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Racial Disparities in Cancer Care | Access to Care for Transgender Veterans | Hepatitis C Among US Veterans | Battling Tobacco Use at Home | HEALTH EQUITY | How Might the Provision of Culturally Competent Services Be Enhanced for American Indian and Alaska Native Veterans? | Improving Trends in Gender Disparities | Suicidality Among Hispanic and African American Veterans Following Surgery

APHA
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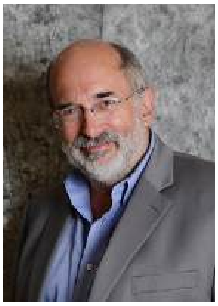
George Floyd (October 14, 1973–May 25, 2020): Make Future Public Health Better Than the Past



One year later, George Floyd's murder requires reflection from public health. The epidemic of police violence and the criminalization of Black lives have existed for generations. The murder of George Floyd on May 25, 2020 was not new information. It was the same suffering and struggle of one fifth of the population of the United States set against the backdrop of American life: the militarization of that life and of our police, the privatization of our prisons, the debasement of our journalism and our media, the corporatization of our professions, and the commercialization of our culture.

Americans made our biases about race known in the US Constitution, where slaves were counted as three fifths of a person. Racial disparities in health have never been a secret to any public health practitioner or any American. But our biases are so ingrained that too many Americans did not and do not see what is right in front of us. However, departments of health have critical tools we can use to help end racial disparities in health so that we, as a nation, provide optimal health to all Americans.

Boards of all health care organizations and institutions regulated by departments of health should be at least 51% people of color, at least until health disparities are eliminated in each community. The current self-selected boards have failed to achieve equal treatment and equal outcomes. Now is the time to try another approach. Targets and timelines can be used to hold institutions accountable for achieving these goals, with fines and de-licensure the consequences for failure.

Departments of health should also measure, track, and report disparities in access to care and disparities in treatment. Fines and de-licensure should be the consequences for allowing disparities in access and disparities in treatment.

Health professions and health care organizations should have equal employment by race and culture. Public money, via Medicare, Medicaid, the Health Resources and Services Administration, the National Institutes of Health, and the Centers for Disease Control and Prevention, provides most of the revenue for nonprofit health care organizations in the United States. These health care organizations should be held accountable for equal employment, equal treatment, and equal outcomes.

It is long past time to replace spending on unnecessary and for-profit medical care with spending on education, housing, the environment, and community development. Departments of health can use measured health outcomes to confront policymakers with the health impacts of this irrational spending—and help provide optimal health to all Americans in the process.

We cannot bring back George Floyd or the thousands of people who were murdered or lynched by our police or our fellow citizens. We cannot reverse the impact of personal and institutional racism on the health of so many of our fellow citizens. We cannot bring back the hundreds of thousands who died unnecessarily from COVID-19.

But we can change and make the future better than the past. AJPH

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9 Years Ago

Social Justice in Pandemic Preparedness

Social justice requires the use of fair procedures, but fair procedures do not suffice to promote social justice, despite hopes that they will. Unless supplemented by a substantive understanding of justice and injustice, procedural notions of justice tend to rely on neutral decision-making. In other words, fairness is associated with lack of bias: decision-making strives to be blind to race, ethnicity, class, gender, and other social categories. . . . Ironically, when applied in a systematically unequal social context – one rife with health disparities – this approach disproportionately affects the already disadvantaged, perpetuating and exacerbating existing disparities. . . . Those who will suffer disparate effects of pandemics or other public health disasters should receive preference in the distribution or rationing of resources, so that they may be protected from further harm.

From AJPH, *April 2012, pp. 587–590, passim*

12 Years Ago

Pandemic Influenza and Screening in Jail Facilities and Populations

The data on morbidity in jails indicate that jail inmate populations contain many individuals with a compromised immune system. This factor may facilitate the spread of infection. Although jails are able to provide limited medical care, their capacity for screening for medical and mental health problems appears to be greater than their capacity to provide care. Planning for a pandemic outbreak should consider the health screening role for jails. One approach would be to develop new instruments for screening and to use public health resources to assist in training and implementing screening procedures. But implementing strategies to prevent the possible spread of infection may be difficult to put into practice unless a jail facility is able to screen and group its inmates according to infection status.

