# EHLR Module 5: Evaluating Environmental and Health Risks

**Laurel:**
Welcome to module five, Measuring Success: Evaluating Environment and Health Change.

I'm Laurel.

We will start the final module of our EHLR basic training, which is Measuring Success. **How do we measure changes in environment and health?**

There are three main objectives for today.

**Our first objective is to:** Describe three general public health categories for which there are community-driven public health indicators associated with land reuse and redevelopment.

**Our second objective is to:** Identify public health indicators that are associated with land reuse and redevelopment in each of three public health categories: environment, health, economy.

**Our third objective is to:** Use the Action Model to include community-driven public health indicators in redevelopment plans.

Over to you Huda.

**Huda:**

**How do we Measure Change?**

Environmental and health professionals can measure changes that occur throughout land reuse and redevelopment.

There are three typical public health categories where we can measure change:

**Environment:** The number of structures demolished and properties redeveloped is a way of measuring change in environment.

**Health:** Blood lead levels can measure change in lead exposure, known as a biomarker of exposure. Because there is no safe blood lead level, this can be used to measure change in the "health" category, such as before and after redevelopment.

**Economy:** Employment rate and property values are ways of measuring change in an economy.

We will now do a knowledge check.

**Knowledge Check # 1**

Select the best answer:

**Environmental and health professionals can measure community changes in which three typical categories?**

- **A.** Economy
- **B.** Health
- **C.** Tax valuation
- **D.** Property availability
- **E.** Environment
- **F.** Community acceptance

Let's pause for 10 seconds for you to answer.

[No audio]

The answer is a, b, and e: Economy, Health, and Environment

Tax valuation, property availability, and community acceptance are not ways to measure community change.

We will now review the indicators that are used for the environment, health, and economy categories.

**Environment, Health, and Economy Categories – ways to measure change**

Indicators can be used to track health outcomes. These health outcomes include the broad view of health, including physical, environmental, and economic health. Indicators should be definable, be measurable, and be stored in an accessible database.

While we focus on the three public health categories of environment, health, and economy, these are broad topics that contain many types of public health indicators. For example, health indicators may include physical health, mental health, access to recreation, community involvement, risk communication, housing, or social factors that affect health. The photo on the right is one of our former graduate interns, with her practicum poster. She consolidated indicators from 45 different communities. In the photo, she is describing the process of how she organized what was important to communities and how many communities picked the same indicators. We set criteria for what is a good indicator. An indicator should be: definable, measurable, and have an available data source. The data source should be accessible.

For example, in some communities, lead is often an issue. The indicator of health status for lead issues is blood lead levels. Blood lead levels can measure change in lead exposure, known as a biomarker of exposure. Because there is no safe blood lead level, this can be used to measure change in the "health" category, such as before and after redevelopment.

**Is the indicator definable?**

**Yes**, it's a blood lead level.

**Is the indicator measurable?**

**Yes**. Blood lead levels can be measured with a blood draw or finger stick.

**What is the data source?**

The data source is the state blood lead level registry. For privacy reasons, though, some restrictions could apply to accessing the data or the data are likely available only in aggregate form for a geographical area.

Now I will turn it over to Laurel to discuss one of the first Action Model projects.

**Laurel:**

One of our first action model projects was in Baraboo, Wisconsin.

The community defined multiple issues and associated measurement indicators.

The first issue was river pollution from past industrial discharges and uses of the river. The indicators were water quality data. The data was used by the state health department to issue fish consumption advisories. The second issue was lack of parks and or green space.

The indicators were the number and types of vacant lots, number and use of green parcels, the number of parks, and the number of bike lanes and trails.

The third issue was vacant and contaminated properties. The indicators were the inventory of sites, inventory of contaminants and possible health effects from environmental exposure, and map of all properties.

The fourth issue was habitat.

The habitat within the city of Baraboo is over a 3 mile stretch of river through the redevelopment area.

It runs through several neighborhoods and parks.

The Baraboo River Floodplain Forest contains a breeding site for waterfowl (Baraboo River Floodplain Forest, n.d).

The indicators were wildfire survey, environmentally friendly lighting, and habitat preservation.

Now, let's do a few knowledge checks.

