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Introduction

CREATING HEALTHY ENVIRONMENTS

When my older son was two years old, our family moved to a small city that boasts a reputation as politically and environmentally progressive. It is located in a state that not long ago shifted from "red" to "blue."[1] So I was taken aback when, that first May, ChemLawn trucks and landscapers clustered in the streets, spraying weedkiller from backpack containers, thick hoses, and even a tractor, leaving little white flags planted in the bright green golf course–like grass and a strong chemical odor in the air. This included not only neighbors' yards but the massive lawn of the retirement home that occupied a full square block, just yards from the elementary school my children would attend.

I was surprised and concerned—and, after my son was diagnosed with asthma a few years later, alarmed. As an environmental health lawyer and professor, I knew that children are especially vulnerable to toxic exposures. Their cells are dividing rapidly, they breathe more air relative to their body weight than adults, and their immature organs are unable to excrete and detoxify harmful substances as well as adults'. Even low-level toxic exposures can cause them long-term or even permanent harm. Herbicides are linked with asthma exacerbation and onset, Parkinson's disease, reproductive problems, and more. When sprayed, they can drift through the air and be inhaled. They can also be absorbed through the skin (and ingested, in the case of food).

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I had assumed that this well-educated, liberal town had policies that would protect my son and that my neighbors were well familiar with the issue. But during the years of advocacy that followed, I began to understand why this wasn't the case. Like forty-plus others, the state has a law limiting local pesticide policies. Its economy is largely agricultural and chemical-intensive. There were few pesticide-reduction policies in the region, lessening knowledge of best practices. I found that a slice of the community was environmentally aware, while the overall culture was not. All these factors overlapped and fed into each other.

With the federal government politically divided nearly to the point of immobilization in recent years, most environmental health protections take place (or don't) on the state level, and sometimes on the local level. As a professional and a parent, this is where my journey began.

In many parts of this country, a child could go to gym class on a typical Monday and play soccer on a field that was sprayed over the weekend with 2,4-D, a weedkiller that was a component of Agent Orange and has been investigated as possibly causing cancer.[2] Or the school grounds may have been treated with a lower-toxicity herbicide, or with safe, nontoxic products and practices. Which of these scenarios applies depends largely on the laws of the child's state of residence; federal law provides only bare-bones protection. State policies can affect community members' exposure to air pollution and to toxic chemicals like per- and polyfluoroalkyl substances, or PFAS—a group of synthetic substances that are added to items to make them oil-, stain-, or water-resistant—and flame retardants, and even whether a product label must list these. While states can be valuable laboratories of innovation, major differences in environmental health laws contribute to inequities in pollution exposures—and, data suggest, health outcomes.

Environmental health (sometimes referred to as environmental public health) is defined by the National Environmental Health Association as "the science and practice of preventing human injury and illness and promoting well-being by identifying and evaluating environmental sources and hazardous agents; and limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food, and other environmental media or settings that may adversely affect human health."[3] It pertains to involuntary

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exposures—so unhappily breathing secondhand smoke as a patron in a hotel bar is an environmental health issue, while smoking, as a personal choice, is not.

Doug Farquhar, government affairs director for the National Environmental Health Association, writes that environmental health law is a "novel concept" in that it incorporates "both society's public health needs" and the environmental factors that affect it. He notes that most major environmental laws are in fact environmental health laws, since they identify protection of public health "as a major justification" for the law.[4] Yet environmental health is typically a lesser-known part of public health than spheres like health care access.

When it comes to limiting people's exposure to pollution and toxins, state policies have taken precedence as the federal government has increasingly retreated from major environmental health lawmaking. As I wrote in an article for *The Conversation*:

> Many of the country's major environmental health laws were passed in the 1970s on the momentum of the environmental movement and with bipartisan support that is rarely seen today.
>
> For example, the Clean Air Act amendments of 1970 required U.S. EPA to regulate a wide range of air pollutants, in some cases based explicitly on protecting human health. They were approved 374–1 in the House and 73–0 by the Senate and signed into law by President Richard M. Nixon. Nixon signed the law that created the Occupational Safety and Health Administration in 1971.
>
> One analyst has written that groups that pressed legislators for environmental protection later splintered into groups advocating for and against environmental laws, reflecting an emerging debate over the appropriate extent of regulation.
>
> At the same time, after the success of many federal environmental health laws, attention turned to problems that are harder for Washington to solve. With state environmental programs growing, some suggested that the U.S. EPA's role should shift from compelling to catalyzing—from requiring specific pollution-reducing actions to helping states act by providing increased information and help with compliance. Yet this view acknowledged that under this scenario, residents of some states would enjoy stronger environmental health protections than others.

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> Reflecting this dynamic and the extent of political division in the U.S., even when the federal government does create tougher environmental regulations, they are often reversed by the succeeding administration or challenged in court.[5]

Most Americans—even knowledgeable professionals—assume that when they go to the grocery or hardware store or drop their child off at school, the government has ensured the safety of all products and practices in those places. In fact, due to major policy gaps at the federal level, if a state has not addressed an environmental health issue, then it may be unaddressed.

Sometimes it makes sense for states to take the lead in policymaking. Different states face differing environmental health challenges, from hurricanes to flooding to wildfires to varying sorts of pests and pollution. States may have different politics, priorities, climates, and cultures. States have always had an important role as laboratories of innovation. Policies tested out at the state level can help to inform decisions of other states and of the federal government.