From AJPH, *Supplement 2, October 2009, pp. S339-S344*

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Prepared by Stephen A. Lewandowski, Vrinda Kalia, Megan E. Marziali, and Luis E. Segura. Columbia University, New York, NY. Correspondence should be sent to the AJPH Global News Team at les2196@cumc.columbia.edu.

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Acupuncture's Radical Roots and Political Branches

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See also Meng, p. 896.

When a third of Americans are fearful of the COVID-19 vaccines, even in the face of the disease's expanding and terrifying death toll, we are reminded that biomedicine's triumph in the health care marketplace has never been total.[1] Indeed, Americans of every type have consistently turned to "alternatives" or hedged their health bets with a mix of botanicals, purges, prayer, meditation, cannabidiol tinctures, and the like. Nothing in the past 50 years has signaled this use of alternatives more than acupuncture. What has not been so clear, in part, is how much radical political struggles were key to the 20th-century turn to this ancient Chinese modality.

Histories of the Black Panther Party and the Young Lords have demonstrated the centrality of health concerns to their political efforts. Sometimes it was capturing a health department x-ray truck to do screening for tuberculosis in the East Harlem neighborhood of New York City, or opening up free clinics to provide desperately needed services that were ignored by mainstream medical institutions. Such efforts provided the standard primary care that was missing. With a turn toward acupuncture, however, many of these activists hoped to develop a real alternative to the medical armamentarium. As Eana Meng describes in "Use of Acupuncture by 1970s Revolutionaries of Color: The South Bronx 'Toolkit Care' Concept" (p. 896) in this issue of *AJPH*, this allowed a "healing process" that combined a new technique with political education.

Knowledge and use of acupuncture existed, although erratically, in the United States in the 19th century. It gained contemporary attention after *New York Times* reporter James Reston's front-page July 1971 story of his experience of having acupuncture, instead of anesthesia, during his emergency appendectomy in China.[2] The subsequent visiting US medical teams in China, as relations with the United States opened up, aroused even more interest in some in the medical establishment. However, for 1970s US radicals, already well versed in Chairman Mao's *Little Red Book* of aphorisms and knowledge of China's "barefoot doctors," acupuncture had medical and political appeal.

As Meng demonstrates, this interest sprang up in the early 1970s in both Oakland, California, and the South Bronx area of New York City, brought by radicals who knew healing required community control linked to self-empowerment, not just medicines. As trips to China became possible, medical practitioners on the left—physicians and lay people alike—began considering acupuncture's application to their communities' needs, especially to curb drug addiction. Auricular acupuncture, combined with caring practitioners and a political analysis of the reasons for so many drugs and addicts in Black and Latinx communities, became an intriguing new treatment of choice.[3] Throngs appeared for this care at a clinic in Oakland, California, and especially in what became known as Lincoln Detox in the decrepit Bronx public hospital undergoing enormous community and practitioner demands for improvements.[4] It could be used instead of the more standard methadone, which substituted another drug for heroin, was carefully monitored, and required daily visits.

Questions exist on whether auricular acupuncture worked then, or now, as its use has spread through the global efforts of the National Acupuncture Detoxification Association that grew out of the original Lincoln Detox program. Part of the problem is what counts as an end point to measure. As medical anthropologist Linda L. Barnes notes, with acupuncture there is the difference between "efficacy—outcomes measured in 'placebo-controlled, experimental conditions,' and effectiveness—'positive perceived outcomes and self-reported improvements in quality of life.'"[5(p254)] With the Lincoln Detox program in its earliest iteration, perhaps its success could have been explained by a number of nonmedical factors, and not just the acupuncture. Practitioners actually paid attention to the patients, with whom they shared a common heritage; provided them with an explanation for why they had turned to drugs; and promised them the possibility of a different kind of life. This was done as they put acupuncture needles in their patients' ears, which may have reduced their anxiety enough to let them heal.

