CHAPTER 1

INTRODUCTION TO THE BUILT ENVIRONMENT AND HEALTH

LEARNING OBJECTIVES

- Compare the three domains that make up the broader concept known as the environment.
- Assess whether the built environment is consistent with the defining characteristics of environmental health.
- Describe the health, equity, and sustainability framework for evaluating the built environment.
- Name some of the professions that are associated with built environment research and practice.
- Describe the processes that shape the built environment.

How does the built environment affect your health? Consider the many different ways. Your apartment, home, dorm, or other place you spend the night protects you from the cold and rain. Curbs separate pedestrians from cars, and schools and commercial buildings have fire alarms, emergency exit signs, and other safety features. For the next twenty-four hours, look around and try to identify the many ways the built environment has been modified for your protection. Were you aware of all of these features? Do you think most people know how much the built environment shapes their daily lives? We will come back to these factors of the built environment in more detail later in this book. For right now, just consider the range and variety of built factors specifically added to the environment for your health and safety.

This book is a survey of the many pathways between the built environment and health, with an emphasis on issues in the United States. The built environment refers to all the many ways humanity builds or manipulates the world around it. The health effects of the built environment occur on multiple scales, including houses, streets, neighborhoods, metropolitan areas, regions, nations, and beyond.

Some impacts operate on very large geographic and temporal ranges, including international or national effects on millions of people over multiple generations. The U.S. interstate highway system, for example, transformed landscapes across the country and contributes to global climate change.[1] Other effects operate at a very local level and may only affect a few individuals for relatively brief moments in time. For example, a temporary sidewalk closing due to building construction may force pedestrians to walk in the street, potentially putting them at risk from passing cars. Including large- and small-scale impacts, those transitory and permanent, the collective impact of the built environment on health may be large.[2]

The built environment provides the framework for how daily lives are conducted, influences health across life spans, and represents important pathways through which individuals come into contact with many health risks. Though the associations between the built environment and health have only been subject to modern epidemiological scrutiny for the past two decades, and efforts to use the power of built environment interventions to address our current health concerns are only in their infancy, there is growing evidence that some environments can promote health while others increase morbidity and mortality.[3] This book provides an overview of the evidence that links the built environment with health, and it describes some of the program, policies, and projects that have been used to modify the environment to promote health.

Dimensions of the Environment

The term *environment* is very broad and can mean many things to different people. Even scientists from different disciplines can utilize varying conceptions of what constitutes the environment. To the geneticist, for example, the environment can be everything outside the genome including features operating on or below the cellular level that influence gene expression or modify genetic material.[4] To the sociologist, however, environment might mean factors beyond what is physically existent in an individual's body and describes the interactions between and among individuals, groups, and societies.[5]

For the purposes of this book, the environment is divided into three broad domains: the physical, social, and built environments. The **physical environment** includes all the various features that are part of mainstream environmental literature: forests, prairies, watersheds, plants, animals, and so on. It also includes the factors that are of concern to classic environmental health: air and water pollutants, radiation hazards, and so forth. These exposures are well known to be

associated with certain diseases and to be linked to better or poorer health. Many of these physical environment problems are discussed in this book because the likelihood of exposure to them can be influenced by the built environment. For example, factories, prominent features of the built environment, can influence the degree to which an individual who lives near these facilities may be exposed to air pollutants, and thus impact health.[6] Physical environment attributes may arise from a built environment feature.

The **social environment** represents the many features that result from or are part of how humans interact with each other. These include the distribution of income, the role of race in society, political power, and other similar factors. There is a large body of evidence showing that the social environment can have profound impacts on health, a field that is also known as social determinants of health. For example, even though race is a social rather than a biological construct,[7] how an individual's race is perceived can have important lifelong impacts on health, from the risk of infant mortality to the incidence of prostate cancer in later life.[8] Race interacts with the built environment in many ways. It can influence income and wealth, which can then lead to an individual's ability to live near parks and other environmental amenities.[9] It may limit access to certain neighborhoods, affecting an individual's exposure to hazardous wastes or influencing access to nutritious food.[10] Thus the social environment is also included in this book.