But uneven environmental health protections create inequities. For example, those who reside in a state that follows California's more stringent tailpipe emissions standards—about one-third of the states—probably benefit from breathing less air pollution from that source. The Regional Greenhouse Gas Initiative (RGGI) is another state-based innovation. It limits greenhouse gas emissions in participating states, which results in reducing other harmful air pollutants too. A recent study that compared RGGI states with neighboring states that have not signed on to RGGI found that data "indicate that RGGI has provided substantial child health benefits," including a reduction in childhood asthma cases.[6]

There are many more examples. Minnesota's Toxic Free Kids Act requires the health department to develop a list of chemicals of concern for children's health and communicate the risks; several others have similar laws. States have passed a patchwork of limits on PFAS in products. Providing water- and stain-resistance to everything from fabrics to nonstick cookware, PFAS are known as "forever chemicals" because of their persistence in the environment and have recently been linked with a range of troubling health effects.[7]

These policy questions about the role of federal and state governments matter now, not only because of unprecedented environmental health chal-

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lenges like climate change–worsened heat and smog and expanded travel of pests carrying infectious diseases, and everyday toxic chemical exposures—but because the increasing impacts on vulnerable groups can have lifelong ramifications. Children exposed to carcinogenic chemicals have many years ahead in which to develop cancer; seventy-year-olds have far fewer. When lead, mercury, or pesticide exposure contributes to a child's autism or ADHD, those conditions may require specialized education and limit their career options and lifetime earnings. When a fourth grader with asthma breathes a disinfectant cleaner like bleach, they are more likely to wheeze than someone who does not already have that disease; they have been sensitized. When a resident of an environmental justice community encounters heavy truck exhaust while walking to the bus stop due to siting of a new fulfillment warehouse nearby, that toxic diesel exhaust may augment existing air pollution common to such neighborhoods and contribute to more severe lung inflammation.

Overall, broader, better federal environmental health protections are ideal and should be the overarching goal. But in their absence, states should act. Where it truly makes sense for states to take the lead—as in the case of COVID-19—the federal government must provide comprehensive, clear, easy-to-access data, information, and guidance to states and localities.

This book begins by examining historic and structural contributors to the quandary of federal shortcomings in environmental health regulation. It describes how states began to act to fill these gaps, the challenges they have encountered along the way, and the uneven results and inequities created or exacerbated, along with best-practice models that other states have replicated or signed on to.

Next, the book explores strategies for success, reflected in the enactment and implementation of innovative state policies—as well as an example of strategies that were needed but were absent or stymied for a variety of reasons. The strategies are as follows:

- State-university-industry partnerships and technical assistance, as exemplified by the Massachusetts Toxics Use Reduction Act and Texas's law requiring pesticide reduction policies and practices in all schools

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- Environmental and occupational health education, modeled by New York State's Occupational Health Clinic Network and Centers of Excellence in Children's Environmental Health
- Community action, exemplified by California's AB 617 law, the Community Air Protection Program, which aims to improve air quality and advance environmental justice in the state
- Collaboration across agencies, often referred to as a Health in All Policies approach, with the Tennessee Livability Collaborative and Colorado's Health in All Policies program as prototypes
- The need for federal guidance, with COVID-19 mitigation in schools as an example of a situation in which states bear responsibility but the federal government must provide data and guidance in order for states to be successful
- Cooperation across states, like the Regional Greenhouse Gas Initiative of Northeastern and mid-Atlantic states, and the Southeast Regional Partnership for Planning and Sustainability that includes federal agencies and states located in the Southeast, as examples of partnering to cut greenhouse gases and strengthen environmental security at the regional level

Finally, this book identifies policy goals that can help make our communities, states, and nation healthier. And it recommends actions that public health professionals and others can take to advance these policy goals and therefore environmental health protections across all states. It describes strategies for advocating for environmental health policies to officials from school board members to state agency decision-makers.

A growing number of public health professionals are seeking this background to navigate their work. Yet as they face these increasing demands, they are challenged by chronically reduced agency funding and staffing, per the cycle of "panic and neglect" in which governments give attention and funding to a new public health threat, only to withdraw it once the immediate crisis abates;[8] the politicization of public health since COVID-19, along with, in some states, the loss of local public health officials' authority by state legislatures that have preempted it; and concern about a lack of new federal environmental health laws that could help to guide state and local efforts.

Whether navigating issues like the enormous range of health impacts of climate change or protecting "fence-line" communities adjacent to polluting

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facilities, public health professionals want to understand the policy terrain and take action. Academics want their research findings to reach policymakers. Medical and public health associations are offering trainings on the legislative process and how professionals can make themselves heard within it. This is a critical time for the role of state and local environmental public health. This book aims to provide information and analysis that can further these efforts, ensuring better health for all of our kids.

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ONE

A Lack of Federal Protections

The first questions I explored in seeking a solution to the pesticide problem were the following: How does the US Environmental Protection Agency (EPA)—the federal agency that sits atop the environmental health regulatory pyramid—address pesticide use on and around school grounds? How helpful is the main federal law—the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)—in protecting my son from toxic weedkillers and insecticides on the playground and soccer field and while riding his bike around the neighborhood?

EPA registers pesticide products for use based on a finding that they do not cause an "unreasonable" risk. Under the law, this determination requires a cost-benefit analysis that takes into account "the economic, social, and environmental costs and benefits" of the use of the pesticide,[1] which can include costs to industry of being prevented from using a pesticide. As a result of this and other influences, many agricultural pesticides that are banned or being phased out in other countries are still widely used in the United States.[2]

Many of FIFRA's requirements for proper use, along with safety information, reside on the product label. Among its other shortcomings, the label may omit ingredients considered trade secrets.[3] In the fable of the label, school and municipal administrators properly interpret its cryptic scientific and regulatory terms and make informed decisions in selecting safer products. Or, as the label fairy tale unfolds, they know to access and understand the more detailed Safety Data Sheet (SDS). Typical SDSs are long—