The problem is often that we do not do enough to measure social and political interventions when they are used in conjunction with medical ones. When I served on a US Food and Drug Administration (FDA) Obstetrics and Gynecology Devices Panel in the mid-1990s, for example, we were asked to evaluate a device called a "home uterine activity monitor." It was to be given to a parturient woman who seemed to be in danger of going into preterm labor. If the woman felt contractions before her fetus's viable due date, she was told to put on the monitor, lie down and send the tracings over a modem, and then call a nurse, who would tell her whether to come into the hospital for tocolytic drugs to stop the labor. As a feminist health activist, I wondered aloud at our FDA meeting whether a woman being able to explain to her family she had to lie down and then talk to a sympathetic human being on the other end of the phone made the difference in outcomes, rather than the monitoring per se or the drugs. The chair of our committee told me no one would pay to evaluate this possibility or, at least, had not yet figured out how to monetize such a simple intervention. And the monitor was never evaluated separately from that caring voice on the other end of the telephone line nor the ability of the pregnant woman to rest.[6]

In the case of the original efforts with auricular acupuncture in Oakland and the South Bronx, the intervention was never measured outside its political context. Those close to the Panthers, other radical Black groups, and the Young Lords understood that healing was never just an individual event and that the cure of drug addiction was not merely to provide another drug separate from an explanatory and political framework. Individuals had to be put into a political public health context.

This history of the beginnings of acupuncture in the United States reminds us that calls to just "follow the science" avoid considering how the science itself is developed, measured, and distributed. Medicine and public health are always embedded in a political context. Mistrust is a reasonable response to the abuse and disdain many Americans have experienced at the hands of that science. If the acupuncture story teaches us anything, it is that needles alone cannot provide all the healing we need. AJPH

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CONFLICTS OF INTEREST

The author has no conflict of interest to declare.

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Reducing Disparities by Restructuring Health Care: Brazil's Family Health System Shows the Way!

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See also Kessler et al., p. 927.

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Crafting policies aimed at mitigating disparities is difficult. Instituting them is complex. At every point in the process, politics can derail the plan. Reports assessing policy are often framed as health services research, discounting its real value as a tool. It is possible that a policy can be well crafted, initiated, and not derailed. Health services research is the way to measure disparity reduction. "The Role of the Family Health Strategy in Reducing Social Inequalities in Mortality Risk Among Older Adults in Bagé, Southern Brazil" by Kessler et al. (p. 927) is well worth a read. This article is timely because universal design is an important response to the global pandemic.[1] This design hits all the marks with an added bonus: it meets the standards for the conduct of ethical research.

Figure 1 succinctly illustrates the gap between output from the research community and the needs of practitioners addressing health disparities in their clinical panels.[2] Family health strategy (FHS) is a Brazilian policy. It was crafted to restructure the primary health care system. That is no small undertaking. Strengthening primary care to achieve health for all was the main strategy. The sources of data shown in Figure 1—clinical trials, observational studies, qualitative interviews, expert opinion panels, case studies, and regulatory guidance—are all necessary for delivering care that diminishes health disparities. However, they are not sufficient.

Health disparities are not new. They have evolved over time. Unfortunately, it takes time to resolve them. FHS is designed to serve the poorest, most vulnerable, and least assisted areas by promoting universal access. Universal access to quality care is the long road to the reduction of health inequalities. FHS' rollout was a political decision based on social vulnerability, and not an elective choice. The FHS model has a geographic framework. Enrollees are assigned in areas in units of 1000 families with dedicated community health workers. FHS bundles home health care, monitoring, and follow-up care delivered in the neighborhood and individuals' homes, and targets actions toward the family and individuals in the community. Health care systems cannot avoid one's exposure to social and lifestyle risk factors. They can reduce health inequalities by integrating care. The US system—Medicare, Medicaid, and private insurance—misses this point. Health care financing in the United States fragments service and promotes disparities for all.

