GROUND TRUTHS

Community-Engaged Research for Environmental Justice

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Public Health

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The field of public health has made major contributions to community-engaged research (CER) for environmental justice (EJ). This is especially true of research that takes a population health perspective, as opposed to clinical, behavioral, or biomedical approaches. Public health has a deep and rich history of engaging matters of social and health equity at the community and population levels, especially as related to racial, class, and place-based environmental inequities. As this chapter shows, public health research is well positioned to address EJ issues because of the field's practical commitments to applying and translating research for social action and policy change. In addition, public health researchers' leadership in developing community-based participatory research methods has influenced CER in many disciplines.

This chapter summarizes some important ways in which CER for EJ has emerged from public health. We begin with an overview of the recently updated 10 Essential Public Health Services, a framework that puts health equity at the center of the field. We present an overview of the core areas of public health research and practice that have especially advanced CER for EJ: community-based participatory research, social epidemiology, place-health research, and health impact assessments. For each area, we summarize core conceptual and procedural groundings, citing some of the key literature and exemplary studies. Next, we identify three broad directions public health research can take to strengthen CER to advance EJ. These directions include engaging more explicitly and purposefully with antiracism and decolonizing praxis and principles; redefining what counts and gets counted as "environmental"; and centering notions of placemaking and power in the (re)production of spatialized and racialized environmental injustices. Table 9.1 shows how the chapter's major themes relate to the dimensions of justice common to CER and EJ.

TABLE 9.1. CER for EJ in Public Health

Dimension of Justice	In CER for EJ in Public Health
Distribution *Who ought to get what?*	Centering health equity by addressing the structural determinants of health, and their roots in historic and ongoing environmental injustices
Procedure *Who ought to decide?*	Strengthening EJ communities' participation in and influence over community-based participatory research and health impact assessments, and in policy making and practices that affect health
Recognition *Who ought to be respected and valued?*	Expanding antiracist and decolonizing approaches to knowledge and research, and recognizing sociospatial exposures to policing, spatial stigma, White spaces, and Indigenous health as environmental justice issues
Transformation *What ought to change, and how?*	Transforming public health through community-based participatory research focused on health equity, and employing antiracist and decolonizing praxis, to promote environmental justice

CER FOR EJ IN PUBLIC HEALTH

The 10 Essential Public Health Services

As a foundation for public health, the 10 Essential Public Health Services (EPHS) is a particularly relevant framework for CER to advance EJ—especially in the U.S. context, where the EPHS is widely used in public health education and accreditation, is cited in some state statutes, and helps define the field to the public. Federal agencies and public health experts developed the EPHS doctrine in 1994 to help distinguish the work of public health agencies and organizations from health care.

The EPHS framework was updated in 2020 to describe the field of practice more fully, center essential activities around equity, and identify the structural injustices that cause health inequities (see figure 9.1) The influence of community-based participatory research (CBPR) can be seen in the shift from the original framework's focus on the field of "public health solving community problems" (U.S. Centers for Disease Control, n.d.) to the current version's call to "strengthen, support, and mobilize communities and partnerships to improve health" (10EPHSFITF 2020). Equity is now a goal of each of the 10 essential services, from creating community partnerships, to engaging in policy and legal advocacy, ensuring access to health and health care services, and developing a diverse and competent workforce. An accompanying statement highlights the need to "remove systemic and structural barriers that have resulted in health inequities . . . includ[ing] poverty, racism, gender discrimination, ableism, and other forms of oppression" (para. 3). These updates to the EPHS provide a stronger rationale for engaging in CER for EJ, although, as we argue below, the field has more work to do to fulfill this promise.
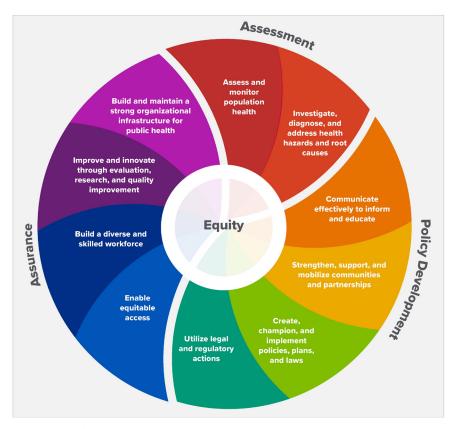
FIGURE 9.1. The 10 Essential Public Health Services framework.
SOURCE: 10EPHSFITF 2020.