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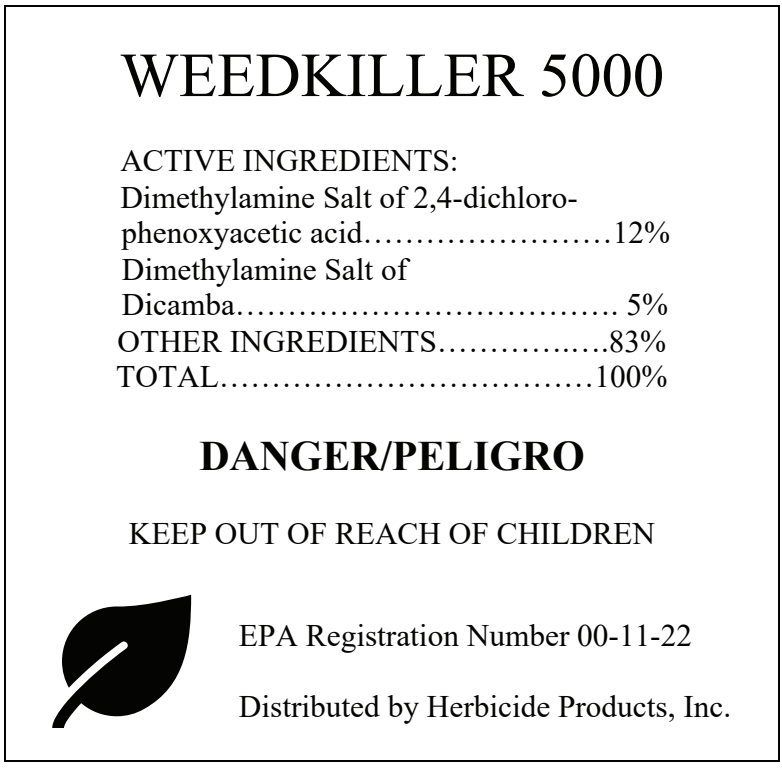

FIGURE 1-1. Example herbicide label

often eight to ten pages—and full of gaps, reflecting how much is unknown about these chemicals.

For example, the simplified example herbicide label shown in Figure 1-1 is typical in that more than half of the product's ingredients ("other ingredients," sometimes referred to as "inert") are not identified. The word "Danger" on the label carries distinct regulatory significance, but few people will be familiar with that meaning—including many school building and grounds managers who make decisions about purchase and use of these products.

Another shortcoming: Neither EPA nor FIFRA impose any requirements beyond the restrictions on the label for states, local governments, park districts, or school districts to develop pesticide use plans, or to limit pesticide use, including in or around environments sheltering sensitive groups, such as schools, daycares, and hospitals.

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EPA does provide high-quality resources, such as model sustainable pest control policies. In the absence of a state requirement or state outreach, however, it is uncertain what would inspire a municipality or school district to seek out these resources. Taking such initiative would likely require the awareness and concern of a staff person or parent, perhaps combined with an advocacy effort seeking a change in practices.

Such deficiencies are not unusual. Many federal environmental health laws contain shortfalls and loopholes—for example, putting the (difficult to surmount) burden of proof on the government to show that a substance is harmful, or considering exposure to only a single substance rather than the more realistic multiple simultaneous exposures, or requiring an economic analysis that sidelines public health costs and benefits. The extent of these gaps can be surprising. An October 2023 *New York Times* article that described California's move to ban red food dye, while the Food and Drug Administration had not, quoted one lobbyist for the law, "Many people were astounded to learn that the F.D.A. is not actively regulating the chemicals we put in our food."[4] In February 2024, media described how lead-tainted applesauce had "sailed through" gaps in the federal food safety system.[5] In the patchwork federal environmental health regulatory system, the government fails to address important issues in regulating toxic substances.

How did this situation come to be?

FEDERAL SHIFTS LEAD TO FRAGMENTATION

Analysts including Paul Knechtges of East Carolina University describe a split that goes back to the early 1900s, when the environmental movement divided into natural resources conservation, on one hand, and sanitary improvements in cities, on the other. Naturalists expanded the environmental movement via the growing role of the federal government in managing natural resources during the Progressive Era, Knechtges writes. By contrast, "the sanitary improvement efforts were more diffuse; they were spread across major municipalities rather than being consolidated under federal mandates."[6]

Same roots, different shoots: Environmental activism took off through the 1970s and beyond, while public health failed to develop a broad-based movement. Public health organizations thus found themselves "on the periphery" of the environmental movement, writes Knechtges. The passage of

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one major federal environmental law after another "would entrench separation of various environmental public health services."[7]

Major structural shifts took place at the federal level when the EPA was established in 1970, at the start of the "Environmental Decade." Many environmental health programs that addressed the health impacts of environmental conditions (such as drinking water quality and air pollution control), previously based in other federal agencies, were moved to EPA. The aim was to "unify" the path to environmental protection, says Thomas Burke of Johns Hopkins University's public health school.[8] Instead, this move caused "fragmented responsibility, lack of coordination, and inadequate attention to public health dimensions of environmental issues," according to the National Academy of Medicine (formerly the Institute of Medicine).[9]

Additionally, the transposition of environmental health programs to EPA was then "replicated at the state levels,"[10] writes Johns Hopkins University public health professor Beth Resnick. Just as at the federal level, the states also moved environmental programs out of their health departments, which had traditionally led programs like drinking water quality, says Burke. As a result, "we got a really balkanized system."[11] Environmental health programs and policies are now often housed in departments such as environment and natural resources, with a smattering assigned to agriculture, labor, and health agencies.

The conundrum: State environment and natural resource agencies that took on tasks previously assigned to public health agencies may lack expertise in health impacts of environmental decisions. At the same time, state and local public health agencies may lack training about—and give insufficient attention to—environmental influences on health. This fragmentation of environmental health can mean that an environmental agency might not prioritize health aspects of its work, while a public health agency underemphasizes impacts of pollution and toxics on health. The fragmentation can cause an overall siloing effect in which environmental issues and public health issues are addressed separately by separate agencies and staff, leaving critical problems that overlap the two areas ungrappled with.