The tools used in public health are simple.[3,4] The requirement for a longitudinal design brings more complexity to the evaluation. Before a policy reduces gaps in death rates, there are discussions of sample composition, ascertainment of death certificates, and choice of statistical models. In particular, statistical model choice can be difficult. Here is a sample of one reviewer's comments:

> Was the proportional-hazards assumption checked before choosing Cox regression?
>
> Response: Thank you for your comment. Yes, the proportional-hazards assumption was checked before choosing Cox regression. We had two covariates significant for the test of proportional-hazards assumption. However, we have decided to keep Cox regression because, first—the covariates significant for the test of proportional-hazards assumption were not our main exposures, but they are important risk factors for mortality in our conceptual framework. Second—Cox regression's function provides better estimates of survival probabilities and cumulative hazard than those provided by the Kaplan–Meier

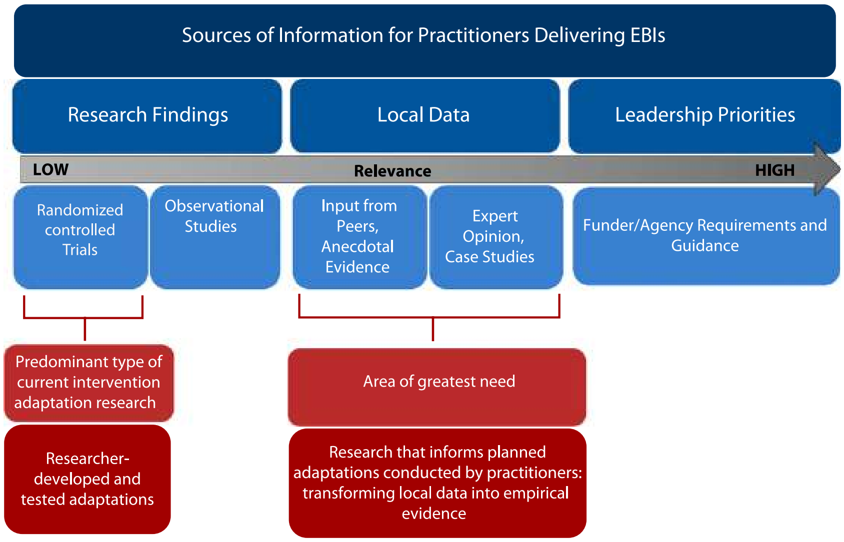

FIGURE 1— **The Mismatch Between Information Relevant to Practitioners and Information Generated by Researchers**

Note. EBI = evidence-based invervention.
Source. Alvidrez et al.[2(pS95)]

> function. We were interested in showing the size of the risk of dying between time 0 and time *t*, or the probability of surviving to time *t*.

This is a necessary back-and-forth. Health services research is not simple. Its rigor is critical to disparities science.

Ethics review of medical research is a global standard. In 2013, my colleague and I proposed that health care policy needs a Belmont-style ethics review.[5] The Belmont Report of 1978 articulated three general principles—*respect for persons, beneficence, and justice. Respect for persons* suggests that participants retain their autonomy. It is the basis of informed consent. Modification of this principle in the policy arena might look like community-wide education about policy change. *Beneficence* strives to maximize benefit and minimize risk. The FHS policy realizes this principle through its emphasis on continuity of care. FHS begins and ends in the family home. Finally, *justice* highlights two key questions. Who stands to benefit from or bear the burden of change? How should one distribute the potential benefits and burdens of the policy?

This report reaches ethics standards through its fundamental focus on mortality. Does FHS reduce the number of deaths among older adults by improving the structure of primary care? This study showed a greater effect of FHS on social inequalities in all-cause and avoidable mortality than was expected. The results also confirmed that health care utilization in urban poor Brazilian populations was associated with lower mortality risk, with greater reductions among more deprived racial/ethnic and socioeconomic groups. The principles of beneficence and respect were further confirmed in their report that 53.4% of household nationwide were enrolled in FHS. This suggests that increasing numbers of households made an informed choice to share the risks and benefits of FHS.