Community-Based Participatory Research

Public health scholars developed CBPR to engage community partners in the research process and share power with them, strengthen research with local knowledge, ensure that communities benefit, and produce research that results in meaningful actions through interventions or policy change (see chapter 2). Since the 1990s, the CBPR tradition has been a major contributor to the theory, methodology, practice, and institutionalization of CER for EJ across many disciplines and research topics.

Public health scholars authored textbooks and handbooks that taught community-engaged theory and methods to EJ researchers in many fields (see, e.g., Blumenthal et al. 2013; Israel et al. 2013a; Minkler and Wakimoto 2022; Wallerstein et al. 2017). Researchers trained in public health helped forge an interdisciplinary approach to CER for EJ—individually and in research teams spanning multiple

research institutions and community organizations. This research provided evidence used in early EJ struggles in the U.S. by conducting epidemiological studies in fenceline communities and industrial hygiene studies in workplaces (see chapter 1). This EJ research has expanded in scope to address law and policy (see chapter 7), food justice (see chapter 10), and urban planning (see chapter 11). Public health researchers and their community partners have also led reflexive research on the CBPR process itself, advancing understanding of power and justice within knowledge production (e.g., Chávez et al. 2008; Muhammed et al. 2015; Shepard et al. 2002; Wallerstein et al. 2019) and demonstrating the value of CBPR methods for increasing the rigor, relevance, and reach of research (Balazs and Morello-Frosch 2013).

Public health has also played a major role in developing the institutional infrastructure for CER, especially in the U.S. From the 1990s onward, schools and programs of public health launched new curricula, centers, and initiatives devoted to CBPR, built long-term relationships with community partners, and recruited a critical mass of graduate students of color committed to environmental and social justice. Professional associations—from the renowned American Public Health Association to newcomers such as Campus-Community Partnerships for Health—promoted CBPR and promulgated standards for conducting and evaluating this kind of research to increase its acceptance in the field. Health researchers secured foundation and government funding streams for CBPR on EJ from the mid-1990s onward, including a 13-year federal interagency program that supported over 50 CER projects for environmental and occupational health, led by the National Institute of Environmental Health Sciences, Environmental Protection Agency, and National Institute for Occupational Safety and Health (Baron et al. 2009). In the 2010s, the National Institutes of Health, and some state environmental and public health agencies, prioritized funding for CBPR to combat health inequities (Blumenthal et al. 2013).

Social Epidemiology

Social epidemiology scholars and practitioners tend to be less concerned with any one specific disease or illness, or any one specific cause. Rather, they are most interested in explicating how broader societal power relations (re)produce the inequitable sociopolitical, economic, legal, and environmental contexts that structure population distributions and patterns of health and illness (Krieger 2020). Central to much of this scholarship are the health effects of various forms of social exclusion, oppression, and inequality, including, for example, structural racism (Agénor et al. 2021; Bailey et al. 2017), gender inequality and sexism (Borrell et al. 2014), aspects of class inequality (Bor, Cohen, and Galea 2017; Fujishiro et al. 2021; Muntaner et al. 2015), and considerations of intersectionality therein (Agénor 2020; Bowleg 2012).

Critical contributions of social epidemiology relevant to EJ-related research also include work that explicates how these outside social and political exposures "get under our skin" to affect physiological functioning across our lifespans. This research has contributed several key concepts that help to illuminate EJ and health. For example, *allostatic load* is a measure of the cumulative burden of chronic stress and life events, as identified by biomarkers and clinical criteria (Seeman et al. 2010). *Weathering* provides a metric of premature decline in health from the cumulative impacts of experiencing social and political marginalization and economic adversity (Geronimus et al. 2006). The concept of *embodiment* describes the process through which social and physical environmental exposures work their way inside of our bodies, revealing patterns of structural inequality that are built into societal arrangements of power and risk (Krieger 2005; Vineis et al. 2020). *Life course* approaches account for the origins of health inequities by tracing how social, economic, and physical environmental exposures at each stage of human development affect health within and across generations (Gee, Walsemann, and Brondolo 2012; Jones et al. 2019).