The **built environment** itself consists of all the many features that have been constructed and modified by humanity. These include everything from how rooms are laid out, to the construction of homes, to the various land uses in a neighborhood, to the structure of neighborhoods and metropolitan areas, to the way regional and national geography and infrastructure interact to protect (or not protect) people from natural disasters. All of these levels of the built environment will be discussed here.

These three domains are not totally discrete, that is, there is considerable overlap between them. For example, racial residential segregation, the degree to which racial groups are concentrated in certain neighborhoods in many metropolitan areas, is both a social and a built environment factor.[11] It is a social factor because race itself is a social construct, only defined in the context of the society in which an individual lives. But when individuals can only buy or rent in certain neighborhoods, and thus their access to supermarkets, pharmacies, and hospitals is constrained, then it is also a built environment factor. Furthermore, when the influence of segregation is considered in the study of the distribution of environmental hazards and amenities, it includes the physical environment as well.

Is the Built Environment Really an Environmental Factor?

For those who consider the term *environment* in a more traditional manner, for example, those who think of the word in the context of narrow national pollution laws, there may be concern that the built environment is not a part of the environment at all. Some may believe that the term *environment* should be restricted to those attributes that exclude human-made features completely, or they at least place cities and intensely developed areas at the bottom of a hierarchy that places natural areas yet untouched by human influence at the pinnacle of desirable environments; others, however, have long advocated for the inclusion of humanity when considering the natural environment. But traditionally, the field of environmental health, the branch of public health from which concerns regarding the built environment first reemerged in the 1990s, has defined its agenda by posing a series of questions that set out to include or exclude certain health risks from consideration. By applying these criteria to the health effects of the built environment, we can determine whether or not the built environment is properly considered to be part of environmental health studies. These questions include:

Does the risk occur outside the body? The source of the problem should originate externally for it to be considered environmental. For example, even though environmental health is very concerned about environmental features that promote hypertension, high blood pressure itself is not traditionally considered to be an environmental disease and is rarely discussed in environmental literature. The proximal causes of hypertension, and its health effects, are observed internally; thus, hypertension is not an environmental health risk. In contrast, some distal factors are environmental stressors for hypertension and are within consideration here, including noise exposures, the distribution and availability of healthy food choices, the influence of the built environment on physical activity, and so on.[12] Therefore, sodium consumption, a major risk factor for high blood pressure, is not often discussed in the context of environmental health, but neighborhood food environments that offer few healthy options yet have ubiquitous sources of high-sodium foods are considered here. In general, though the health consequences of the built environment are almost always internally observed, their causes lie outside the body: in a person's home, neighborhood, metropolitan area, or rural community. Thus built environmental factors are not internal to the body—the risks are external.

Is the exposure or health risk voluntary? Generally, environmental health includes involuntary rather than voluntary risks. Smoking is considered to be

voluntary (though, as will be discussed in this book, there are features of the built environment that affect the likelihood that someone will smoke), and thus it is not generally considered to be an environmental health problem. In contrast, exposure to secondhand smoke is considered to be an environmental issue, as suggested by secondhand smoke's alternative name, environmental tobacco smoke.[13] Nonsmokers exposed to tobacco smoke do not cause the exposure but rather become exposed because of the actions of others.[14] Considering the built environment, though, there is some individual choice regarding in what sort of environment one lives. For the most part, the broad parameters of the built environment—streets, the need to use a car to get to work, the construction of public works, and so forth—are set by society and an individual has little control over these features.[15] Thus the health risks and benefits of the built environment are not voluntarily accepted or individually produced.

Is the health risk caused by a biological agent? Though very concerned about malaria and other vector-borne diseases as well as diseases spread by contaminated water, for the most part environmental health does not address diseases caused by viruses, bacteria, and other organisms. Thus, as important an issue as it may be, HIV/AIDS is not a major subject in the environmental health literature. However, the built environment's influences on risk behaviors are considered here.[16] In general, the risks outlined in this book act on individual health without the intervention of biological agents.

Taken together, built environment to health pathways tend to originate outside an individual's body and health issues associated with the built environment tend to result from involuntary exposures to nonbiological factors. Based on these criteria, the built environment may be properly considered to be part of environmental health. This does not mean that everyone will agree about this application of these guidelines, only that built environment factors are consistent with the generally accepted parameters of environmental health.

How to Evaluate the Built Environment?

