Introduction to Appalachian Place and Health

> The first [word that comes to mind] is just the geography,
> that it's a region that stretches from Maine down the eastern
> seaboard of the country, down all the way to the South. And
> beyond that, because it implies difficult traversing terrain, rural
> isolated communities, strong independent people who don't
> really want to be messed with, who are not necessarily happy
> to change, but have a very strong sense of self-identity—which,
> you know, conflicts with change. An area that had been used
> for natural resource harvesting and also as a tourist attraction
> to the hot springs and the parks and all of the different beauties
> of the area. So it's a very diverse, hardy sort of a connotation
> to that word.
>
> —Twenty-five-year resident of Appalachia

Imagine two older people meet on a plane, one from Hawaii and the other from West Virginia. They strike up a conversation and eventually the discussion turns to their health. Because they are similar in age, they share some common ailments: stiff muscles, problems remembering important events, and maybe even elevated cholesterol or heart disease. As their conversation continues, one shares concerns about family members who have died from cancer, children

who suffer with asthma and diabetes, and grandchildren struggling because of developmental delays. Which of the two travelers do you think is more likely to mention these additional health conditions?

If you think the West Virginian is more likely to experience poor health, you are correct. Hawaii consistently ranks as one of the healthiest states in the country, based on many indicators including obesity rates, mental health, and some environmental conditions. In contrast, West Virginia consistently ranks as one of the least healthy states according to these same indicators.[1] Even if you are not a health professional, you can probably speculate as to why Hawaiians are healthier than West Virginians. Access to health care, genetics, and lifestyle contribute to differences between states, but health is a complicated interaction among multiple forces. Understanding the impacts of poverty, education, and environmental contamination is critical to understanding health. These external forces, or social determinants of health, encompass economic, political, and environmental conditions and contribute to health disparities tied to where people live. Your place of residence, including your country, state, neighborhood, and house, affects your overall health and well-being and differentiates you from others.

Social determinants are the "conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks."[2] Collectively, these conditions comprise "place," but they go beyond physical geography to include the context of where people live. Social determinants and their connection to place are part of the national dialogue for advancing health and addressing health disparities. The strategic plan for public health in the United States is called *Healthy People*. Every ten years, the US Department of Health and Human Services engages stakeholders to identify long-range goals and near-term objectives for improving the nation's health. *Healthy People 2020* is the third installment of the plan, but the first version to include social determinants of health. Just like the landscape varies from location to location, so do social determinants such as food security, environmental contamination, and community context. We can measure differences in social determinants both globally and locally.

Location and place interact with factors that affect health. Access to public and private health services, an individual's likelihood of being obese, and a community's ability to recover from a major disaster are examples. This being so, I became more interested in the impact of environmental quality on

public health. This led me to consider whether some of the unique situations in which Appalachian people live is connected to their health. I knew that the Robert Wood Johnson Foundation has been comparing health among US counties since 2008 using multiple indicators. Its work tells us that, when it comes to life expectancy and overall health, zip code may be as important as genetic code.[3] You may be prone to cancer because of your family history, but your chances of actually getting and dying from cancer increase because of where you live. As many have stated, "heredity loads the gun, environment pulls the trigger."

For better or worse, where people live, work, and play is inextricably tied to their health. To know about their health is to deeply comprehend the place where they live. In a sense, fathoming the connections between health and place portrays the environmental geography of health. Environmental conditions such as contaminated water, unsafe food, poorly designed neighborhoods, polluted air, and inadequate housing characterize places as much as culture, community, and landscape. Why some places are more degraded than others is sometimes easily explained by the assets within their boundaries, as is the case with coal, natural gas, and other energy resources. In these instances, the state of the environment is the result of historical activities tied to cultural and natural resources. In other places, the environment is degraded by political decisions to fulfill short-term economic objectives with little thought to long-term public health consequences.

Both long-term natural resource exploitation and shortsighted decision-making contribute to environmental conditions that threaten the health of Appalachian people. The well-known environmental concerns in the region include devastating mountaintop-removal mining, historic human-caused and natural disasters, ruined streams from untreated sewage, and unhealthy indoor and outdoor air. Not so well-known are how these conditions burden the health of Appalachian people in ways that are disproportionate to other places. This is a missing piece of the Appalachian narrative that begs to be told and was the motivating force for this book. Before delving into stories demonstrating how people are ailing in Appalachian places, let us examine a few key concepts.