Informing much of the work in these areas are broader theories and frameworks that situate health within its wider social, political, and economic contexts and power relations, which fundamentally shape who is exposed to what, and when. Core theories and frameworks for EJ include social production of health and political economy orientations (Harvey 2021; McCartney et al. 2019), ecosocial theory (Krieger 2001), fundamental causes (Phelan and Link 2015), and models of social, macro, and commercial determinants of health (de Lacy-Vawdon and Livingstone 2020; Naik et al. 2019). Non-CER studies informed by these frameworks have explored EJ exposures, often in relation to the broader structural foci of social epidemiology (e.g., structural racism, gender inequality, class inequality). This has included, for example, work demonstrating links between ambient air pollution and racial residential segregation (Jones et al. 2014; Morello-Frosch and Jesdale 2006); air and noise pollution and neighborhood deprivation (Saez and López-Casasnovas 2019); noise pollution and racial and economic segregation (Casey, Morello-Frosch, et al. 2017); neighborhood racial composition and annual exposures to toxic waste emissions (Hipp and Lakon 2010); intersectionality and cancer risks related to air toxics (Alvarez and Evans 2021); neighborhood racial composition, income, and urban greenness (Casey, James, et al. 2017); and neighborhood racial composition, tree canopy, and cardiovascular and respiratory health (Jennings et al. 2019). These currents in social epidemiology have influenced and inspired CER studies of EJ, which can add a valuable complementary approach to the statistical analyses of large data sets mentioned here. Integrating CBPR and social epidemiology offers an especially promising avenue for applying CER to advance EJ, especially when employing a place-health approach to research (Petteway et al. 2019a; Wallerstein, Yen, and Syme 2011).

Place-Health Research

As a subdiscipline of social epidemiology, place-health research focuses on place-based exposures as encountered within specific geographies and sociopolitical spatial contexts, and represents a well-developed area for advancing EJ through CER. This research draws on complementary disciplines—such as human geography, health geography, urban planning—to understand the natural, built, economic, and social environmental contexts of specifically defined places (Arcaya et al. 2016). Often, outside researchers work collaboratively with residents to uncover and address potential EJ-related concerns. The place-focused and environmental-oriented nature of this particular public health work lends itself well to adopting core CER principles for advancing EJ knowledge production and social action. As Petteway, Mujahid, and Allen (2019) discuss, such work can leverage the "practical and procedural translational advantages of much place-based research (e.g., space-bound, locality- and/or jurisdiction-specific), while simultaneously capitalizing on the scientific and political translational advantages of harnessing place-based knowledge, insight, and expertise of the people whose lives unfold within the 'place' being studied" (6).

CBPR in this area has examined issues related to neighborhood food environments (Breckwich Vásquez et al. 2007), parks and greenspaces (Peréa et al. 2019), tobacco environments (Petteway, Sheikhattari, and Wagner 2019), and aspects of neighborhood built and social environments (Petteway, Mujahid, and Allen 2019). Other work has focused on more traditional EJ exposures. For example, Madrigal et al. (2014) worked with Latinx youth in a farmworker community to examine environmental concerns using photovoice. Johnston et al. (2020) worked with youth co-researchers who used multiple participatory methods, including participatory GIS and personal air-monitoring devices to document exposure to airborne particulate matter, while Nolan et al. (2021) completed similar work with youth researchers to study nitrogen dioxide and sulfur dioxide exposures. Other scholars have conducted participatory survey-based environmental research within fenceline communities (Cohen et al. 2012), and survey and water sampling work with residents of a heavily polluted Latinx community (Sansom et al. 2016). This body of work not only offers valuable empirical evidence, but also enhances community participants' agency, strengthens the transparency and accountability of the research to the community, and disseminates the results to residents and leaders in ways that facilitate their efforts to remedy EJ concerns.

