**Activity 1.2 – Case Study of Unregulated Lead Exposure**

Class 2 explores the historical foundations of our understanding of lead toxicity and the regulatory policies that came into being over time. This class also explores a current major epidemic of childhood lead poisoning in Nigeria in communities that have families mining for gold without any occupational protections in place.

Before class, students should read the following three articles (hyperlinked on InTeGrate site):

* Linking Geological and Health Sciences to Assess Childhood Lead Poisoning from Artisanal Lead Mining in Nigeria
* Lead Poisoning Investigation in Northern Nigeria
* Lead Poisoning Crisis in the Zamfara State in Northern Nigeria

This class begins with a discussion for approximately 10 minutes.You should use **Historical and Occupational Lead discussion questions** to prepare for this**.**

After exploring the recurrent historical pattern in the first portion of class, show students a video clip on artisanal gold mining in Nigeria: <http://www.bbc.com/news/world-africa-22128957>.

Next, students will explore a recent occupational/environmental case of lead exposure from artisanal gold mining in Nigeria (25 minutes). The activity can be explained by following **Activity 1.2 Instructions.** Students will need **Student Materials: Interdisciplinary approaches to addressing lead poisoning in Zamfara, Nigeria**.

Class concludes with a short discussion (approximately 5 minutes) of how these modern occupational exposures in developing countries are similar to and different from the historical cases discussed at the beginning of class.

**Teaching Notes and Tips**

* Each of these activities could be conducted independently, or expanded into multiple class sessions, allowing for more in-class research/discussion of the independent assignments.
* If your students are not familiar with reading scientific articles, provide them with **How to Read a Scientific Article** (hyperlinked on InTeGrate site).
* We have provided an optional PowerPoint presentation that is a teaching tool for instructors interested in the role of occupational exposure to lead and the history of regulating lead exposure.
* For faculty who are particularly interested in issues regarding international lead exposures, visit this article.

Rive, M. A., Lafranconi, A., D'orso, M. I., Cesana, G. (2012). Lead Poisoning: Historical Aspects of a Paradigmatic "Occupational and Environmental Disease." *Safety and Health at Work, 3*(1), 11-6.

* To explore occupational risks today, this video shows ventilation systems, recycling, and personal protection used in making lead sheeting. <https://www.youtube.com/watch?v=Vrqvds8YWf8>

*The following items are included below:*

* Historical and Occupational Lead discussion questions
* Activity 1.2 Instructions
* Then and Now discussion questions

**Historical and Occupational Lead discussion questions**

Group discussion

Ask students to briefly reflect as a group on these questions:

1. Across these examples, what contributed to occupational health risks and what barriers were faced in addressing them?

*Possible Answers:*

*In the earliest cases, people did not connect lead exposure to observed symptoms; lack of understanding was a key barrier. Later, new industries and uses brought new kinds of exposures that were poorly understood (for example, that inhaled fumes from lead work were extremely dangerous). Even when these connections were made, workers were often unable to protect themselves or risk losing their jobs. Often, these workers were “lower class” people whose voices could be ignored by the industry or government.*

1. Lead poisoning has been referred to as a “paradigmatic” occupational and environmental disease. What does this mean?

 *Possible Answers:*

* *The earliest recognized cases of lead poisoning likely resulted from occupational exposures, where high levels of lead exposure (acute) from working with lead over an extended period of time (chronic) resulted in recognizable symptoms like paralysis and “saturnine colic” (severe abdominal pain).*
* *Over time, much of what we have learned about lead exposure and health effects has come from occupationally exposed people.*
* *Most occupational exposures were associated with/contributed to an environmental exposure that was usually less acute, but affected a larger number of people. For example, artisans who made Rome’s lead water pipes suffered the most severe physical symptoms, but the population that drank from those pipes was also exposed to lead.*
1. Why is occupational lead poisoning rarely seen in developed countries today?

*Possible Answers:*
* *Today we have a better understanding of how workers can be exposed to lead and there are regulations (including personal protection, medical monitoring, and environmental/workplace monitoring) in place to protect workers.*
* *Industrial practices and personal protection equipment have been developed that better prevent exposure to lead.*
* *Fewer people are employed in “lead industries” in these countries today.*

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**Activity 1.2 Instructions**

Group work (20 minutes)

Provide students with the worksheet **Student Materials: Interdisciplinary approaches to addressing lead poisoning in Zamfara, Nigeria**. Assign each to one of these disciplines/organizations when completing the worksheet:

* Doctors without Borders: Medical professionals (doctors and nurses)
* U.S. Centers for Disease Control : Epidemiologists, health care professionals, and veterinarians
* U.S. Geological Survey: Geologic and chemical analysis
* Terra Graphics Environmental Engineering: Environmental sampling
* University of Idaho: Department of Environmental Sciences:

Students may work individually or in small groups.

After students have had time to complete the worksheet (15-20 minutes), ask them to share their findings with the class. As a group, consider the following **Then and Now discussion questions:**

1. How were people from these different disciplines brought together to address this problem? How were they organized and their skills/approaches coordinated?
2. What additional disciplines or types of professionals do you think would be important in addressing this and similar issues?
3. What role do you think professionals from the U.S. and other countries can play? What are their limitations?
4. At this point, what do you think are the most promising solutions?
5. How was the situation in Zamfara similar to the historical occupational case you considered at the beginning of class?
* *Low income populations exposed to lead through their work to earn money spurred by the recent increases in gold prices;*
* *Limited understanding of the health effects of inadvertent lead exposures or how to reduce them*
* *Few resources for alternate employment or mechanisms available to reduce exposures*
* *Limited/ineffective government ability to protect workers*
1. How is this situation different?
* *At this point in history – but elsewhere in the world – there is a good understanding of the health risks and have approaches to monitor*
* *The ‘experts’ are generally from other countries/cultures*
1. What implications do these differences have for solutions?
* *Limited ability of outsiders to promote or implement solutions*
* *The tolerance for risk and implementation of solutions may be different*

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