THE PLACE CALLED APPALACHIA

A zip code identifies where your house is located on a map, but your place is far more than a zip code. Place includes social, political, cultural, and environmental

conditions of the specific location. The concept of place is grounded in geography, identity, childhood, and emotional connectedness.[4] For many of us, a place is meaningful because of both our past experiences and our current circumstances. A place is unique because of the people who inhabit it and the history that defines it. Place means many things; some of them are good, and others not so good. A place can be both hopeful and hopeless, it can both inspire optimism and court despair, and it can both satisfy and frustrate at the same time. Place is complicated but meaningful. Think of the difference between a house and a home. A house has physical boundaries; a home does not. When you think about going home, you may be thinking about your house, but you are also likely to think of your relationships within your community and your experiences there. Your home has shaped who you are; your house is a storage vessel. Home is your place.

Like place, Appalachia has multiple meanings, many of which are not related to map coordinates. Appalachia is defined by its culture, music, food, mountains, and natural resources. Its state and county boundaries "are of no use in defining either the geography or cultural outlines of the region."[5] People who live in the region would agree. Those who call Appalachia home understand it differently than those who do not. This difference contributes to the many negative images of Appalachia in contemporary arts, literature, and media. Unfortunately, these negative portrayals of Appalachian people often overshadow the many positive attributes. For decades, scholars have attempted to more objectively define the region. However, after much debate and discussion, one scholar contends, "we cannot agree on a definition of Appalachia, nor can we definitively say who is Appalachian. Yet we can agree that Appalachia is an important concept because it often makes a difference in people's lives, either personally or as a group."[6]

Because Appalachia has many meanings revolving around place as a social construct, it is almost impossible to imagine drawing precise boundaries of the region. No matter, this is exactly what the federal government did in 1965 when Congress passed the Appalachian Regional Development Act. This legislation created the Appalachian Regional Commission (ARC) and required the ARC to define the boundaries of Appalachia so that government resources could be allotted to the area.[7] The first map included 360 counties within eleven states surrounding the Appalachian Mountains. Over the years, the ARC has obtained congressional approval to expand the region's borders to include 420 counties in thirteen states.

The original map of Appalachia sought to define a region with homogenous socioeconomic and geographic characteristics.[8] Yet as discussions about defining Appalachia have unfolded, we have come to understand that Appalachian people are far from homogenous. We are diverse in countless ways. The current ARC map, which includes counties stretching from western New York through eastern Kentucky and into northeastern Mississippi, indeed reflects this diversity. Even with our diversity, many localities within the region do share similar economic and environmental conditions. High unemployment, low incomes, and persistent poverty concentrate in Appalachia, as do environmental burdens from the past and the present.

Even with its shortfalls, we can still use a map to explore and compare Appalachia to other locations across a range of social, cultural, economic, health, and environmental conditions. A map also conveys a greater understanding about perceptions of this place. When I asked more than three hundred environmental health professionals who work in the region to view the ARC map and state the first word or phrase that came to mind, their responses varied. Many of the responses related to Appalachia's landscape, with words such as "mountains," "wooded," and "rural." Their perceptions of the region went beyond geography and topography, though, and into some societal characteristics, using words such as "poor," "poverty," and "impoverished." Some of the words were compassionate, such as "forgotten" and "heart of America," but others were less so, including "uneducated" and "outcasts."

Almost all the professionals who responded to my survey believe environmental health problems in Appalachia differ from those in other places. At least some of those problems result from political decisions made with promises to improve the economy. In these cases, politicians make unsubstantiated claims that promoting heavy industry and removing the region's natural resources will create jobs. Other environmental problems disproportionately affecting Appalachian people stem from inadequate resources being dedicated to infrastructure, housing, and education. At least some of this inadequacy is tied to tax incentives offered to those companies that politicians promise will solve the region's economic woes. This job-promising-infrastructure-busting situation has played in a loop for decades in Appalachia, but its effect on the environment and public health is often left out of the conversation.