Decades beyond the 1970s, this "splintering of environmental public health functions still exists today in most states," notes Knechtges."[12] In a 1997 study of state government environmental health infrastructure, Thomas Burke, Nadia Shalauta, Nga Tran, and Barry S. Stern found great diversity in the organization of environmental health programs. In survey-

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ing the state agencies that implement ten federal environmental laws, including the Clean Air Act, Clean Water Act, and laws addressing hazardous materials, the study authors noted that while these laws may have strengthened state capabilities, they may also have "forced a narrower state focus toward the regulatory aspects of environmental protection and away from the broader public health aspects."[13]

Emphasizing federal requirements to manage air and water pollution and waste management and having grown dependent on federal funding for these activities, state environmental agencies lack capabilities in epidemiology and risk assessment that enable an understanding of health impacts of environmental conditions—one side of the disconnect. On the other side of the disconnect, the study found that health departments continue to have primary responsibility for the public health aspects of environmental programs—health assessment, toxics programs, health surveillance, and environmental epidemiology—but with little regulatory authority for these programs. Additionally, the authors note that state budgets for environmental regulatory programs were four times greater than those for environmental health programs.

While Burke and colleagues note that the growth and diversification of environmental programs is positive, the main question is whether staff working in these two areas of environmental protection and public health are able to reach past silos and work together to maximize environmental health protection.

Another challenge is data and data integration. According to Megan Wallace and Joshua M. Sharfstein of Johns Hopkins University's public health school, while public health relies on information technology and data, "much of state and local public health work remains based on paper, with large gaps in the ability of health departments to obtain, analyze, and share information expeditiously."[14] Additionally, they find that over one-third of local health departments cannot access electronic data from local emergency departments that "could facilitate early identification of illnesses of concern." Therefore, a spike in children's visits to emergency departments for asthma attacks may be unknown to the local public health director, who in an ideal world is on the ground connecting asthma emergencies with contributors such as air pollution and toxics.

Consider that even before my son's asthma was diagnosed, I had observed that many of his friends and classmates had this illness. In fact, based on my nonscientific observations, I guessed that about 25 percent of the

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kids at his elementary school suffered from this breathing disorder. By any measure, that appears to be an epidemic—or some might say a cluster, which implies group proximity to an environmental trigger that is causing or contributing to a disease. Some might say that it qualifies as an emergency.

I worried my son was next, and I was right—along with his pal who lived two blocks from us and was diagnosed within weeks of him. Yet no one commented on or seemed to recognize a pattern. Where was the incidence data, the understanding of environmental triggers of asthma and how to reduce them, the knowledge about how to identify such pollution sources in the neighborhood? Some data about the extent of the problem likely resided in the school nurse's files. Other pieces of the puzzle may have been held by staff of different agencies—or not, due to deficiencies in education, training, staffing, data, or technology. The pieces were never put together.

What might a collaborative approach look like? Maybe like this: The state or local health department conducts surveillance that identifies an asthma hot spot in a community—25 percent of children in that area, let's say, have been diagnosed with the disease—then partners with environmental agency staff to identify indoor or outdoor asthma triggers, increase education and enforcement, and develop new policies to reduce instigators of asthma problems. They bring in other agencies and organizations as called for, such as the school district and park district. This de-siloed approach is more likely to improve environmental health outcomes in terms of reduced asthma diagnoses and exacerbations than an incomplete, siloed approach that only views and addresses one patch of the quilt.

Or consider high-volume hydraulic horizontal fracturing, or fracking, a process in which a mixture of sand, water, and chemicals is injected deep underground to break up shale rock and release natural gas for energy use. Fracking has raised public health concerns due to the many trucks (and their diesel exhaust) used to transport materials to and from the sites; the potential for exposure to toxic chemicals (benzene and many others) via inhalation or due to leaks and spills of wastewater; and possible contamination of groundwater after the fracking operation is completed. The operation is frequently carried out near residences and schools, meaning children and other vulnerable groups can be exposed to these risks.

Fracking is exempt from the federal Safe Drinking Water Act due to the "Halliburton loophole," named for the company that former Vice President

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Dick Cheney headed. So the issue moves to the states, which may have varying views of fracking's appeal given their economic, environmental, social, and other priorities. Consider a situation in which a state legislature passes a law allowing fracking, then delegates development of regulations, which flesh out the law, to the state's natural resources agency. Its staff may competently manage decisions affecting land and minerals, but do they have the capability to incorporate consideration of potential health impacts on nearby residents in their analysis? If not, are they partnering with sister agencies that do possess that expertise? Who is protecting environmental health?

Given the regulatory gaps at the federal level, many environmental health issues are addressed—*if* they are addressed—at the state and local levels. But they often are not. Given expansive and growing daily challenges like addressing the many impacts of climate change and the spread of toxic chemicals, significantly more collaboration among state agency functions is needed.

INDUSTRY INFLUENCE

A major contributor to environmental health regulatory gaps is the influence of industry. Industry associations' bedrock near K Street and the US Capitol lessens into a smaller flow beyond the Beltway as it migrates to statehouses and occasionally city hall. Industry mechanisms of influence are well-oiled and well-established and often outweigh the will of regular citizens. *Roll Call* reports that the ten highest spenders on lobbying laid out $326.6 million in 2022 in an effort to press the federal government to favor their positions.[15] On the one hand, when it comes to worker safety and health regulatory development, the national labor unions, with their offices encircling the Department of Labor, enjoy proximity and connections. But it is more challenging for consumers to serve as an effective counterweight to the National Association of Manufacturers, American Chemistry Council, American Petroleum Institute, and US Chamber of Commerce. There is no one organization or constituency representing US consumers or parents.

