

Is a health study the answer for your community?

A guide for making informed decisions

For decades, environmental health scientists at Boston University School of Public Health have worked with community groups to address environmental health problems. We wrote the Health Studies Guide to assist community groups and individuals who think that some form of environmental health investigation or health study may be useful or necessary in their community. Readers of this guide may have concerns about drinking water contamination, or the relationship between emissions from a power plant and asthma in their community. People may suspect that a certain disease in their community, such as lupus, has an environmental cause or trigger. All of these are reasons for wanting a health study. Hopefully this Guide will help readers think this through.

Chapter 3: A Menu of Health Studies

The Guide can be found on our website at

<http://www.bu.edu/sph/health-studies-guide/>

Chapter 3 : A Menu of Health Studies

Which Type is the Best Match to Your Research Question?

“Is there a type of study that is most appropriate for what we are trying to accomplish? Really and truly there is not. . . . Nine out of ten, a health study will be telling you that your mind is playing tricks on you and you do not know what you are talking about.”

— Emma, Resident of Louisiana

Considering the pros and cons of study types and knowing what information they can and cannot provide will help you develop a clear research strategy and avoid feeling as frustrated as Emma was. Below we have grouped some sample research questions under appropriate study types. Each type of study is sketched only briefly here. Longer descriptions appear in the next chapter. Community groups are unlikely to undertake three of the study types included here—environmental impact statements, risk assessments, and public health assessments. However, the community’s insights and questions may be important in triggering, planning, and evaluating such studies.

Figure 3.1 summarizes the study types and the results they can produce. Use this chapter to match your question to a type of study or to stimulate your thinking about ways to refine your research question. Since only limited information is provided here, this will be a preliminary match. We encourage you to flip back and forth with Chapter 4 to read more about your chosen type of study. If you decide after reading further or talking with community or academic partners that your chosen study type is not a good fit, you can return to this chapter to pick another option.

You may find you have more than one question or that more than one type of study looks like a match to your question. That’s OK—maybe you can think of a creative way to combine approaches. In real life, that is often what happens. On the other hand, if none of the questions sounds like your own, you might reconsider whether a health study will help you get what you really need.

Each type of study examines something slightly different, but for the most part they focus on exposures, outcomes, or both. As you will see, studies that focus on exposure or outcome alone tend to be less complicated.

Finally, each study type is shown in Figure 3.2 on the exposure-disease model presented in Chapter 2.

Figure 3.1 Summary of Study Types

<u>Study Type</u>	----->	<u>Results</u>
(1) Mapping		
Exposure mapping		Map(s) of exposure
Outcome mapping		Map(s) of disease distribution
(2) Studies of Exposure		
Environmental monitoring		Concentrations in environmental media
Personal monitoring		Concentrations in immediate and personal surroundings
Body burden (biomonitoring) study		Concentrations in bodily tissue or fluid
Environmental impact statement		Description of environmental changes
(3) Studies of Outcome		
Community survey		Survey responses; may be qualitative
Analysis of registry data		Comparison of community disease or mortality rate with standard rate
(4) Studies of Exposure-Outcome Relationship (Epidemiologic Studies)		
Ecologic study		Correlation between exposure and disease
Cohort study		Relative Risk between exposed and unexposed groups
Case-control study		Odds Ratio between cases (have disease) and controls (no disease)
(5) Studies of Contaminated Sites		
Risk assessment		Characterization of hazard, estimates of health risk
Public health assessment		Exposure evaluation and health effects evaluation using collected data

(1) Mapping Studies (p.39)

Where are sources of environmental exposure located?

Exposure mapping can be done either by community groups or by scientists. It helps communities visualize sources of pollution, possibly identifying patterns of exposure. Some exposures are obvious; others will require that you get data from an environmental agency or other source. For example:

- *Some drinking water wells have been closed as a result of contamination. Where are these wells located in relation to people's homes, schools, etc.?*
- *Which neighborhoods are closest to the farms where sludge is sprayed?*
- *Are there childcare centers within walking distance of the highway?*

Where are the diseases occurring in our town?