Even as environmental health professionals understand the struggles of Appalachian people when it comes to protecting and improving public health, they agree that something makes this place different than others. They are the

ones who inspect landfills, ensure safe food, test water quality, and monitor insects that spread disease. Their mission is to prevent disease by improving the environment, a mission difficult even in wealthy suburbs far from rural Appalachia. These environmental health professionals also understand the challenges of safeguarding public health despite political and economic constraints. Such constraints create underfunded health departments that rely on grants and national politics to set priorities rather than addressing what might be the more important concerns in local places.

For more than fifty years, elected officials at all levels of government have exacerbated problems in the region by politicizing the status of the Appalachian economy. A defining moment came in 1964 when President Lyndon Johnson announced the War on Poverty in his State of the Union speech. His war began in earnest in 1965 when the Appalachian Regional Development Act mandated reducing economic disparities in the region. This mandate is still the ARC's overarching mission. Strategies to address economic disparities largely focus on increasing access to and within the region by building new highways and other transportation infrastructure. While the ARC targets economic disparities with a modicum of gusto and a mound of federal funds, a simmering health crisis is starting to boil over. We see it most alarmingly in the opioid crisis that is gripping Appalachian communities harder than most other places in the country. Opioids may have finally grabbed the attention of politicians, but decades of data reveal that Appalachian people are among the least healthy in the country. There is a vast region in the wealthiest country in the world where nineteenth-century health conditions still exist and even, in some cases, abound.

HEALTH DISPARITIES

There will always be health disparities. People will suffer maladies linked to genetics, gender, and age, and there is nothing we can do about it. Some health disparities are just unavoidable. Other health disparities are systemic and "closely linked with social, economic, and/or environmental disadvantage." These avoidable disparities result from "characteristics historically linked to discrimination or exclusion."[9] Such disparities and so much needless suffering can be prevented through public health strategies and political decisions that prioritize health. Disparities tied to geographic location and socioeconomic status may be invisible, but they are not inevitable.

In a series of reports, the Centers for Disease Control and Prevention (CDC) examines health disparities from a variety of perspectives, including social elements, demographic factors, health care access, and environmental hazards.[10] The CDC specifically connects public health to where people work, how people live, and the economic circumstances of their lives. If the gap between the rich and the poor continues to expand in the United States, avoidable health disparities may get worse even as the overall economy improves. Through a complex set of social, economic, and environmental conditions, poverty increases vulnerability to negative health consequences. Diabetes, malnutrition, occupational injuries, and substance abuse are among the preventable disparities between the rich and the poor. Even as the CDC calls attention to this problem, its work underscores significant gaps in our understanding of place-based health disparities.[11]

When detailing health disparities, the discourse often focuses on people who live within urban areas. For example, in 2015 lead contamination of Flint, Michigan's water supply drew national attention to the plight of low-income people in an urban place. City officials made the decision to switch water sources from Lake Huron to the Flint River despite concerns about their ability to ensure its safety. Almost 45 percent of Flint's residents live in poverty and for more than one year they were exposed to high levels of lead. The Michigan Civil Rights Commission issued a report arguing that the Flint water crisis goes well beyond contemporary technical glitches or political decisions. Rather, they point to a long history of racial injustice and policies that create communities segregated by "race, wealth, and opportunity."[12] Whether blatant or furtive, racial or economic segregation leads to disproportionate environmental exposures in many places, and these exposures lead to avoidable and preventable health outcomes.

In many ways, rural areas exhibit similar health disparities to urban areas. Take asthma, for example. Asthma and other respiratory conditions are not just related to urban air pollution. People in rural areas have asthma but the reasons for it differ in rural Appalachian Pennsylvania from those in inner-city Philadelphia. People may be exposed to similar pollutants in urban and rural areas, but the sources of these pollutants are not the same, so solutions for minimizing exposures are place-specific. Reducing environmental exposures causing asthma in Philadelphia because of urban air pollution requires a different approach than addressing asthma disparities from coal mining activities in the western counties of Appalachian Pennsylvania.