**Knowledge Check # 2**

Select all that apply:

**What indicators can partners use to measure environmental changes?**

- **A.** An inventory of contaminated properties that incorporates a public health focus.
- **B.** Blood lead level data.
- **C.** The number, size, and uses of green space.
- **D.** The number of structures demolished and the number redeveloped.

Let’s pause for 10 seconds for you to answer.

[No audio]

The answer is a, c, and d. Blood lead level data would typically be a health indicator.

**Knowledge Check # 3**

Select all that apply:

**What indicators can partners use to measure changes in physical and mental health and well-being?**

- **A.** Blood lead level data.
- **B.** The number, size, and uses of green space or recreational areas.
- **C.** Crime statistics.
- **D.** The number of structures demolished and the number redeveloped.

Let’s pause for 10 seconds for you to answer.

[No audio]

The answer is a and c. Blood lead levels, particularly in young children are used as a community health indicator.

Crime can affect mental health and well-being.

The number, size, and uses of green space or recreational areas and the number of structures demolished and properties redeveloped are used to measure changes in the environment.

**Knowledge Check # 4**

Select all that apply:

**What indicators can partners use to measure changes in economy?**

- **A.** The number of visitors accessing parks and recreational areas.

**B.** Employment rate.
**C.** Property value of housing.
**D.** Demographic data on income, poverty, employment, and occupation.
**E.** Blood lead level data.

Let's pause for 10 seconds for you to answer.

[No audio]

Answer: a, b, c, and d.

Blood lead level data is incorrect because it is used as an indicator to measure community changes in health.

We will now review how to identify health outcomes.

**Community members create and develop indicators to measure changes in overall health status over the course of redevelopment.**

The success of a project may depend on tracking and evaluating the community's overall health:

- Physical health and mental health , Community involvement.
- Environmental improvement , Built environment , Economy , Education , Safety and security , Environmental resources and Housing.

Here is an example of a community outcome that improves health for a community that wants more access to healthy foods.

**Issues are related to community needs and concerns**. For example, a need for increased access to healthy foods.

There is a lack of access to full-service grocery stores and gardening areas.

**Outcomes are a result of or change from addressing an issue.**

The desired outcome is better access to healthy food choices, such as increasing the number of full-service grocery stores or providing green space for community gardens. These are associated indicators to help track the outcomes.

Outcomes are a change or a result.

The following are examples of some outcomes:

- Lowered blood lead levels in children.
- Increased property values.
- New hospital with 10* new primary care providers.
- New grocery store with a full range of healthy food, including fresh fruit and vegetables.
- 10* contaminated properties cleaned up and redeveloped.
- A new business with 20* jobs created for youth.

*These can also be indicators since they are quantitative.

We will now review the Action Model.

Let's visit the **Action Model Toolkit.**

ATSDR designed an Action Model toolkit containing 4 steps.

Community members can use this toolkit to make changes in the community, such as redeveloping properties in their neighborhood. This will help improve the health of their community.

ATSDR has consolidated the indicators from 40 action models from communities across the United States.

There are four steps to a health-focused redevelopment of blighted properties.

The final step creates community-driven public health indicators that can be tracked to measure changes in health outcomes.

The image on the right details the 4 steps of the Action Model.

These are:

- **Step 1:** What are the issues in the community?
- **Step 2:** How can redevelopment address these issues?
- **Step 3:** What are the community health benefits of redevelopment?
- **Step 4:** What indicators are needed to measure the health benefits?

Here is the link to an Action Model template from the Action Model toolkit.

You can access it and download a template from this link:
https://www.atsdr.cdc.gov/sites/brownfields/actionmodeltoolkit/prepare-for-your-first-action-model-workshop/#section-3-3

Use the template to follow along in our upcoming Action Model exercise.

**These are the 4 steps in The Action Model.**

- Issues "(Step 1)".
- Redevelopment Approach " (Step 2)".
- Health Benefits "(Step 3)".
- Indicator " (Step 4)".

The **ATSDR Community Health and Land Reuse Scorecard** is another tool to help communities select and track health, environment, and economy indicators.

Indicators measure changes in health, environment, and economy.

They can range from blood lead levels, number of structures demolished and properties redeveloped, and employment rate.

Using the scorecard, you can identify indicators or paste existing indicators into Step 4 from the Action Model template described in the previous slide.