Even so, significant conceptual, methodological, and procedural challenges remain for place-health research (Arcaya et al. 2016; Petteway et al. 2019a). Documenting environmental threats may contribute to stigmatizing places and the people who inhabit them (discussed below). This research can also be limited by choosing short-term temporal measures, and narrow and static spatial

designations (such as census tracts), that do not adequately measure long-term and cumulative exposures across the spaces people actually traverse. An important response to these problems is to measure environmental exposures across a person's activity space, which includes all of the places they go to, pass through, and encounter on a routine basis. Unlike most exposure-related research that focuses on one spatial location (e.g., air pollution in one's residential neighborhood), an activity space approach can provide a more comprehensive picture of exposures based on people's mobility patterns—between home, work, school, places of recreation, shopping locations, transportation routes, and so on. Park and Kwan (2020) have applied this approach to studying air pollution, while others have applied it to research on noise pollution (Tao et al. 2021), greenspace (Bell 2015), and aspects of local food, alcohol, and tobacco environments (Lipperman-Kreda et al. 2015; Widener et al. 2018). While promising, this activity space work would be greatly enriched in rigor, relevance, and reach by taking a more participatory approach that more thoroughly centers community knowledges, experiences, and spatial perceptions of exposures, and enlists community partners in disseminating the findings and implementing responses.

Health Impact Assessment

Another area of public health that plays a promising role within EJ-related research and practice is health impact assessment, or HIA. HIA is an analytic process and tool developed to generate evidence regarding the potential health harms and benefits of proposed policies, programs, projects, or plans (Harris-Roxas and Harris 2011). Originating in and extending the use of environmental impact statements (EIS) in construction and development projects, HIA is

> a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. (National Research Council 2011, 5)

HIA generally consist of six stages: (1) screening whether the decision-making process can benefit from an HIA, (2) scoping potential health effects of the proposal and parameters of the study, (3) assessment of the health impacts, (4) recommending mitigations and alternatives to protect health, (5) reporting and communication to stakeholders and decision makers, and (6) monitoring decisions and health outcomes (Bhatia 2011). A core feature of HIA is that it can be used to assess any type of policy, program, project, or plan—including zoning, land use, community development, transportation, and housing—and all elements that shape distributions and patterns of place-based environmental exposures, experiences, and opportunities. Ideally, HIAs are completed prior to any final decision making regarding a potentially harmful environmental change, policy, or practice so that potential health impacts are assessed by health officials and policy makers. Thus,

by its very nature, HIA is a tool designed to promote EJ by providing evidence to preempt environmentally detrimental actions before they can produce health-harming exposures.

While HIA has been practiced for decades, explicit connections to notions of health equity, racial equity, and environmental and social justice have only become core aspects of HIA work more recently (Buse et al. 2019; Heller et al. 2014), prompting increased community engagement and centering community knowledge(s) within all assessment activities. While much HIA work has focused on topics like transportation and housing (Cole, MacLeod, and Spriggs 2019; National Center for Healthy Housing 2016), applications have evolved to examine a more expansive range of EJ-related topics, including racism, community policing, and mental health (Human Impact Partners et al. 2015), and tobacco licensing (Upstream Public Health 2015).

While HIA has done well to advance EJ in public health, HIA remains relatively limited outside of academic and university-led contexts. For example, in a review of all documented HIAs conducted in the U.S. between 1999 and 2020, Petteway and Cosgrove (2020) found just 71 of 2532 (3 percent) in which local health departments served as a lead or authoring partner—suggesting that public health has far to go in making HIA part of routine practice to advance EJ. HIAs can also expand community participation by welcoming local organizations and residents more fully into the research process.