Disease mapping can be done either by community groups or by scientists, and helps you visualize patterns in an area. However, mapping requires that you already have the data, perhaps collected from a door-to-door survey or looked up in a registry.

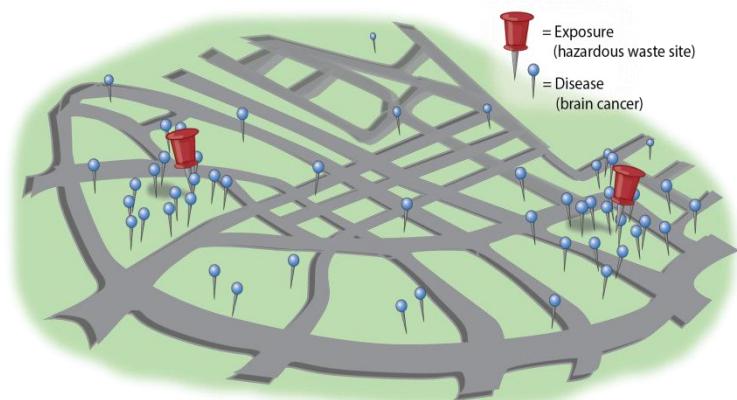
For example:

- *Where on our street or in our neighborhood are the lung cancer cases located?*
- *Where in our town are the greatest number of pedestrian fatalities?*
- *Where in our county are the leukemia cases located?*

Does there seem to be any pattern to the locations of exposures and outcomes in my community?

Just as **mapping** can be used to see the locations of exposures *or* health outcomes in your community, both can be captured on the same map.

- *The west side of town has more cases of brain cancer for its population than other neighborhoods. Does it also have more hazardous waste sites?*
- *Are there more breast cancer cases near the underground plume of contamination compared with areas with no ground water contamination?*
- *Do cases of cardiovascular disease mortality appear to be higher downwind of the coal-fired power plant?*



(2) Studies of Exposure (p.45)

Are there toxic substances in the environment?

Environmental monitoring looks for and measures concentrations of chemicals or other toxicants in the environment. Depending on the availability of equipment and laboratories, samples of air, water, soil, or food can all be examined for evidence of contamination. For example:

- *Is there lead in my garden soil? How much?*
- *Is there mold in the air I am breathing? How much?*
- *Are there hazardous chemicals in my drinking water? Which ones and how much?*



Have we been exposed to pollutants? Are there toxic chemicals in my body?

A **body burden study** measures chemicals that are in a person's body. By taking samples of body tissue (blood, urine, saliva, hair, nails, or breast milk) some specific contaminants can be measured. These studies answer questions such as:

- *Is there lead in my blood? How much?*
- *Is there mercury in my hair? How much?*
- *Have I been exposed to PCBs? Is there evidence of them in my body?*

What will be the impacts of this land use?

An **environmental impact statement** is intended to describe the environmental impacts of a new development, such as a highway or building, or a modification of an old one, such as capping a landfill. Although this type of study is not strictly speaking an exposure study, it gives information that may be useful in thinking about exposure, by answering questions like these:

- *How will construction of this highway affect water runoff?*
- *How will building a power plant here affect the air quality in this area?*
- *How much will building a parking lot here increase traffic in locations where children are known to walk on their way to school?*

(3) Studies of Health Outcomes (p.53)

Are we sick?

A **community survey** can help you learn about what is happening in your area, either by going door to door or by making phone calls. Surveys can answer questions such as:

- *What health problems are residents of our street experiencing?*
- *What health problems are of concern to my neighborhood?*



Are we sicker than other, similar communities?

An **analysis of disease registry data or vital events data** lets you compare death rates or the rates of certain diseases—usually cancer—with those in other areas. For example, registry data can answer the questions:

- *Does our town have a higher rate of lung cancer than the state average?*
- *Does our county have a higher-than-expected rate of childhood leukemia?*
- *Are people dying younger in my city than in other cities?*

(4) **Studies of the Exposure-Outcome Relationship (p.58)**

Are there more health problems in places where people are more highly exposed?