The need for attention to health disparities in rural places is even more critical because of the wide range of contributing factors. There are documented

disparities in physical ailments such as diabetes, asthma, and cancer in Appalachia, but Appalachian people also tell us they feel less healthy than most other people in the country.[13] West Virginians on average say they feel in poor health more frequently than people in any other state and this is one reason why it ranks as the least healthy state in the United States[14] This ranking is notable because West Virginia is the only state entirely within the boundaries of Appalachia and is therefore sometimes used as a proxy to represent the region.

Long-term trends in annual surveys suggest that Appalachian people in general are more likely to believe they are in poor health than are residents of other states. When people think they are unhealthy, it is likely they are, even lacking a diagnosis from a health professional. Just the fact that they cannot see a doctor or nurse, for whatever reason, might contribute to how healthy people feel. More objectively, this presumption is supported by the documented lack of access to medical care in Appalachia.[15] The perception of poor health combines with numerous other indicators and is drawing attention to health disparities in a region that has been scrutinized for its economic disparities for a long time.

Since its inception, the Appalachian Regional Commission has worked to reduce, highlight, and document economic disparities. Annually, the ARC classifies, evaluates, and compares employment, poverty, and income within the region and between the region and the rest of the country. Its work underscores the economic struggles that plague Appalachia but does not connect these struggles to public health. The ARC's 2016–20 strategic plan focuses mainly on investing in projects with the potential to improve the economy. Even the one goal in the plan mentioning health does so in the context of creating a "ready workforce" rather than improving public health.[16] The strategic plan notes the existence of health disparities in Appalachia and specifies a need for more investments to improve health status, but focuses on access to services rather than improving environmental conditions or other social determinants.[17]

It is true that lack of access to health care services can exacerbate health disparities, but the rationale for much of the investment in Appalachia has been jobs, not health. Actually detailing health disparities and identifying strategies to reduce them are relatively new endeavors in Appalachia. It wasn't until 1999, more than thirty years after the ARC was formed, that it convened an Appalachian Health Policy Advisory Council to examine health issues. More than two hundred health-related projects were funded by grants running through this council from 2004 through 2010. Most of these were designed to enhance access by constructing facilities and improving equipment. Measurable improvements

in access to care in some localities are tied to these projects, but they did not make a discernible impact on reducing health disparities in the region. In 2017, the Robert Wood Johnson Foundation and the ARC collaborated to quantify Appalachian health disparities for the first time. They found that thirty-three out of forty-one health indicators are worse in Appalachia than in the rest of the country.[18]

ENVIRONMENTAL AND HEALTH EQUITY

Understanding health disparities requires more than just identifying differences in health status and access to health care. We can find health disparities in groups who have adequate health care access, so defining good health as good access is much too narrow. The percentage of people with high cholesterol might be higher among middle-class white people who live in the suburbs than low-income African Americans who live in the city. Does this mean that high cholesterol is a health disparity because of these differences between groups? Measles is another compelling health disparity. Even though health officials declared measles eliminated from the United States in 2000, it is coming back. From 2010 to early 2017, the CDC documented more than fifteen hundred cases of measles, mostly in communities where people are unvaccinated.[19] Those who refuse to vaccinate their children because of fear of autism or other health conditions are not poor people in Appalachia. They are generally well-educated, professional white people who, paradoxically, have access to vaccinations because of their income and insurance. Measles is affecting one segment of our population differently than another, but calling this a health disparity confuses and lessens the meaning of the term.

What appears to be a disparity may not be related to the ability to access care. People who get screened are more likely to be diagnosed than those who do not. People who choose not to vaccinate may suffer even though they have ample access to health care resources. Intent and injustice underlie true health disparities and a health disparity is best understood as the "metric that is used to measure progress toward achieving health equity."[20] Health equity embraces social justice as a goal in addressing health disparities. It is based on the principle that all people should be healthy regardless of where they live, how much money they make, or whether they have access to a physician.

Health inequities arise when poverty, education, lack of nutritious food, and environmental quality make some people less healthy than others. They do

not exist when people can make choices about their health care, where they live, and the type of work they do. Health inequities also arise when people are unable to afford health screenings, vaccinations, or treatment. There is no inequity when people can pay for prevention and treatment, either through insurance or out-of-pocket, but choose not to partake in either. Not all health disparities are the result of inequities, but those that are tied to place generally are.