RE-(EN)VISIONING CER FOR PUBLIC HEALTH

Public health—especially through the prism of place-health research—can further embrace and refine CER principles and praxis to advance EJ in three ways. First, building upon the complementary conceptual groundings and goals of CBPR and social epidemiology, we call for deeper engagements with *antiracist and decolonizing praxis and principles*. Second, we encourage deeper, more deliberate and explicit engagement with *placemaking and power* in historic and present processes and practices that make, unmake, and remake our daily place-health contexts. Third, we invite reflection and dialogue regarding *what counts as "environmental"* within EJ-related work in public health, briefly highlighting some promising areas that deserve closer attention.

These directions amplify strengths of place-health research by deepening engagements with notions of power, inclusion, and representation within knowledge production processes—re-(en)visioning place-health research as a site of resistance, contestation, and transformation to change embodied contexts and consequences of environmental injustices. Moreover, public health research needs to engage more fully with the *theories* mentioned here, which may be widely known but are not yet deeply practiced. Faced with pressures to conduct ever more empirical research, while appearing to address pressing issues of

justice and community participation, empirical researchers can be tempted to poach theoretical concepts and apply them shallowly. In the mid-1990s, Green et al. (1996) issued a similar critique of the co-optation of participatory research by many studies that failed to develop substantive community partnerships and co-conduct research on equal and mutually beneficial terms. Today, we see the need for a comparable reckoning with antiracist, decolonizing, and EJ theories, to achieve a more deeply transformed focus and practice of CBPR in public health, rather than a hurried and transactional relationship to these theories. The mid-1990s critique led funding agencies and others to adopt stronger and more specific requirements for community participation in health research, and we hope that the kind of thorough reflection that we can only sketch out here will prompt a similar response.

Engaging Antiracism and Decolonizing Praxis

While CBPR researchers have considered racism and power dynamics within research collaborations (e.g., Chávez et al. 2008; Muhammad et al. 2015; Waller-stein et al. 2019), public health can move further towards a CBPR that centers antiracist and decolonizing praxis and principles. We noted earlier that revised EPHS implores the field to address structural inequities and their causes. As Alang et al. (2021) write, dismantling the upstream barriers to delivering essential public health services "requires building alliances across systems to address the range of social determinants of health caused by White supremacy" (818). This much-needed reckoning can be oriented by frameworks such as Ford and Airhihenbu-wa's (2010) articulation of a public health critical race praxis (PHCRP) and Alang and colleagues' (2021) explication of strategies for how the EPHS can contribute to dismantling White supremacy. Each draws from critical race theory and merges it with theories and concepts from social epidemiology. While the entirety of these frameworks demands concentrated attention from the field, several elements are particularly relevant to CER for EJ.

Most broadly, these frameworks call for opening avenues of "disciplinary self-critique"—understood as "the systematic examination by members of a discipline of its conventions and impacts on the broader society" (Ford and Airhi-henbuwa 2010, 1394). Alang et al. (2021) recommend many strategies to this end, including the need for the field to incorporate critical race theory and antiracist methodologies across the public health curriculum, and set measurable goals for faculty and student racial equity competency. These are certainly prerequisites for faculty and students who plan to do CBPR, along with learning to assess their own individual, institutional, and disciplinary positionality in relation to the community (see chapter 3). Public health can also prioritize research and policy development that explicitly targets indicators of White supremacy and structural racism (Adkins-Jackson et al. 2021; Hardeman et al. 2022, Agénor et al. 2021).

Another core principle is honoring "voice"—that is, "prioritizing the perspectives of marginalized persons"—to enable the (co)production and inclusion of new knowledges (Ford and Airhihenbuwa 2010, 1394). This must extend beyond the traditional practice of including community "voice" on advisory boards, to more intentionally and thoroughly "center the margins" within all aspects of EJ research and knowledge production. Public health can also "ensure equitable allocation of resources and redistribution of power in community partnerships" (Alang et al. 2021, 816) by moving from models in which community organizations are junior partners toward fully collaborative and even community-owned and community-led approaches (see Wilson, Aber, et al. 2018).