The scorecard is a good way to track the status of multiple indicators at the property being redeveloped.

The fillable Action Model Indicators Scorecard is available at this PDF link:
https://www.atsdr.cdc.gov/land-reuse-health-program/media/pdfs/Health_and_Land_Scorecard-H.pdf

Continuing on the same web page, you will see the template of the scorecard.

After consolidating the Action Model indicators from 40 communities, we ended up with 9 community-derived indicators related to community health.

**The community-derived indicators include:**

1. The Built Environment with 17 Indicators
2. Community Involvement with 4 Indicators
3. Economy with 16 Indicators
4. Education with 4 Indicators
5. Environmental Improvement with 6 Indicators
6. Environmental Resource with 5 Indicators
7. Housing with 11 Indicators
8. Physical Health with 4 Indicators (may include mental health indicators as well)
9. Safety and Security with 2 Indicators

You can click on each topic on the website, and the indicators will be available to you.

You can cut and paste these into your Action Model or Scorecard templates.

You can also create your own community-specific indicator.

For example, one community was concerned about the smell of garbage from a nearby transfer facility.

They selected as their indicator a survey of residents and businesses about how much the odor disrupted their quality of life.

You can access the indicators at the following link:
https://www.atsdr.cdc.gov/land-reuse-health-program/php/healthfields-tools-resources/community-health-and-land-reuse-scorecard.html

Next, Huda and I will lead you through an Action Model exercise using the indicators on the web page.

**Let's work with the Action Model's Community Derived** Indicators
In this module, we will focus on all four steps.

Then, we will dive deeper into "Step 4: What public health indicators are needed to measure changes in health benefits."

The scorecard corresponds to Step 4 of the action model.

In Step 4, we can select an indicator from the nine community-derived indicators on the web page. We can write the indicators in both Step 4 of the Action Model Template and in the Indicator Scorecard. Or we can paste the indicators from the scorecard. Alternatively, we can create a new indicator that is specific to one community issue.

The community-derived indicators can be accessed by scrolling down on this web page: https://www.atsdr.cdc.gov/land-reuse-health-program/php/healthfields-tools-resources/community-health-and-land-reuse-scorecard.html

Let's use the scenario of a former school that a rural community wants to re-purpose.

The community identified four concerns or issues:

1. The school is contaminated with lead and asbestos.
2. The community needs increased access to health care.
3. The community wants to keep youth in the community.
4. The community needs increased access to healthy food.

**Huda:**

Laurel, let's look at issue 1, lead and asbestos contamination of the school. As an environmental professional, what can be done about lead and asbestos for our Step 2 redevelopment approach?

**Laurel:**

Huda, lead and asbestos are actually very common contaminants in brownfields.

We can remove lead and asbestos contamination following standard procedures.

**Huda:**

So, Step 2 is to remove lead and asbestos.

**Laurel:**

Huda, you used to work in healthcare. Can you suggest the health benefit of cleaning up lead and asbestos?

**Huda:**

Yes, we would expect to see reduced exposures to these contaminants. By removing the contamination, we can estimate a reduction in exposure. For example, lead based paint and asbestos containing material were removed from a former school. The contractor reported the linear feet of asbestos removed and the project manager was able to estimate the square footage of lead based paint that was removed.

Let's look at the second issue, increase access to healthcare. The redevelopment approach is to turn part of the vacant school into a health clinic. Step 3, the health benefit are reduced exposures and improved health.

Now, let's pause for about 30 seconds while you think of how you could complete steps 1 – 3 for these two issues: keep youth in the community and increase access to healthy food.

Let's think back on the nine Action Model indicators described previously to decide what particular indicator to use to measure changes from our redevelopment approach to address lead and asbestos contamination.

In this scenario, "remediate the lead and asbestos" will be under the Environmental Improvement indicators.

This is Step 4 of the Action Model.

The website for the environmental improvement indicators is: https://www.atsdr.cdc.gov/land-reuse-health-program/php/healthfields-tools-resources/environmental-improvement-indicators.html

Now, I can add my indicators to the Step 4 of our Action Model template.

If we also wanted to address impacts of potential lead exposures, then we could click on the physical health indicators. However, in this case we are simply viewing an excerpt of the environmental improvement indicators.

Here again is the header row of our Action Model showing steps 1-4.