Modes of industry influence include involvement developing laws and regulations, filing lawsuits to impel changes, funding research studies, and making cash contributions to politicians who are in a decision-making posi-

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tion. As far as impacts on research, the authors of an article in *BioScience* express concern that the EPA's risk-assessment process for pesticides and other chemicals "can proceed using a narrow portion of the available data and can be based exclusively on industry-supplied studies . . . which has inherent conflicts of interest."[16] The authors, led by Michelle D. Boone of Miami University and Christine A. Bishop of Environment Canada, write that such conflicts of interest are "ingrained in the process," in part because EPA works hand in hand with industry to establish study methodology, which can be "prohibitively expensive for researchers outside of industry." Therefore, much or even all of the data that EPA considers as part of risk assessments may come from research carried out or funded by industry, "despite clear conflicts of interest." The authors also cite research finding that studies submitted to regulatory agencies by industry are more likely to support findings favorable to industry.[17]

In terms of lobbying power, after California passed its innovative Proposition 65 law, which limits water pollution emissions and requires warning labels for chemicals that cause cancer or birth defects, other states tried to follow its example. But opponents, who hadn't expected Prop 65 to succeed, "crushed" those efforts with "massively funded political campaigns," according to a Stanford Law School blog.[18] Burke of Johns Hopkins notes that New Jersey made early, critical strides in developing programs that led to federal laws like Superfund. It created a unique right-to-know law to provide hazard information to both workers and communities. But that was "before the rise of the trade associations," Burke says. "They made enormous campaign contributions to politicians to prevent action and worked to 'manufacture doubt'"—referring to industry efforts to create uncertainty about harms like smoking and climate change.

Some recent industry efforts have focused on preemption—when a higher level of government prevents or limits a lower level of government from regulating a particular issue. This has been more commonplace in statehouses, where lawmakers may preempt the ability of local governments in that state to address an environmental health concern. According to the US Centers for Disease Control and Prevention (CDC), ceiling preemption, which prevents local governments from establishing more stringent ordinances than those established by state law, has become "almost routine" in legislative and regulatory processes recently, especially on issues involving health protection and consumer protection.[19] For example, due to a concerted industry pressure campaign on statehouses in the 1990s, more than

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forty states now have laws preempting local governments' ability to regulate pesticide use. State preemption laws are increasing, limiting the regulatory abilities of local governments on issues ranging from minimum wage to firearms. Regenerating the autonomy and power of localities in the face of state preemption efforts is now a major goal within the field of public health.

If challenges like preemption can be addressed, then, given the stagnation at the federal level and the uneven environmental health protections at the state level, city hall can be freed to develop new, innovative policy ideas on a small scale. Sited out of the way, geared to idiosyncratic local issues, the town council is less likely to be pressured by external special interests and more able to act quickly and creatively—which can produce lessons learned that are useful for other localities and for states.

THE END OF FEDERAL ACCORD

A third explanation for the slowing of federal environmental health policy is today's rabid political divisions, which differ from decades ago, when many laws were passed with bipartisan support. Harvard University environmental law professor Richard Lazarus explains that since President George H.W. Bush began to pull back on environmental efforts for political reasons, there has been "presidential administration whiplash" from one regime to the next, and a simultaneous end to new environmental laws coming from Congress. Without the ability to pass new legislation, every administration is trying to tack new goals onto old laws, "which does not easily fit," says Lazarus, and "is a disaster for lawmaking."[20]

Assuming the federal government can remain open for business—shutdowns and threats of shutdowns having become frequent in recent years[21]—bills to protect environmental health typically pass, if they do pass, with an exceedingly narrow margin. The Inflation Reduction Act of 2022, for example, which addressed climate change among other issues, was approved by the House of Representatives 220–207 and the Senate 51–50, entirely along party lines.

Even when the federal government creates tougher environmental laws or regulations, they are often reversed by the succeeding administration or challenged in court. In 2022, the Supreme Court struck down the Clean Power Plan, determining that the EPA lacked authority under the Clean Air Act to regulate greenhouse gas emissions by requiring power plants

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system-wide to adopt cleaner energy sources.[22] Such an authorization to the EPA would seem to require new climate legislation from Congress—almost unthinkable at present.

Following on that decision, the Supreme Court heard a case challenging the "*Chevron* doctrine," the traditional deference given to federal agencies like EPA when they make a "reasonable interpretation" of an ambiguous law. Such deference has been granted for several decades, on the assumption that an agency's toxicologists, biostatisticians, and other experts are best placed to make such a determination. With the court's 2024 decision to reverse *Chevron* in the case *Loper Bright Enterprises vs. Raimondo*, agencies will no longer enjoy this deference and agency experts may be overruled more often by judges who have less expertise in the area of policy in question. Notably, since the decision applies only to federal agencies, it may further move the main locus of environmental health policymaking to the states.

More broadly, some observers believe that EPA itself has failed to evolve so as to maintain its relevance. Kenneth Olden, former director of both the National Institute of Environmental Health Sciences and National Center for Environmental Assessment, compares EPA with the National Institutes of Health (NIH), asserting that NIH reinvented itself and remained relevant while EPA stagnated.[23] He writes that after EPA succeeded in cleaning up dramatically dirty skies and waterways, many people no longer saw environmental protection as a priority. At that point, he writes, EPA should have made the case that environmental protection is critical over the long term and addresses hazards that can have dire impacts "even though one may not be able to see, taste, or smell them." EPA needed to put "a human face on environmental protection by linking invisible pollutants to human health." EPA also needed to recalibrate to address more scattered sources of pollution, such as farm runoff, he writes. By contrast, he believes that NIH, after accomplishing its original job of stemming the epidemic of infectious diseases, "identified the new scientific challenges associated with the rise in life expectancy," such as chronic disease, and expanded into twenty-plus centers supported by substantial funding (although its budget has since been reduced).