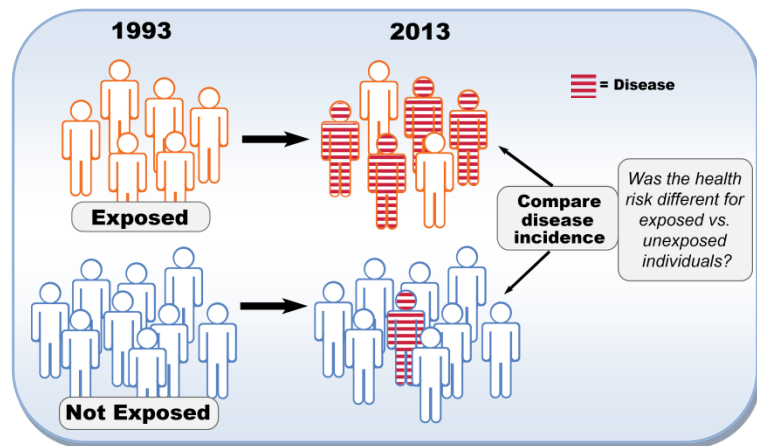
An **ecologic study** asks whether there is an association between some exposure and some health outcome across a set of geographic units (for example, towns, counties).

- *When I look at all the cities and towns of the state, do those with higher brain cancer rates also have a heavier burden of hazardous waste sites?*
- *Across the United States, do the counties that host a coal-fired power plant also have higher rates of asthma?*

What is the difference in disease risk among people who had a particular exposure and people who did not?

A **cohort study** follows people over time and compares a health risk among people who were exposed to the hazard to the health risk among people who were not exposed. For example:

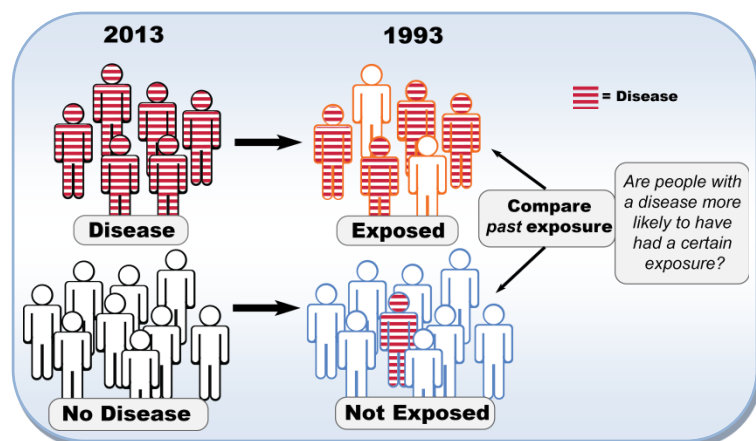
- *Are the people who lived near a hazardous waste site 20 years ago more likely to have had cancer than people who lived far from the site?*
- *What will happen in the next five years to people who are exposed to this radiation source compared with people who are not exposed to it?*



Are people with a certain illness more likely than other people to have had some specific exposure in the past?

A **case-control study** compares people who have a specific illness or condition with people who do not. Case-control studies may ask:

- *Were adolescents who have learning disabilities more highly exposed to lead paint as toddlers than adolescents who do not have learning disabilities?*
- *What differences in lifestyle, behavior, genetics, or environmental exposures exist between women with breast cancer compared to women from my town who do not have breast cancer?*



(5) Studies of Contaminated Sites (p.64)

What chemical exposures are people likely to have from this site?

What is the overall level of health risk from this site?

A **risk assessment** characterizes contamination at a site, estimates potential human exposures for a set of exposure scenarios, and provides estimates of the associated cancer risk and non-cancer health hazard.