Documenting health disparities in Appalachia tends to focus on those that are connected to lifestyle, such as cancer and diabetes, and emphasizes the more controllable individual behaviors rather than uncontrollable living conditions.[21] This attention to addressing behavioral causes of disparities is understandable, since self-reported prevalence of unhealthy behaviors such as smoking is higher in many Appalachian states than others.[22] However, when we zero in on lifestyle we minimize or even disregard the impact of health equity and social justice in creating health disparities.

Just like access to health care, smoking, inactivity, and a poor diet are critical components of health status. Just like access, these behaviors are only part of the story behind health disparities. Additional determinants contribute to overall health, including involuntary exposures, place-based circumstances, and social and environmental conditions. Few have explored the broader relationship between environmental exposures and health outcomes. Those that have, focus on specific environmental circumstances such as mountaintop-removal mining.[23] Some of the poorest people in the United States live in Appalachia, and no one disputes that poverty and health are related. However, in poor communities, living conditions and environmental exposures may be just as important as income, access to health care, and lifestyle. Moreover, people who suffer from poor health because of where they live may have no control over exposures connected to their health status. In some instances, Appalachian people may even create exposures by supporting industries and activities that promise to ease their burden of poverty by providing jobs.

A cyclical relationship exists among poverty, health, and the environment. Therefore, working to improve public health by addressing economic conditions and access to health care without tackling environmental health is incomplete and unsustainable. In at least some instances, exposure to environmental harms is involuntary and based solely on the place in which people live. Even rich people who have access to health care can become sick when exposed to environmental hazards. When groups of people face disproportionate exposures to environmental contaminants simply because of their place of residence,

health disparities are the metric for health inequities. Examples of disproportionate environmental exposures are found throughout the United States but some of these exposures are unique in Appalachia and indicate environmental injustice. As evidence mounted that race, and its ties to poverty and place, were important indicators of the location of environmental hazards, the environmental justice movement emerged.

ENVIRONMENTAL JUSTICE

The United Church of Christ (UCC) uncovered relationships between the location of environmentally hazardous sites and race.[24] Its 1987 report, *Toxic Wastes and Race*, was the first to document that urban African American communities are more likely to be exposed to serious environmental hazards than other communities. Twenty years after the 1987 report, the UCC updated its analysis and concluded that not much had changed; race is still an important predictor of exposure to toxic substances.[25] The work by the UCC in urban areas started a national dialogue leading to an executive order from President Bill Clinton. The order requires all federal government agencies to identify and minimize how their decisions could disproportionately affect minority and low-income populations.[26]

Although environmental justice became a mainstream concern in the early 1990s thanks to the efforts of the UCC and others, events in the early 1970s and 1980s in rural Warren County, North Carolina, are considered the historical catalyst for the movement. Warren County borders Virginia and is part of a cluster of counties with the highest percentage of African Americans in the state. This part of North Carolina also has very high poverty rates. In 1973, local people fought against plans to construct a landfill to dispose of polychlorinated biphenyls (PCBs). They were concerned about the possible health consequences of PCBs, which are organic chemicals from previously used electrical transformers, fluorescent light bulbs, oil-based paints, and plastics. PCBs were banned in the United States in 1979 but, because they persist in the environment, managing the disposal of PCB-containing products remains a challenge today.

Warren County residents questioned why the predominantly rural African American community was targeted for the landfill. Protests and confrontations over coal in rural Appalachia have a long history, but the situation in Warren County was different because of the questions it raised about deliberately targeting one community as a dumping site. There were no natural resources or

infrastructure in the county that made it the most feasible location for the land-fill. It looked like Warren County was the leading landfill candidate because of its racial composition and high poverty rates, rather than technical factors. In 1982, after almost ten years of resistance, activists successfully blocked the landfill from being built, securing their legacy in the environmental justice movement.

Warren County exemplifies how the official boundaries of the region may mask important contributions of its people. The county is in an Appalachian state, but it is just outside of the ARC-designated boundaries of the region. Warren County might well identify with Appalachia culturally, but it is not con-sidered Appalachia on the map. Regardless, this is an important case because it was a defining moment in environmental justice in America generally and rural America specifically. Warren County scenarios are becoming more prominent in rural Appalachia with contemporary environmental insults such as hydraulic fracturing for natural gas and oil. Every new protest in Appalachia contributes to our understanding of the relationship between place and health and serves to exemplify how local people are speaking out about projects with questionable economic benefits and unquestionable and inequitable environmental harms.