So as outdoor workers grow increasingly weak from heat exhaustion during steamier summers, viruses previously viewed as exotic travel poleward, and

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consumers seek personal care products free of endocrine-disrupting chemicals, the heavy clouds above leave us vulnerable below, lacking umbrellas and protection. If we want to stay protected, we need to create our own. With federal environmental health protections lessening, state and local guardrails become our refuge for those of us lucky enough to enjoy them. How has this played out?

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TWO

Enter the States

Our federalist system assumes that states may do what the federal government doesn't. In some cases, it makes sense to leave decisions to states. They can prioritize issues specific to that geographic area or to more localized preferences. A health department in a Western state may focus on protecting schoolchildren or outdoor workers from wildfire smoke, as this has been a more prevalent problem in that part of the country. Some states may welcome fracking operations while others elect to keep them out. States can serve as laboratories of innovation, testing new policies and programs to see how they work. Those that turn out to be winners may be adapted and adopted by other states, or even by the federal government.

In the absence of federal environmental health standards—or of federal standards adequate to protect human health—states began to act.

STATES START TO FILL THE GAPS

From the start, California blazed its own trail. It was the sole recipient of a waiver under the motor vehicle provisions of the Clean Air Act, allowing it to set its own standards to reduce air pollution from motor vehicles and, therefore, improve public health. Given its economy—so enormous that, as of April 2025, it would be the world's fourth largest if it was a country[1]—and Los Angeles's historically smoggy skies, Congress gave this state the

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singular authority to set standards that are stricter than federal requirements. While the continuation of the waiver has sometimes been in question in recent years, California's influence in this area remains unchanged.

Its impacts are widespread. California's emission limits have been adopted by seventeen states and the District of Columbia, as shown in the two columns under the heading "LEV regulations" in table 2-1. Yet the exchange of policies works in both directions. California developed the nation's first vehicle emissions standards in 1966, before the federal government developed standards. Two years later, the EPA adopted California's standards for that year's cars. UCLA law professor Ann Carlson calls this pattern, in which California innovates and federal regulators piggyback on the state's demonstrated success, "iterative federalism." This practice has continued for decades.[2]

California's Zero-Emission Vehicle requirement, another piece of its efforts to lower motor vehicle emissions, was enacted in 1990 and has evolved as technological advances have moved transportation in the direction of zero emissions.[3] Most recently, California pushed the environmental health envelope again with its commitment for new vehicles to be zero emission starting in 2035. Charging infrastructure and other elements of ensuring these vehicles are convenient for drivers are also required. Many of the same states have piggybacked on these efforts, too—see column "ZEV program" in table 2-1. (As a note, several aspects of California's vehicle emission programs became uncertain starting in January 2025.)

Other California environmental health innovations exert a similarly outsized influence on the rest of the country. The state's Proposition 65—the Safe Drinking Water and Toxic Enforcement Act of 1986—requires that it develop an updated list of chemicals known to the state to cause cancer or reproductive harms. Businesses must include warning labels on products that contain chemicals on the list. Due to California's size and economic impact, residents of states from Arkansas to Alaska may notice Proposition 65 warnings on their new shirt or at the entrance to the airplane they board. And manufacturers may devise new formulations—free of components on the Proposition 65 list—of a product that is marketed nationally, to ensure they can sell it in California.

At the local level, San Francisco's Integrated Pest Management policy is widely viewed as a national model. It, too, includes a list—the Reduced Risk Pesticide List of products that have undergone the city's own Pesticide Hazard Screening Protocol (and meant for the use of city departments).[4]

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TABLE 2-1. States that have adopted California's vehicle emission standards, specifically Low-Emission Vehicle (LEV) criteria pollutant and greenhouse gas emission regulations and Zero-Emission Vehicle (ZEV) regulations, under the Clean Air Act. The table depicts the model year (MY) the state adoptions took/take effect and is current as of May 13, 2022.

	Applicable model year		
	LEV regulations		
State	*Criteria pollutant regulation*	*GHG regulation*	*ZEV program*
California	1992	2009	1990
New York	1993	2009	1993
Massachusetts	1995	2009	1995
Vermont	2000	2009	2000
Maine	2001	2009	2001
Pennsylvania	2001	2009	
Connecticut	2008	2009	2008
Rhode Island	2008	2009	2008
Washington	2009	2009	2025
Oregon	2009	2009	2009
New Jersey	2009	2009	2009
Maryland	2011	2011	2011
Delaware	2014	2014	
Colorado	2022	2022	2023
Minnesota	2025	2025	2025
Nevada	2025	2025	2025
Virginia	2025	2025	2025
New Mexico	2026	2026	2026

(*Source*: California Air Resources Board)

Municipalities around the country reference San Francisco's list in their own pesticide-reduction policies—thereby multiplying its impact—often alongside the EPA's list of safer pesticides.

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THE GAP-FILLING IS UNEVEN ACROSS THE STATES

When I observed the high rate of asthma among children in my neighborhood, I was largely on my own in reaching out to local policymakers and experts to express my concerns and request assistance. I also reached out to a state agency. But getting a helpful response was an uphill battle. I made the changes that my son's pediatrician had recommended to address his asthma, which focused on the indoor environment: high-efficiency air filter in his room, pillow and mattress covers to protect against dust mites. But our indoor environment was already pretty allergy- and asthma-safe. After all, I worked professionally in the field of environmental and occupational health. So I started learning about outdoor asthma triggers. And I learned and I learned. There was a lot to know.