Taken together, principles of "voice" and "disciplinary self-critique" can help bring techniques of *counter-storytelling* and *counter-mapping* into the fold of CBPR, policy, and public communication for EJ (see chapter 6). As Delgado (1989) explains, counter-stories "can show that what we believe is ridiculous, self-serving, or cruel . . . can show us the way out of the trap of unjustified exclusion . . . [and] can help us understand when it is time to reallocate power" (2415). Counter-mapping "challenge[s] dominant ways of conceiving the landscape and the socio-political interests they represent" (Willow 2013, 872). These approaches are both destructive *and* productive: they help us to interrogate and dismantle narratives that curate and incubate exclusion and oppression, and (re)imagine and act to pursue just and anti-oppressive alternatives. For example, these approaches can reframe the structural determinants of environmental health as the product of ongoing colonization, racism, and exploitation, rather than individual genes, lifestyles, and bad fortune.

This capacity for counternarratives could enable deeper engagement with the PHCRP principle of "social construction of knowledge"—referring to "the claim that established knowledge within a discipline can be re-evaluated using antiracism modes of analysis" (Ford and Airhihenbuwa 2010, 1394). And in this regard, public health researchers working on EJ projects would do well to reflect more on Smith's (2021) work on decolonizing knowledge production and curation. Particularly, Smith's reflections on notions of (mis)representation and commodification of knowledge(s), which resonate with PHCRP, offer guidance on how to "unsettle" research power dynamics that often function to silence, erase, or co-opt community knowledges for outsider benefit. Core areas for decolonizing considerations include decisions about which EJ research topics get studied (i.e., who sets EJ research agendas), which methods are chosen and who choses them, which forms of data are prioritized, whose knowledges and perspectives are centered/valued, who owns and/or has access to EJ research data, and who materially benefits most from the research, for example, financially, professionally, socially. In short, decolonizing demands consideration of far-reaching changes in control over research agendas, methodologies, and research ethics, as well as reconciling dominant and

traditional ecological knowledges and reconceiving just relations among people and other nature.

Simultaneous with these considerations is the imperative of more expressly and thoroughly orienting CBPR for EJ around *intersectionality*. The ten PHCRP principles emphasize intersectionality within EJ, which requires that researchers not only "center the margins," but *center the intersections*. This means recognizing that varying configurations of overlapping environmental and social oppressions—for example, along race, class, and gender lines—necessitates varying configurations of "voice," methods, and knowledges to be centered within any one specific EJ concern. Engaging the antiracist and decolonizing principles discussed here can help public health researchers become more responsive to EJ scholars who have called for greater attention to matters of intersectionality (Alvarez and Evans 2021; Ducre 2018; Malin and Ryder 2018). Deeper consideration of these concepts should prompt CBPR to pursue new research designs, methods, and forms for communicating results and recommendations.

Centering Placemaking and Power

As discussed above, CBPR-oriented place-health research represents perhaps the best expression of public health research for EJ. However, much place-health research tends to *de*-place EJ relationships, failing to examine how they are rooted in economic, political, and social processes that shape the spatial distributions of environmental risks and opportunities. For example, de-placing research might measure cross-sectional exposure to air pollution but not track historic and present policies and practices related to environmental deregulation, land use, transportation policy, greenspace, and housing. Cross-sectional research that ignores the mechanisms and manners through which place is actively made, unmade, and remade over time presents as ahistoric, apolitical, and power blind— ignoring critical aspects of how environmental exposures are (re)structured over time and space.

In response, recent theorizing emphasizes how the process of *placemaking* is shaped by physical, material, symbolic, and discursive policies and practices, with "place" understood as an inherently political site of continual contestation (Allen, Lawhon, and Pierce 2019; Petteway 2022). Thus, placemaking must be understood as social, political, material, and symbolic/representational, with processes that structure fundamental relations of space, property, and capital that undergird place-health contexts across communities and geographies. In settler-colonial states such as the U.S., the (un/re)making and taking of place are highly racialized, which shapes the spatial sorting and organization of environmental privilege and risks in residential, occupational, and recreational places (Kent-Stoll 2020; Neely and Samura 2011; Powell 2007). These interrelated notions can help guide CER in naming power and explicating the many factors that shape the place-based contexts of health inequities and EJ over time.