A recurring theme of this book is how do we measure and assess the built environment? How can we objectively describe its features and impacts? As will be seen, there are many ways to evaluate the built environment. For the most part, this book uses epidemiological evidence whenever possible. These include peer-reviewed articles published in academic journals that use standard health research methods. Among the epidemiological tools included here are case-control studies; cohort designs; and qualitative, ecological, and multilevel analysis. The book also

uses engineering reports, case studies, architectural assessments, theoretical texts, and other sources as well.

Public Perceptions and Assumptions Regarding the Built Environment

The modern study of the built environment is a fairly new field of research. Although there have been concerns that some environments were healthier than others even back in ancient times[17] and the fields of urban planning and public health had common beginnings that resulted from problems posed by urbanization in the nineteenth century, the majority of research on the built environment that meets current standards of scientific validity dates back to the last two decades.[18] Thus it is likely that the full range of health effects may not yet be identified and it is always possible that a connection between the built environment and health accepted today may prove to be discounted in the future when additional evidence is analyzed. This is a growing and evolving field. The public tends to want certainty, however, particularly when theories of the built environment to health connection could result in expenditures of billions of dollars or more on infrastructure. But it is not always possible to provide guarantees in this field.

Many laypeople may not know about the health risks of the built environment or simply assume that these issues have been long studied and all major controversies resolved. Therefore, a common assumption may be that the suburban environment in which most U.S. residents live is the best possible built environment in terms of health, even if some research suggests this may not be true.[19] Part of this disconnect is the result of the lack of dialogue between researchers and the public. As with most health research, findings are couched in precautionary language, published in scientific journals, and rarely presented in standard English. A related misconception is that many people assume that rural environments, or living away from the rest of humanity on a deserted beach or mountaintop, are among the healthiest place to live—never considering the certain eventual need for medical care, the day-to-day need to purchase food, or the health value of contact with supportive family and friends.[20] Actually, evidence suggests that rural living is less healthy than urban living despite the noise, crowding, and congestion of cities.[21] But these findings are buried in journals unknown to the public.

Another issue is that research findings can contradict the rationale for past decisions. Millions of families moved to the suburbs to provide healthier environments for their children. To suddenly suggest that urban living, or at least

living in communities that promote alternatives to cars, might be healthier may challenge these people. In the absence of public education, accessible data, and the time to absorb the implications of new research, it is difficult to expect that new research findings and new theories of health will be broadly accepted. There is much more to be done to educate the public about the health impacts of the built environment.

Cross-Disciplinary Nature of the Study of the Built Environment

From its very beginning in the mid-nineteenth century to its revival at the end of the twentieth century, the study of the built environment has transcended the boundaries between academic disciplines and incorporated theories and research from a wide variety of research approaches.[22] In some respects, this has been a rewarding process and the level of knowledge in participating fields of study has been enhanced. Health research has informed urban planning and economists now study human behavior, for example. But the cross-disciplinary nature of built environment study can also lead to confusion, particularly when two separate disciplines use a term in two very different ways. For example, in ecology research a *community* represents the totality of the animals, plants, and microbes in a given place; the trees, birds, mammals, fungi in the leaf litter, underground microorganisms, and so forth in a forest.[23] Humanity's consideration in this ecosystem schema may be limited to their ability to shape the system by setting fires, building roads, or promoting global climate change. In health and sociology, a *community* represents the collection of individual people in an area, their collective power to effect change as well as their individual characteristics and group interactions, but this may say nothing about the ecosystem they inhabit and the other species that coexist in this environment, differently defined. Still others have placed humanity inside a larger ecological complex that combines these two worlds.[24] The result can be confusion when attempts are made to communicate findings from one discipline to another. But despite these problems, the study of the built environment has been marked by a great deal of cooperation and collaboration across disciplines.

There are also crosscurrents of ideas within the broader disciplines of design and health. Some architects who are best known for their iconic buildings have also informed neighborhood design as well. For example, Frank Lloyd Wright may be better known for his Prairie style residential homes and the Guggenheim Museum in New York, but he also wrote extensively on the layout of suburbs in his Broadacre City work.[25] Lewis Mumford was an influential architecture

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Disciplines Associated with the Built Environment

Public Health. Closely related to but broader than medicine, public health is concerned with the health of groups as well as individuals; practitioners focus more on prevention of disease and preservation of health than they do on diagnosis and treatment of individual illnesses. Public health professionals conduct studies, design interventions, administer programs, and evaluate services.