Why did this time-consuming (not to mention expensive, given everything I had to buy) burden fall on me? Some states do better than others at filling the environmental health policy gaps left by federal shortcomings. Why? Culture is clearly a factor. Wisconsin, for example, has deep seeds of prioritizing conservation and pollution prevention, planted at least in part by the Scandinavian and German immigrants who brought their progressive beliefs with them from across the ocean. University of Wisconsin professor and ecologist Aldo Leopold wrote about the importance of protecting the land in his influential 1949 book, *A Sand County Almanac*. Wisconsin Senator Gaylord Nelson originated Earth Day. The state has historically made a greater commitment to environmental protection than many others.[5] Massachusetts has, too, likely influenced by the Puritan waste-not ethic and the naturalistic ethos of Henry David Thoreau, both going back to the Bay State's earliest days.[6]

Another influence is the wealth of the state in question; in general, those with more funds spend more on environmental (and, by extension, environmental health) protection.[7]

The dominant contributors to a state's economy matter. Tulane University environmental studies and public policy professor Joshua Basseches and colleagues confirm that enacting climate change–focused laws can be more challenging in states where fossil fuel companies provide jobs and tax revenue.[8] This likely also applies to economic drivers like agriculture or minerals extraction. Basseches et al. also pinpoint the challenge of "fragmentation of pro-climate policy coalitions"—for example, when representatives of the solar power industry jockey for influence with wind power companies,

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thereby weakening the strength of the renewable power sector as a force when it goes up against organized "powerful fossil fuel incumbents."

Partisan politics matter, too, with Democrats more often casting votes in favor of the environment.[9] But there are important limitations to this generalization. In interviews with state legislators, Vanderbilt University sociology professor David Hess and his colleagues Quan D. Mai and Kate Pride Brown found that framing of bills that advance renewable energy and energy efficiency (which protect environmental health via cleaner air) affected their likelihood of passage. Examining bills proposed between 2004 and 2014, they found that legislators distinguished them based on frames related to ideological differences. When proposed policies were structured as mandates—such as requirements to increase use of renewable energy by a certain percentage—there was less support than for similar policies structured as tax reductions (like tax credits for installing solar power), reduction of government waste by increasing building efficiency, and expansion of the ability of local governments to act.[10]

For example, Hess, Mai, and Brown list laws aimed at increasing building energy efficiency that passed in "red" states. These lean in the direction of goals and incentives rather than mandates. One mandate—for newly constructed state buildings to meet or exceed standards for energy efficiency and indoor air quality—aligns with interview responses in the study that incorporating such measures at the time of building construction is less expensive than changing systems in an existing building and creates long-term cost savings.

This study suggests that passage of environmental and energy policies—and, by extension, environmental health policies generally—is more complex than a simple red state–blue state dynamic. While Hess, Mai, and Brown concede that some types of laws are unlikely to get off the ground in Republican-controlled states, they conclude that nevertheless there are opportunities to pass environmental (and related) laws that "can appeal to conservatives of both parties and to Republican-dominated state legislatures."

Similarly, a number of "red" states are increasingly budgeting funds toward projects to protect their coastal and other areas from climate change—although they may refer to "extreme weather events" rather than "climate change."[11] Framing and phrasing matter.

A major government effort to better connect environment and health via data collection and integration, and improve environmental health protection across states, is the CDC's National Environmental Public Health

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Tracking Network. Established in 2002, it combines health data and environmental data from national, state, and local sources "and provides supporting information to make the data easier to understand."[12] States apply to the program in a competitive process. CDC funds recipients to develop and implement local tracking programs and data networks "to grow public health capacity and expertise in environmental health surveillance, and to modernize data systems."

The original intent was for the Tracking Network to be "a national program, national database, unified data resources," says Burke of Johns Hopkins. "Without that, states are flying blind."[13] Thirty-three recipients—thirty-two states and one county—are part of the network. (Note: This program was significantly cut in the first half of 2025.) One of the network's outcomes is a nationwide drought map created through the program's data exploration functions. Drought datasets include a drought monitor, drought severity index, and precipitation index. Another example is the Heat & Health Tracker, which connects data on maximum temperatures with data on emergency department visits for heat-related illness. The State of Florida uses the data from this tool to study the efficacy of kitchen faucet filters to reduce arsenic in drinking water from wells and for air quality alerts in schools to create healthier environments for asthmatic students.[14]

A 2017 assessment of the Tracking Network found that expanding the amount of community-level (such as census tract) data that is included is a key to ensuring its usefulness moving forward, along with the participation of all fifty states.[15] The authors also recommend building broader partnerships between the state tracking programs and academic entities in order to develop and test hypotheses via research studies, which should then be published. These goals align with the movement in environmental health toward looking beyond the risks of single pollutants to a broader examination of a community's exposure to multiple pollutants simultaneously, and incorporating the greater sensitivity of groups like children, pregnant women, and environmental justice populations.

PROGRESSIVE PROTOTYPES—AND INEQUITIES

The downside of the current regulatory patchwork at the state level is the health inequities created. Someone who lives in one of the dozen-and-a-half

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states that align with California's tailpipe emissions standards rather than the more relaxed federal standards probably enjoys health benefits from reduced air pollution—while residents of other states do not. That is also the case for residents of East Coast states within the Regional Greenhouse Gas Initiative (RGGI) partnership, which limits greenhouse gas emissions, and other hazardous air pollutants in the process.[16] A study that compared RGGI states with neighboring non-RGGI states concluded that "RGGI has provided substantial child health benefits," sparing children hundreds of asthma cases and reducing preterm births and cases of autism spectrum disorder and low birth weight. These health benefits translate into dollar savings, too—between $191 and $350 million.[17]

As a local example, Cuyahoga County, Ohio, adopted an innovative, multidisciplinary program to address housing conditions that worsened asthma in high-risk pediatric patients. It coordinated remediation for moisture problems, mold, and additional asthma triggers and provided weatherization for energy efficiency and other healthy housing improvements. Symptom days, emergency department visits, and hospitalizations declined significantly for the group receiving the intervention.[18] This was unique because improvements to indoor air quality—which is critical to good health, since it is where people spend most of their time and can be contaminated by a range of allergy and asthma triggers—typically address only one concern at a time, like lead paint.