Unfortunately, in some instances, residents in rural Appalachian commu-nities contribute to projects that create harmful environmental exposures. In places with persistently bad economic conditions, communities may support any kind of development offering the potential for quick economic returns, especially if jobs are on the table. This support abounds even if the relief is certain to be temporary and almost always intensifies the debate between ad-vocates of environment protection versus economic development. Some of the stories I tell in this book underscore difficult choices Appalachian people face when both environmental health and economic impacts are uncertain but jobs are promised. Much in the way the UCC report highlights disparities in urban areas, I seek to highlight some of the unique aspects of rural Appalachia that exacerbate environmental injustices, health inequities, and health disparities. I also draw attention to the important role of and challenges for environmental and public health policymakers and professionals as they pursue solutions to place-based inequities and health disparities.

THE PLACE OF ENVIRONMENTAL AND PUBLIC HEALTH

Public health is both a profession and a mission. The profession includes personnel at multiple governmental levels, often partnering with business, nongovernmental

organizations, and researchers. The mission of public health is "the fulfillment of society's interest in assuring the conditions in which people can be healthy."[27] Public health professionals create and implement strategies to stop disease and injury from spreading through populations. Public health is easily distinguishable from medical care because of its attention to prevention rather than treatment. Also, different than medical care, the patient in public health is an entire community, not one single individual. The more than one-hundred-year history of public health success represents its key role in improving the nation's health and suggests new challenges moving forward.

In 1900, the leading causes of death in the United States were pneumonia, tuberculosis, and diarrhea. At the end of the twentieth century, a strong and valued public health system was able to minimize or, in some cases, eliminate many infectious diseases.[28] Antibiotics and medical care strategies for treating individuals are only part of the reason for the decline in infectious diseases throughout the century. Interrupting the way pathogens move from person to person, or the mode of transmission, is just as important as preventive drugs and individual patient treatments. Air, food, water, or vectors such as mosquitoes and ticks are needed for some of the most infectious diseases to spread. Tackling these modes of transmission is the crux of environmental health and many significant historical public health achievements are the direct result of environmental health practices. Examples include water and wastewater sanitation, food safety protocols, hazardous waste management, and outdoor and indoor air quality control. There is no doubt that attention to environmental conditions in specific places decreases the burden of disease.

As society transitioned into the twenty-first century, public health priorities changed dramatically. Now, the United States is largely comprised of places where chronic conditions such as heart disease and cancers are the leading causes of death. These chronic illnesses feed a massive health care system that amplifies the role of prescription drugs and high-cost treatments. Chronic diseases also shift the structural elements of environmental health from straightforward approaches such as disinfecting tap water, removing lead from gasoline, and banning specific pesticides. There are clear environmental solutions to persistent health problems such as obesity, asthma, and some cancers, but they are muddled by politics, economics, and history.

Environmental health actions to prevent chronic disease involve global, national, and local strategies to improve living conditions and the political will to do so. These are place-based actions and numerous organizations at all levels

of government complicate implementing these actions. Public health responsibilities are housed in large federal departments in Washington, state departments of health and the environment, and small county health departments such as those in the remote corners of Appalachia. Public health in the federal government involves a morass of agencies, institutions, organizations, and offices. In some cases, multiple units within one federal department compete for resources to address a single public health issue. Ultimately, if local resources are limited by structural inequities, programs and policies at the federal level may have very little impact on the wholesomeness of your next bite of food, the cleanliness of your next glass of water, or the clarity of your next breath of air.

Some of the most vital public health infrastructure is localized in county and city health departments across the country. These local agencies identify and address place-based environmental health priorities. Local health departments are funded by a patchwork of sources that include federal and state subsidies, governmental and foundation grants, and local taxes. This means that they are often hamstrung by uncertain and unsustainable resources. The restrictive funding of local health agencies is an example of a structural inequity that contributes to health disparities. Some of the people in greatest need of preventive services live in places, including Appalachia, without adequate local public health support.