Reimagining What Counts as "Environmental"

Public health can further advance CER for EJ by expanding its focus on deficits-oriented physical and chemical exposures to include more sociospatial exposures, including positive "exposures" to places and spaces of joy, inclusion, love, healing, and resistance. Sociospatial exposures are inclusive of a broad range of social interactions and relations that can act as environmental stressors or destressors, from experiences of discrimination based on gender, race, disability, and sexuality, to aspects of gentrification, displacement, dispossession, and place-attachment and memory. We limit ourselves to discussing just a few potentially important EJ-related examples here.

Policing.   As Simckes et al. (2021) outline, the population health impacts of exposure to various aspects of policing can be quite substantial—especially given historic and present contexts of racialized police violence. The near omnipres-ence—or potential/threat of presence—of police within neighborhood, work, retail, recreation, and education environments makes policing a rampant, even continuous, environmental exposure. The physical and psychological harms of racialized policing—both direct and indirect—are well-documented in public health scholarship (Bor et al. 2018; Lett et al. 2021; Turney and Jackson 2021), as are harms from policing of racialized immigration status (Asad and Clair 2018; Patler and Laster Pirtle 2018). If people of color can be surveilled, harassed, pursued, apprehended, and killed in any place for any reason, then policing must be recog-nized as a toxic environmental exposure—one that harms health, for example, via stress pathways related to anticipatory anxiety and allostatic load.

Alang et al. (2021) urge public health to integrate measures of exposure to police brutality and other indicators of structural racism and White supremacy into routine health surveillance research. We can imagine the development of a policing-related version of the well-known Toxic Release Inventory (TRI)—a toxic police inventory, which maps, tracks, and monitors spatialized practices of (racial-ized) police surveillance and aggression as duly acknowledged environmental exposures. There would be an important role for CER in creating this inventory, which could include crowdsourced maps of street-based police harassment, GIS data that show routes and locations of experiences of "driving while Black," and crowdsourced location data for mapping police encounters in residences, work-places, and recreational and educational spaces.

Spatial Stigma.   Public health researchers would also do well to closely examine spatial stigma (Halliday et al. 2020; Keene and Padilla 2014). Notions of stigma are well-known and researched within public health in relation to issues such as HIV, obesity, smoking, sexuality, and disability. Spatial stigma, however, presents a par-ticularly important form of stigma for EJ because stigma associated with a place

or space can act as an environmental stressor (Keene and Padilla 2014; Tran et al. 2020). Moreover, the ways a place or space is (mis)represented in research can function to amplify or counter such a stigma (Cairns 2018; Graham et al. 2016). This last point is especially important within public health research, which has a proclivity to focus on deficits and problems of places. In research on Black communities, for example, the representation of place can be "swallowed up by the very death and decay that is bolstered by the hard empirical evidence of Black geographic peril" (McKittrick 2011, 951).

Some CER partnerships have grappled with the dangers of stigmatization by prioritizing community partners' control over how potentially damaging information is disseminated (Minkler, Pies, and Hyde 2012), or by choosing projects that actively destigmatize communities (Gutberlet and Jayme 2010; Tremblay and Jayme 2015). At a minimum, public health research needs to begin each CER project by exploring potentially stigmatizing impacts on relevant communities with community partners, and incorporating their considerations to shape the research agenda, questions, and dissemination plan from the start.

Related to, yet distinct from, spatial stigma is the notion of "the white space," which Anderson (2015) describes as "settings in which Black people are typically absent, not expected, or marginalized when present" (10). The racialization of spaces in countries such as the U.S. means that Black, Brown, Indigenous, and other people of color will often be seen *as* the potential environmental threat when moving through White-dominated or White-associated spaces. The White gaze of fear and stigma attaches to and travels with people of color, who are often well aware of this surveillance when moving through space. This of course has direct implications for considerations of policing as an environmental exposure, but also for considering White space itself as a discrete exposure. Here, we can imagine community-engaged place-health research at the intersections, for example, of structural racism, intersectionality, allostatic load, and life course—making use of activity space approaches to assess White spaces as an EJ exposure, building on the work of Kwan (2013), Wong and Shaw (2011), and Candipan and colleagues (2021), and using community-led methods like participatory GIS and photovoice.