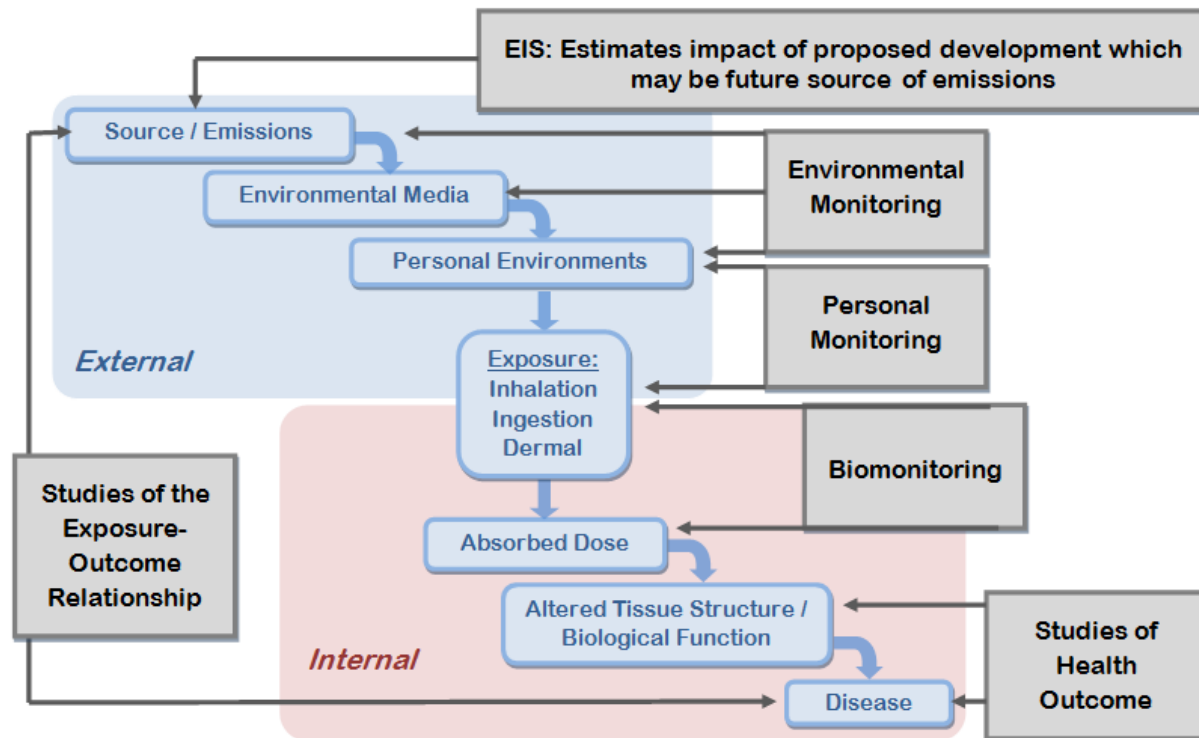
- *What is the lifetime cancer risk of drinking well water contaminated with chemicals originating from this site?*
- *What is the non-cancer health hazard associated with teenagers' contact with chemicals while trespassing on the site?*



Are people exposed at this site? If so, are they exposed enough to take action? Will this exposure make people sick in the future?

A **public health assessment** looks into the details of exposure at a particular site, such as a hazardous waste site, and provides information from studies that have already been conducted regarding the hazards identified at the site.

- *What are people's actual exposures at this site?*
- *Have people's actual exposures to this site made them sick?*

Figure 3.2 What Various Study Types Address in the Exposure-Disease Model

Summing Up

This chapter introduced you to the main study types and offered some examples of questions these studies are intended to answer. This was a preliminary exploration of the options available and an opportunity to see how closely your research question developed in Chapter 2 resembles some of the questions here, and if it fits into these study types. Perhaps you were able to narrow down a few potential options or perhaps you will want to go back and refine your research question. Chapter 4 will delve into more detail about these study types, including aspects of time and cost as well as provide resources to help further your understanding. This background knowledge will help you weigh your study options with a public health professional. Furthermore, familiarity with study designs, strengths, and limitations will inform your expectations for the study's results, if you decide to pursue a study, and give you the tools needed to communicate your study's goals and approach to others.



Key Points from Chapter 3

- Approach the menu of health study types with your research question formulated. Were you able to find a study type(s) with a research question similar to yours?
- Learn more about the study types that appealed to your question in Chapter 4 and return to this chapter if you don't find a good match or if your research question changes.