Just as there are barriers to primary care services in many Appalachian places, public health services are also out of reach. Resource constraints are critical blockades to implementing the mission of public health, especially considering that it is tricky to document the benefits of prevention. We can easily tally up the costs of prevention in dollars spent on programs such as restaurant inspections and spraying for mosquitoes. It is much more difficult to put a monetary value on the lives saved and illnesses averted through these types of programs. One result of the complexity of detailing benefits in monetary terms goes back to the emphasis on prioritizing economic development over public health. It is straightforward to itemize the presence of new jobs, but difficult to itemize the absence of disease. This is a message that I will return to numerous times throughout this book.

Local governments in rural Appalachia often face major resource hurdles in implementing and sustaining public health programs. These hurdles intensify existing health disparities by exacerbating challenges in preventing acute illnesses as well as chronic health conditions. As an example, there are underlying factors contributing to diabetes and obesity. Public health officials identify

obesity as a major public health issue in America, going as far as calling it an epidemic.[29] But what about the underlying factors contributing to obesity? Researchers have successfully linked genetics and lifestyle to obesity, but clearly there are other factors contributing to the epidemic. Searching for these factors has led to an expanding field in public health generally referred to as addressing the built environment, which understands that place is a critical determinant of health. It also means that successfully preventing obesity and its associated health conditions requires broader measures than only targeting internal forces such as lifestyle. To make the greatest impact, we must address external forces such as land-use planning and community design.

I write about Appalachian populations who face health disparities because of *where* they live, rather than *how* they live. Such a place-based approach is the very foundation for the pursuit of environmental justice by minimizing exposure inequities that lead to health disparities.

STRUCTURE OF THE BOOK

There are documented disparities in cancers, asthma, diabetes, substance abuse, and many other health conditions in Appalachia. Answering the question of why these disparities persist even as other places in the country get healthier requires us to investigate many factors, including where people live. This means that we need to explore environmental health differences tied to specific places. We also need to probe into the reasons for these differences, paying attention to controllable inequities that contribute to them. In this book I describe some of what is currently known about environmental exposures and health disparities in Appalachia. I do not intend this work to be a comprehensive account of the relationship between the environment and health in the region. I also do not claim that all the information I present in the following pages is new; I did not gather primary data about environmental exposures, for instance. Rather, I hope to contribute a perspective in which place-based conditions are seen as at least part of the reason why Appalachian people are among the least healthy Americans. Many of these conditions are out of our control, because they are either born from a history of environmental abuse or are subject to current constraints leading to environmental neglect.

To paint a picture of the impact of environmental health disparities in Appalachia I use published research, information from interviews, and personal observations. My intent is twofold. First, I strive to provide the reader with

verifiable data related to specific environmental conditions. There is a wealth of available statistics for comparing counties in Appalachia to the rest of the country, and the map of the region is essential to make these comparisons. Second, I highlight specific Appalachian places as examples of communities that are exposed to environmental conditions unique to the region.

Before diving into specific stories, I lay the foundation for environmental health in chapter 1. This foundation is critical to framing the remainder of the book because I define environmental health and examine possible inequities in implementing strategies to reduce risks in Appalachia places. I summarize environmental health infrastructure at the global, national, and local levels to provide some context for the challenges and circumstances in Appalachia.

The built environment is a significant public health issue especially when it comes to inequities that contribute to health disparities. A great deal of attention to the health impacts of the built environment revolves around understanding rising obesity rates relative to community design. The rate of obesity in Appalachia is higher than the national average, but the reasons for these rates are more complicated than the way communities are designed. Other health disparities in Appalachia are clearly tied to land-use decisions in rural areas. There are disproportionate environmental exposures in Appalachia arising from both inside and outside living conditions. By comparing Appalachian to non-Appalachian communities in chapter 2, I highlight prevailing inequities in exposures to radon, lead, and secondhand smoke and the health disparities these exposures cause.