- **Step 1**, issues, is a former school with lead and asbestos contamination.
- **Step 2**, the redevelopment approach that can be taken, is to remove contaminants.
- **Step 3**, the health benefit is reduced exposures.
- **Step 4** will be what indicator measures change. This is from the environmental improvement indicators such as pre and post redevelopment media impacts, pre and post redevelopment levels of contamination, number of lead abatements and remediations, and number of asbestos abatements and remediations.

Now we will discuss the second issue which is to increase access to healthcare. The redevelopment approach is repurposing the school for use as a community health clinic. The health benefit is access to health care. The indicator that can be collected is a built environment indicator such as number of vacant buildings put back into functional use.

Next, you try it! How would you complete Steps 2, 3, and 4 for these issues: keep youth in the community and increase access to healthy food? Pause the training for a couple of minutes and give it a try.

OK, now that you have practiced filling in the Action Model, I'll share what we did.

For the issue to keep youth in the community, our Step 2 was to create job by opening new businesses. Our Step 3 health benefit was improved economy. Our Step 4 indicators were number of jobs created and number of businesses, industries, and services.

For the issue to increase access to healthy food, our Step 2 was to start community gardens and farmers markets and to turn part of the school property into a grocery store. Our health benefit was improved health. We selected the built environment indicators of number of community gardens, number of farmers markets, and food security data.

We can use the Community Health and Land Reuse Scorecard that we discussed earlier.

Use the scorecard to track changes in indicators over time. As shown on the scorecard, the number of lead abatements is tracked. Pre-redevelopment, there were zero abatements. Mid-redevelopment, there were 8 abatements. Post-redevelopment, there were 18 abatements. This exceeded the goal of 15 abatements set by the redevelopment committee. The work was completed in about 12 months, from 11/01/2019 to 12/31/2020.

Now let's do a knowledge check.

**Knowledge Check # 5**

Environmental and health professionals can use the Land Reuse Action Model Toolkit indicators and scorecard to help their communities select indicators to incorporate into redevelopment plans.

- **A.** True
- **B.** False

Let's pause for 10 seconds for you to answer.

[No audio]

The answer is a) true. Redevelopment falls under three general public health categories: environment, health, and economy. Within these three categories, ATSDR has identified nine public health indicators related to community health. Examples include the built environment, community involvement, environmental improvement, and housing.

Now I will turn it over to Laurel who will describe a fictitious case example where we show how the toolkit and scorecard can be used to guide members of the development community.

**Laurel:**

Let's look at **outcomes related to a contaminated site**. This is a mock site.

This case study is on a fictitious asbestos mine. It is the ABC site in Keweenaw Peninsula. This is a mock site that is loosely based on real events. The site was an active asbestos mine from the early 1900s to 1993. Chrysotile, which is a toxic form of asbestos, was mined, resulting in many tons of waste rock and mine tailings. Runoff from this tailing site began to migrate off the site. The contaminated water containing fibers of asbestos moved into the

surface water, the stream, and the sediments in this community. There were also wetlands contaminated with this runoff. The site also is a source of airborne asbestos. The tailings piles were used as a recreational area for activities such as hiking and kids playing.

ATSDR and federal and state agencies were alerted to dangers associated with the ABC site. They immediately assessed the situation as an emergency and created a campaign to inform the public about risks. The team of agencies contacted local groups who regularly accessed the mine site.

The team of agencies developed an education and awareness campaign. Federal, state, environmental and health agencies collaborated with local nonprofits to protect the public's health. The campaign informed residents about asbestos exposures and encouraged residents to minimize exposure by staying off the mine property.

The site was identified as a hazardous place where recreation can be dangerous to people's health. A risk assessment performed on the site details, such as number of people accessing the site, the contaminant of concern, frequency of access, and duration of access estimated that asbestos exposure was prevented for 160 people per year.

Let's do another knowledge check.

**Knowledge Check # 6**

Select all the messaging actions that apply to Asbestos Mine:

- **A.** The development community team communicated findings and concerns to other state and local partners.
- **B.** The local partners encouraged residents to minimize exposure to asbestos by staying off the mine property.
- **C.** Allowed people to continue skiing or hiking on the site as long as the snow was at least 3 inches deep.
- **D.** Prevented 160 people per year from being exposed to asbestos.
- **E.** Went hiking on the site with visitors to demonstrate that there was no risk of recreating on the mine tailings.