Those who live in this Ohio county and benefited from this unusual, comprehensive program were lucky. Most people in need of this kind of service do not live in a state or municipality that provides it. While there is growing activity to connect housing availability and affordability with the built environment and health outcomes, such efforts are scattered and irregular; whether one benefits depends on coincidental decisions about where to live. An article about the Cuyahoga County program notes that key policy impediments to improving health in housing include "lack of clarity in statutory authority, and gaps in responsibility for the built and indoor environments."[19]

Perhaps no example of federal whiplash and scattered state efforts to fill the resulting gaps in protection approaches efforts to ban the insecticide chlorpyrifos. Chlorpyrifos is part of a class of insecticides called organophosphates that kill insects and other animals by interfering with nerve impulse transmission. Of thirty-six organophosphate insecticides registered for

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use in the United States, all can cause acute toxicity.[20] EPA banned chlorpyrifos for indoor use in 1996, but it is still widely used in agriculture and can be used on golf courses and to treat wood fences and utility poles. Health effects of human exposure can include low birth weight and neurological and developmental problems in children. A study by Dr. Leonardo Trasande, professor in New York University's medical, public service, and global public health schools, found that American children born in 2010 "lost 1.8 million IQ points and 7,500 children had their IQs shifted into the intellectual disability range as a result of prenatal organophosphate exposures."[21] At a high enough dosage, central nervous system effects of chlorpyrifos exposure can be severe, ranging from reduced motor function to breathing problems and paralysis.[22]

As table 2-2 illustrates, the federal back and forth in regulating chlorpyrifos has spanned about a decade. EPA planned to ban chlorpyrifos in agriculture, then reversed this plan; several states began instituting their own bans; a federal ban was back on, per a court decision; several more flip-flops took place. In 2023, a federal court overturned a ban; in response, in 2024 EPA proposed to disallow chlorpyrifos on food crops, excepting eleven com-

TABLE 2-2. A recent history of chlorpyrifos regulation

Year	*Action*
2016	EPA plans to ban chlorpyrifos in agriculture.
2017	EPA reverses this plan.
2018	Hawaii bans chlorpyrifos and requires evaluation of pesticide drift at three schools.
2018	Court reverses EPA and bans chlorpyrifos nationally.
2019	Appeals court tells EPA to make a decision. EPA: No ban.
	California bans chlorpyrifos. Other states do the same or consider it.
2021	EPA bans use of chlorpyrifos on food crops.
2023	Court overturns ban.
2024	EPA proposes to restrict chlorpyrifos, excepting 11 food crops.

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mon ones, including apples, strawberries, and wheat. Hawaii, California, Oregon, Maryland, and New York have banned the use of chlorpyrifos.

For people who live or work in settings where chlorpyrifos might otherwise be used, the state bans, which still stand, can provide significant environmental health protection. Those in other states don't enjoy this safeguard—again, an inequity at the state level. Use of the insecticide has declined, however, particularly following California's ban. This trend again highlights California's influence, and it and the other states with a ban in place presumably provide a national benefit of reducing the overall amount of chlorpyrifos on the country's produce. Yet EPA's proposed continued use on numerous popular foods means that children will continue to ingest chlorpyrifos residue in their diets.

What is needed now to protect environmental health, says Burke of Johns Hopkins, is strength at the state and local levels. But instead, "it has gotten much, much worse because it is politicized and has lost funding." He points to the lack of state and local capacity to address urgent situations like high lead levels in drinking water in Flint, Michigan, the emission of volatile organic chemicals following the East Palestine, Ohio, train derailment, and increased flooding around the country: "We see a very fragmented approach."[23]

Given this challenging scenario, what can we learn from the experiences of states that have moved forward with their own environmental health policy efforts? Some general principles, which will be explored in the coming chapters, can be gleaned from the experiences of a number of states around the country.

- State-university-industry partnerships can lead to greater success than state governments acting alone when it comes to developing, implementing, and evaluating environmental health policies. Universities can play multiple, critical roles. They can carry out research and communicate it to state policymakers, thus ensuring that policies are based on the current scientific understanding of an issue and helping to ensure that the most important issues are prioritized for action. Academic experts can conduct cost-benefit analyses that provide clear evidence about the

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case for a policy—and where higher costs can be expected, like at the initial implementation stage, that information can help government agencies direct funding or other types of assistance to increase the support for a new policy and smooth its rollout. Public university extension programs are almost custom-made for this kind of role, given their mission to share "practical, research-based information" with communities.[24] Industry is also a critical partner, with its on-the-ground understanding of how industrial processes work and where and how changes can be made to improve environmental health outcomes. These kinds of partnerships are better positioned than a state agency alone to deliver hands-on technical assistance to make a change such as selecting and using an environmentally preferable disinfectant instead of a toxic conventional product in a school or other community setting. These principles are exemplified by the Massachusetts Toxics Use Reduction Act and the State of Texas's Integrated Pest Management law for schools.

- An understanding of basic principles of environmental and occupational health—how pollution is emitted, its impacts on health, the groups that are particularly vulnerable, and how to address pollution exposures—is foundational to the ability to develop and implement policies in this arena. Yet because medical students receive almost no education on this topic and there has been an erosion of environmental health content in master of public health programs, the resulting lack of knowledge can be a significant obstacle to progress in many states. In New York, the successful undertaking to build a state-funded, statewide network of both occupational health clinics and children's environmental health centers has gone a long way toward addressing this deficiency. By expanding training programs in these areas of environmental health and by emphasizing the importance of prevention in workplaces, schools, and recreational areas, the clinic networks have created a cadre of professionals who act as educators and advocates for environmental health policies.
- Community action and input can be invaluable in ensuring that local concerns and priorities reach state policymakers. This has particularly been the case for air pollution, given that EPA monitors aim to gauge the overall air quality of a broad area and can miss hot spots of air pollution emitted by a particular facility or industrial zone. Community action has also been central to efforts to address the greater exposure of

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