The old coal camps serving as home to some rural Appalachian people have many of the most basic environmental health problems. It is hard to imagine that there are still people in the United States who do not have access to safe drinking water, but places throughout Appalachia lack such critical infrastructure. A major chemical spill in the drinking-water source for Charleston, West Virginia, accentuated the consequences of failing regulatory and technical infrastructure. Ensuring safe water is a main environmental health function, but private systems predominate in rural Appalachia and are problems in communities, such as coal camps and company towns, that were not intended to be places of long-term habitation. Chapter 3 draws attention to public and private drinking-water supplies and wastewater treatment systems, explaining the difference between them and documenting specific instances of contamination and inequitable exposures in Appalachia.

Like drinking water, food safety affects everyone, and its health impacts are usually completely preventable. Multistate outbreaks regularly occur in the

United States and the CDC estimates that more than 48 million Americans suffer foodborne illness every year. On the other hand, food security is more localized and targets the poor. The documented health impacts of food insecurity include diabetes and obesity, both of which are at epidemic levels in Appalachia. Chapter 4 describes specific food safety and security issues in the region and offers examples of programs and policies aimed at improving these conditions. The number of farmers' markets is expanding and is touted as a major part of the strategy to tackle food insecurity. However, in chapter 4, I examine the uncertain impact of farmers' markets on this critical issue in Appalachia.

Water quality and food security are usually localized problems. On the other hand, pollution emitted from industry and waste facilities affects broader areas throughout Appalachia. Some places in the region are assaulted by multiple pollutants to their water and air, exposing local people to a range of potential health effects. At least some of these exposures are because facilities were built in Appalachia even though other locations might have been more technically sound choices. Chapter 5 highlights exposures to chemicals and other pollutants arising, at least in part, from political motives to bring jobs to the region. The region seems to be ground zero for solving the nation's energy needs. Addressing these needs without the foresight to understand the potential public health impacts is a recurring scenario in Appalachia, one which will never address economic disparities in a sustainable way.

Evidence of Appalachia's role in energy supply is found in its thousands of natural gas wells. In some ways, shale gas development in the form of hydraulic fracturing resembles coal mining in the early twentieth century. Appalachian communities are again providing energy for the nation while being burdened with legacy environmental health problems. A major concern with hydraulic fracturing is the lack of research related to potential public health risks from both the drilling itself and managing waste arising from the process. Nevertheless, drilling is proceeding at a rapid pace in Appalachia because of both the natural resources and economic conditions in the region. In chapter 6, I explore shale gas development and other extractive industries, including coal. I draw attention to health disparities that we have now documented with coal mining but have yet to document with hydraulic fracturing.

Activities to remove natural resources from Appalachia sometimes have disastrous consequences. Regrettably, both human-caused and weather-related disasters are commonplace. Some of the most memorable and historic natural disasters, such as floods, have plagued the region along with equally historic

"unnatural" disasters such as coal-ash spills. Appalachian people are also vulnerable to predicted impacts from climate change because of a lack of infrastructure and resources, but they may be more resilient thanks to their history with disasters. Some climate change projections suggest improvements in specific environmental conditions in the region, but I explain in chapter 7 that there is a connection between climate change and disasters in Appalachia. Even though people in the region have endured many significant disasters in the past, climate change is likely to be a game changer. I feature some of these disasters in this chapter to weigh Appalachia's vulnerability to projections about the future of extreme weather events.

When writing about Appalachia, it is essential to offer the narrative in a way that is relevant to those who live here. One way I attempt to do this is to begin each chapter with a quote from an Appalachian resident or local environmental health professional, to offer the perspectives of people who live and work in the region. After sifting through several years of interviews, focus groups, and surveys, I chose relevant and impactful passages. To further contextualize the issues raised in this book and to add a human element to each chapter, stories of specific places serve as examples of some of the unique environmental exposures existing in Appalachia. These stories were recommended by numerous people during background interviews for this project. In almost every case, I visited the places I write about and talked to people in the area.

A note on terminology: Throughout the book, I use "environmental health" to identify both environmental exposures and conditions affecting public health, and to identify the profession that seeks to minimize these exposures. On the other hand, "public health" is more broadly used than "environmental health." Exposures affecting public health include those that are behavior-based, such as smoking and eating a poor diet. Environmental health may be narrower in focus than public health, but it is the key to reducing many health disparities because it is the first line of defense in improving health status.