Let's pause for 10 seconds for you to answer.

[No audio]

The answer is a), b), and d).

Allowing people to continue using the site or hiking on the site with visitors (answers c and e) are incorrect because these activities could expose people to asbestos.

I will now review the differences between issues, indicators, and outcomes.

**Issues** are community concerns related to redevelopment.

For example, community members may worry that there are not enough green spaces for their children to play. They may be worried about lead contamination in the soil from lead paint dust from abandoned buildings.

**Indicators** can be derived to track progress towards achieving an improvement (the outcome) in health related to the issue. Indicators typically are quantitative – such as a map or list or number.

For example, a list and location of contaminated sites, or community blood lead level screening results are public health indicators.

**Outcomes** are changes in health, environment, economy and many other public health indicators.

For example, increased access to healthy foods, lowered obesity rates, reduction in chemical exposures, and increased property values are outcomes that improve individual and community health.

Huda and I will now play “name that issue, indicator, outcome” game.

**Laurel:**

I will list out different items. Huda will decide whether it’s an issue, indicator, outcome, or both outcome and indicator.

OK, Huda, are you ready?

Please tell me whether it is an issue, indicator, outcome, or both indicator and outcome?

For example, I may say “Need healthier food choices” and the answer is that’s an issue.

Here we go.

Need more primary care providers:

**Huda:**

Issue

**Laurel:**

Number of farmers markets:

**Huda:**

Indicator

**Laurel:**

Name the contaminants at a site and the potential health effects resulting from exposure to these contaminants.

**Huda:**

Indicator

**Laurel:**

Three developers noticed the “this is an opportunity sign” in six vacant downtown buildings and put in bids to purchase them:

**Huda:**

Indicators, but also, an outcome because they put in bids (a change or activity).

**Laurel:**

Inventory of land reuse and brownfield sites:

**Huda:**

Indicator

**Laurel:**

What if we said, created an inventory?

**Huda:**

That is an outcome. It is an activity or change.

**Laurel:**

OK, Huda, please tell me whether the following items are issues, indicators, outcomes, or both indicators and outcomes?

**Laurel:**

Created murals and signs to make downtown buildings look better:

**Huda:**

Outcome

**Laurel:**

Number of murals and signs to make downtown look better:

**Huda:**

Indicator

**Laurel:**

Local Park district added 12 after school and weekend youth programs within one year, doubling the number of programs:

**Huda:**

Outcome, but “12 new programs” is an indicator. It can be complicated!

**Laurel:**

Number of primary care providers:

**Huda:**

Indicator

**Laurel:**

A full-service grocery store moved into the old warehouse site, offering a full range of healthy and inexpensive produce and foods:

**Huda:**

Outcome

**Laurel:**

After cleanup, the former Navajo forest products became a food hub and indoor farm:

**Huda:**

Outcome

**Laurel:**

Navajo Nation EPA worked with U.S. EPA to remove 20 tons of contaminated soil from the Navajo forest products industry site:

**Huda:**

Outcome, but 20 tons of soil removed is an indicator, so both!

**Laurel:**

Two Diné college summer interns were featured in a Navajo Times article, which led to job offers for both of them:

**Huda:**

Outcome

**Laurel:**

Number and types of contaminants at 20 different sites:

**Huda:**

Indicator

**Laurel:**

Number of clinics with maps to indicate distance to clinics:

**Huda:**

Indicator

**Laurel:**

Number of activities for youth provided by schools or park district:

**Huda:**

Indicator

**Laurel:**

The Local Park District created 100 new programs

**Huda:**

Indicator

**Laurel:**

Number of vacant or boarded buildings in the downtown area:

**Huda:**

Indicator

**Huda:**

The link to the post-test in CDC Train is on our training home page. The post-test is optional but needed to obtain continuing education units.

The reading that supplements this training is Section IV of the free course textbook, Land Reuse and Redevelopment: Creating Healthy Communities. The book is available on the home training page.

That is the end of the presentation for Module 5. Thank you for attending.

The contact person for this training is ATSDR's Land Reuse Team.

They can be reached at: atsdr.landreuse@cdc.gov