Epidemiology. This subfield of public health focuses on the factors that cause, prevent, and may influence disease. Epidemiology is a technical field that uses a number of statistical and other techniques that aim to provide basic scientific evidence that may inform health practice and public policy.

Sanitary Science. Taking their name from the great sanitary surveys of the nineteenth century, sanitarians are those professionals involved in implementing laws and regulations meant to protect public health, including food safety, water quality, and other similar types of inspections and enforcement.

Medicine. Physicians are on the front line of diagnosing and treating disease. Though many doctors also have public health degrees and work extensively in public health, most physicians' preventive health services are performed on the individual rather than the population level.

Nursing. Nurses work with physicians and others to provide direct care to patients. Many nurses also work on the population level to help address health risk behaviors and other types of preventative interventions.

Urban Planning. This field aims to shape and influence the overall nature of neighborhoods, cities, and metropolitan areas. Many urban planners focus on designing and implementing policies and programs that promote economic development, create affordable housing, provide emergency services, administer public programs, manage infrastructure, plan transportation improvements, and so on.

Architecture. Architectural practice can range from the design of open spaces (usually referred to as landscape architecture) to the design of individual buildings, neighborhoods, or cities. As will be seen, architecture is heavily influenced by theories of design and has a long history of trying to improve health. However, it should be noted that architects are not the only designers of buildings. Many are designed by engineers, and the design of buildings in developed societies is heavily shaped by building and other safety codes.

Urban Design. An urban designer often works on the overall physical appearance of, and relationships between, buildings, streets, and open spaces over an area that can range from an individual parcel to an entire community. In contrast to urban planners, who tend to focus on programs and policies, urban designers usually produce plans and design guidelines targeted to a specific location.

Landscape Architecture. Landscape architects tend to design the outdoor spaces for a given project or for a larger community. They may often work closely with architects and urban designers in these efforts.

Sociology. Sociologists, along with their colleagues, anthropologists, study the rich texture of human interactions and how individuals see themselves in relationship to others. They also study human behaviors and the behaviors of groups.

Economics. There are many subfields within economics and though some may seem far removed from the study of the built environment, even the most distant can provide insight on the impacts of the built environment. For example, macro economics, which includes the size and rate of expansion of the money supply, can have an impact on the built environment through interest rates, which can either promote speculative building or severely curtail construction activity.

Ecology. Ecological analysis and environmental science have played an important role in shaping the built environment. Through its tools that include the concept of an ecosystem being a series of energy flows, for example, it assists in the understanding of how the built environment can shape human behavior.

Law. The legal framework of a society profoundly impacts what can be built where. Therefore the study of the law, the identification of how laws are made and how they have been implemented, can assist in our understanding of how the built environment is constructed or how it can be improved.

critic for *The New Yorker* magazine, an author of key urban planning texts, and a cofounder of the Regional Plan Association of New York. Similarly, public health informs medical practice and medicine is central to public health research. In general, this book uses urban planning as a shorthand way to include all the design professions and public health to include all the medical professions. See Focus on: Disciplines Associated with the Built Environment.

Placing the Analysis of the Built Environment into a Broader Context

The environment is more than the sum of an area's trees, cars, people, and wildlife. It represents the totality of life and the broad mixture of interactions among people and between any one small area and the planet as a whole. Furthermore, there will be profound impacts on the environment of future generations that are derived from decisions made in the past and today. Therefore, assessing the impact of the built environment should be greater in scope than simply looking

to see if a given single attribute affects the incidence of disease or the prevalence of risk factors at one time. It is important that the assessment of the built environment be placed into a broader context.

In this book, there are three primary areas in which the built environment is assessed: health, sustainability, and equity. All three are highly interconnected. For example, inequality is a risk factor for poor health, and countries, states, and metropolitan areas with higher levels of income inequality tend to have higher infant mortality, higher overall mortality, and lower life expectancy.[26] Thus equity influences health. But health also influences equity, as disability and disease can result in lower incomes and increased exposures to environmental hazards. Therefore it is useful to consider these factors both in isolation and as interconnected constructs.

