breakdown—Comparing Communities.pdf

Materials

- Lesson Slides (attached)
- Proposal Rubric- Comparing Communities (attached)
- S-I-T (Surprising, Interesting, Troubling)—Comparing Communities (attached; optional; one per student)
- Paired H-Chart—Comparing Communities (attached; one per student)
- Life Expectancy Comparison Chart—Comparing Communities (attached; one per student)
- 3x5 index cards (optional; one per student)
- Computers or individual devices
- Access to internet or Wi-Fi

Engage

Teacher's Note

For this exercise, it is beneficial for each student to have access to a computer so that they can explore the OK2Share website at their own pace.

Begin the lesson by showing the unit's essential question on **slide 3** of the attached **Lesson Slides**.

Display **slide 4**. Share the lesson's learning objectives.

Display **slide 5**. Instruct students to visit the OK2Share website and view the life expectancy map of Oklahoma county as a group.

Ensure that students look at data from Oklahoma county by changing the county at the bottom right of the map. Have students hover their cursors over the county and the zip code. The average life expectancy will change as the cursor moves over the different zip codes. As students locate county and zip code, have them record their initial observations.

Display **slide 6.** Pass out the **S-I-T (Surprising, Interesting, Troubling) handout** (or a 3x5 index card) to each student.

- Share the instructional strategy S-I-T (Surprising, Interesting, Troubling).
- Instruct students to record one surprising fact or idea, one interesting fact or idea, and one troubling fact or idea.
- Encourage students to share their thoughts in small groups or with a partner.

Display **slide 7.** Discuss the following questions as a whole group:

- What do these data tell us?
- How could you determine average life expectancy by zip code?
- How does everything that we have learned to this point connect?

Explore

Teacher's Note

The Zip Code Breakdown attachment from Lesson 3 is also included in Lesson 4 attachments.

Display **slide 8.** Instruct students to pull out their handout **Zip Code Breakdown** from the previous lesson. While viewing the two aerial photos have students look for environmental threats found in each zip code. Some examples of environmental threats are listed below:

- Superfund Sites
- Landfills
- Refinery
- Fleet Parking Lot
- Major Highway
- Average Home Prices
- Access to grocery stores

Ask students also to determine the average home values for the two locations. They can use apps such as Zillow to help them find the home values.

Information on Home Values

Pointing out the difference in home values provides two pieces of information. First, people who live in high-pollution areas might not have the financial means to relocate. People in poverty might be stuck living close to several environmental threats. Secondly, older homes tend to not be as well maintained and are more likely to have excess dust and mold that contribute to asthma.

Display **slide 9.** Ask students to analyze the property values reflected in the chart for the two zip codes. Encourage them to research access to such commodities as fresh produce and grocery stores as well.

Teacher's Note: Formative Assessment

Listen closely to student conversations as they identify environmental threats in the two communities. Students should begin to see a correlation between race, poverty, and health.

Explain

As a whole group, facilitate a discussion to enable students to share the connections they are making. Display **slide 10** and use the following prompts in this discussion:

- How do these environmental threats affect air quality?
- How are we able to determine life expectancy by zip code?
- What does all of this mean?

Teacher's Note: Formative Assessment

Observe student responses carefully. Students should begin to see a correlation between race, poverty, and health. These conversations can be emotionally draining on students. They should have some time to process this information.

Extend

Display **slide 11**. Pass out the attached **Paired Texts H-Chart** handout and share the instructional strategy Paired Texts H-Chart. Have students compare and contrast OKC and Washington D.C. Now that students have a better understanding of the science behind asthma, they can focus on the social aspects. Ask them to write details about Washington, D.C. in the left-hand column and details about Oklahoma City in the right-hand column.

Ask them to write down any additional similarities or differences they notice in the video distinguishing OKC from Washington D.C.

Display **slide 12**. Share the entire video that students watch in Lesson 1.

Display **slide 13.** After the video, instruct the students to share what they wrote with an Elbow Partner and add any new information they discovered through sharing. Ask students to discuss as a whole group the connections they have made. At this point, students should begin to see a correlation between race, poverty, and health.

Display **slide 14**. Ask students if they have discovered answers to questions on the Driving Question Board. Encourage them to add new questions that they do not, as yet, have answers to.

Teacher's Note: Formative Assessment

Pay close attention to what students are sharing out in the whole group debrief. They should be able to point out that the environmental issues that they see in Oklahoma City are common across the United States.

Evaluate

Display **slide 15**. Instruct students to continue to work on their final proposals for the storyline, picking up where they left off in Lesson 3, adding more information and expanding upon their initial responses.

- What is the problem?
- What do you know about the problem that other people should know?
- What evidence can you provide to support your claim?
- What are some possible solutions to this problem?

Resources

- Children's National Medical Center. (2013). *Health Disparities, Focus on Asthma*. [Video]. YouTube. https://www.youtube.com/watch?v=fMufgnJId58
- Environmental Protection Agency. (n.d.). *Superfund sites*. https://www.epa.gov/ok/cleanups-oklahoma#sites
- Environmental Protection Agency. (2020). *Cleanups in Oklahoma*. https://www.epa.gov/ok/cleanups-oklahoma
- Google maps satellite. (n.d.). *Oklahoma City, OK.* [Aerial maps]. https://earth.google.com/web/@35.48264792,-97.4791978,363.52415431a,121151.59788577d,35y,0h,0t,0r
- K20 Center. (2021). Driving Question Board. Strategies. https://learn.k20center.ou.edu/strategy/1511?rev=8567
- K20 Center. (n.d.). Elbow Partners. Strategies. https://learn.k20center.ou.edu/strategy/116
- K20 Center. (2020). Paired Texts H-Chart. Strategies. https://learn.k20center.ou.edu/strategy/132
- K20 Center. (2020). S-I-T (Surprising, Interesting, Troubling). Strategies. https://learn.k20center.ou.edu/strategy/926
- Oklahoma State Department of Health . (2018). *2018 Life Expectancy at Birth by Zip Code*. OK2SHARE. https://www.health.state.ok.us/ok2share/index.shtml
- Zillow. (n.d.). *United State Home Values.* [Chart]. https://www.zillow.com/home-values/