Indigenous Lands and Spatial Healing.   Ancestral and Indigenous knowledges reveal that connections to land and nature are healing (Redvers 2020). However, due to colonization, Indigenous peoples now endure some of the gravest health disparities in the U.S., which include cancer, cardiovascular disease, infant and maternal mortality, substance abuse, and depression (Echo-Hawk 2019; Paradies 2016). Public health CER can recognize historical and ongoing injustices for Indigenous people, and work to reclaim and reimagine their relationship to land, food, medicinal plants, and sacred sites. According to the Urban Indian Health Institute

(UIHI), EJ and health equity efforts have overemphasized Western cultural norms, focusing on the role of institutional and structural barriers to health care with little attention to cultural and traditional knowledge systems (Echo-Hawk 2019). Instead, UIHI is working toward health equity for American Indian / Alaska Native populations by "breaking barriers, building beauty, and restoring culture," by supporting tribal communities in "exercising self-determination and reclaiming their unique cultural knowledge systems for the health of the future generation." In their work, "data, research, and evaluation are cultural values and ancestral practices, and we are reclaiming them to be used for Indigenous people, by Indigenous people" (para. 9).

As one of 12 Tribal Epidemiology Centers providing research services to tribal governments and U.S. governmental agencies, UIHI is one example of the growing Native American health infrastructure. Within this infrastructure, tribes and intertribal organizations have developed their own extensive research capacities, including tribal institutional review boards with their own research ethics protocols. Native and other researchers in academia and government can collaborate with these organizations, and should expect to do so as junior partners or co-principal investigators.

CONCLUSION

This chapter has sketched out several ways in which public health can evolve into a more courageous, politically attuned partner to communities struggling for EJ. The field has established a solid base for this work in the newly centered goal of equity in the 10 Essential Public Health Services, and traditions of CBPR, social epidemiology, place-health research, and health impact assessments. Now, public health CER must engage in deeper and more creative thinking about how to enact antiracist and decolonizing principles; enrich social epidemiology with the study of placemaking and activity spaces; expand conceptions of environmental health to include EJ issues provoked by sociospatial exposures to policing, spatial stigma, and White spaces; and take inspiration from Indigenous efforts to reclaim their lands, cultures, and health infrastructures.

This requires imagining new futures for both the science and practice of public health for EJ—including research translation and political engagement (e.g., Galea and Vaughan 2019; Morgan-Trimmer 2014; Schwartz et al. 2016). This involves remembering that public health research is ultimately about healing bodies, lives, and communities, not merely analyzing samples and specimens. This will be facilitated by recruiting and training a new generation of researchers whose lives are rooted in embodied experiences of environmental injustice. This also demands that all researchers develop capacities to question their own positionality in relation to the EJ communities with whom public health should collaborate

reciprocally and respectfully, and to the field. Who is producing EJ knowledge, taking up the discourse space, and driving (or stifling) policy and research priorities? Who has the power to use, (mis)represent, and discuss whose bodies and lives in research? Do researchers possess the care and courage—not just the scientific curiosity and capital—to fight for environmental justice?

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Ground Truths shows how community-engaged research contributes to environmental justice for Black, Indigenous, people of color, and low-income communities by centering local knowledge, building truth from the ground up, producing data that can influence decisions, and transforming researchers' relationships to communities for equity and mutual benefit.

The book outlines the main steps in conducting community-engaged research, evaluates the major research methods used, and addresses institutional barriers to this kind of scholarship in academia. A critical synthesis of research in many fields, *Ground Truths* provides an original framework for aligning community-engaged research and environmental justice, and applies the framework in chapters on public health, urban planning, conservation, law and policy, community economic development, and food justice and sovereignty.

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