Health

Over time, there has been a broadening in the concept of what health is. Today, it is considered to be more than just the presence or absence of disease. It includes the overall well-being of an individual, the ability of an individual to fully participate in the social interactions of a community, and a lack of barriers to good health across a life span.[27] Some of the health outcomes of the built environment are easier to characterize than others. Though there are ongoing controversies regarding the definition of obesity and the quality of its measurement, ultimately obesity is fairly easy to identify. But other factors can be more difficult to quantify. The measurement of "connectiveness" of an individual to his or her surroundings, the degree to which individuals feel part of the society around them or even have interactions with others living near or passing by their home, is more difficult to assess. For example, some architects and planners argue against high-rise residential buildings because they believe that living above the fifth floor results in a disconnect from the street.[28] But how to operationalize and measure this type of connectiveness is difficult.

Equity

This factor refers to the distribution of risks and assets between groups as well as the distribution of diseases and good health.[29] This book often highlights inequities in exposures and health that appear to be associated with race, income, or both. The individuals and groups can be located in one place, as in the unequal access to supermarkets between poor and wealthy communities in metropolitan Detroit, or it can reach across countries, as in the case of the transport of hazardous waste from developed countries to less developed nations. An environment can be healthy in many ways that also negatively affect equity.

A gated community, for example, may well provide important recreational opportunities to its residents. But if, as a result, a community votes down a bond issue to support the construction of a public park for its low-income neighborhoods, then the result may widen inequities.

Sustainability

Through sustainability, the concept of equity is broadened to include persons in the future. The impacts of development must not just be analyzed in terms of their effects on current populations, but the very long-term impacts must be considered as well. For example, given the problems associated with greenhouse emissions from coal-powered electricity generation, there have been suggestions that nuclear power plants should once again be built in the United States. But one important consideration must be the long-term impacts of nuclear power generation, including the very large problem of how to secure the safe disposal of radioactive wastes. These may require a site that can be isolated and free from accidental releases for hundreds of thousands or more years. Furthermore, although nuclear power might help reduce carbon emissions today, its wastes might also burden future generations who will not have benefited from our current energy use.[30] In addition, as will be discussed in Chapter Sixteen, the inclusion of equity in sustainability issues has had a controversial history, with some proposing that the very concept of sustainability could be suspect if it meant the perpetuation of existing inequities.[31]

Influences on the Built Environment

The study of the built environment should be broader than the consideration of individual factors themselves; it should also include an understanding of the processes that create these environments. To a certain extent, what we see in an area today is the result of a multitude of short- and long-term processes and decisions that have left a legacy in the design of buildings, neighborhood features, and metropolitan form. Part of the underlying conceptual model used here is derived from Henri Lefebvre's theory that urban space is the result of social processes.[32] In other words, the features of the built environment reflect the interplay of economic, political, and other similar factors. Some of these factors directly influence the shape of the built environment; others are more indirect influences. These include, but are not limited to:

- Laws: development takes place within a legal and constitutional framework
- Geology: soils, coastlines, tectonic factors

- Economics: economic trends, incomes, local economic factors
- Personal and societal values: neighborhood preferences, social factors
- Health assumptions: beliefs regarding causes of morbidity and mortality
- Ideology and political theory: theories of poverty, personal liberty, private property
- Technology: automobiles, Internet, pollution prevention
- Science: research, theories

Summary

The broader concept of the environment can be divided into three domains: the physical, the social, and the built environments. The built environment is consistent with what is traditionally considered to be environmental health because it is concerned with issues that are involuntary, arise outside the body, and are caused by nonbiological agents. The study of the built environment is multidisciplinary and draws on urban planning, architecture, public health, medicine, economics, and other fields.

Key Terms

Built environment	Physical environment
Equity	Social environment
Health	Sustainability

Discussion Questions

1. List five environmental features and classify each as belonging to the built, social, or physical environment. A feature can belong to more than one domain.
2. Describe the place where you would most like to live. What do you think would be the health benefits of this place? What might be the health problems?
3. Discuss why health is more than just the presence or absence of disease.
4. Name three factors that might contribute to the growth of a city or contribute to the form of the built environment.

For More Information

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