Death rates shine a bright light on specific areas of health care disparities. Throughout its history, public health has made reducing mortality risk its holy grail. This study of FHS and its impact on mortality shows an area of health disparities research needing specific focus on premature mortality in middle age. Population health effects are difficult to measure. However, targeted policy is the only path to influencing population health. As I mentioned before, health care system restructuring to diminish disparity is difficult to craft, is complicated to start, and can be derailed. Premature mortality leads to bereavement. Simply put, bereavement is the loss of someone very dear. Research provides evidence that loss is a threat to population health and vitality.[6] Groups who experience health disparities have well-documented rates of excess mortality. Excess mortality is not just a personal issue; it is population health requiring its own policy. AJPH

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Partisan and Other Gaps in Support for COVID-19 Mitigation Strategies Require Substantial Attention

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See also Barry et al., p. 937.

In their article in this issue, Barry et al. (p. 937) offer a useful portrait of American public opinion about COVID-19 mitigation efforts. Using data from a nationally representative panel study, with surveys in April, July, and November 2020, they describe levels and predictors of support for social distancing, indoor mask wearing, and contact tracing, three important behavioral tactics to control viral transmission. Each of these behaviors remains important in 2021, even with the onset of mass vaccination.

THE GLASS HALF FULL AND HALF EMPTY

As with many investigations of American public opinion about significant policy issues, the authors' data provide multiple stories. One story—the "glass half full" story—tells us of robust public support for adhering to evidence-based tactics to reduce coronavirus transmission. For all three public health measures and across all time periods, support exceeded 70%. Although there was a decline between April and July in the public's perception that social distancing is important (from 89% to 79%), the level of support remained substantial (78%) even in November, when "pandemic fatigue" had set in. Support for mask wearing held steady between July (80%) and November (79%), as did that for contact tracing (declining only slightly from 74% to 73%). Although public health authorities would prefer these numbers to be closer to 100%, it is rare to see such high levels of agreement among the US public, and this support signifies that in spite of the uncoordinated and insufficient response at the federal level, the public as a whole was committed to public health strategies throughout 2020.

Digging deeper, however, as Barry and colleagues' nuanced analysis allows us to do, provides the second—"glass half empty"—story. The authors observed large and persistent gaps in support by partisanship, age, and trust in science. For instance, Democrats' support for social distancing was roughly 30 percentage points higher than that of Republicans across all time points. Although there is much accumulated evidence on partisan differences in a host of COVID-19 outcomes throughout 2020 (e.g., perceptions of the seriousness of the problem and support for public health actions, mask wearing, and social distancing),[1,2] Barry and colleagues' analysis is novel because they examined partisan differences with more nuance, by overlaying two other attributes that are distinct from partisanship: a fixed (vs fluid) worldview and trust in science. They found that gaps between people who trust science and those who do not are larger even than partisan gaps, for example a 45-percentage-point gap in November in support of mask wearing.

STEPS ON A PATH FORWARD

Although it is tempting to look backward to trace the many reasons why these ideological and political differences in response to COVID-19 emerged (as others have done[1,3]), looking forward must be the focus of our efforts as public health researchers and practitioners. Addressing the partisan-related gaps in COVID-19 opinion should be a priority for 2021, particularly as evidence continues to emerge about sustained partisan differences in attitudes. In mid-January 2021, survey researchers at the Kaiser Family Foundation found a 32-percentage-point difference between Democrats (64%) and Republicans (32%) with respect to who had already received or would get the vaccine as soon as possible.[4] As Barry et al. argue, "developing persuasive communication efforts" to target these key groups should be a critical priority. But what should this look like, specifically? What investments or interventions should the field of public health pursue?

First, resources devoted to national, state, and local communication campaigns should be increased. The Ad Council and the federal government coordinated a public service announcement campaign throughout 2020 (including one called #AloneTogether tailored to young adults, an important group identified by Barry et al.), and such efforts must be amplified.[5] Messages should be based on communication science principles and involve strategic engagement with specific groups.[6]

As experts have emphasized,[6] engagement with communities of color is a high priority; addressing the concerns of young people, Republicans, and those with low levels of trust in science is also critical. What are their values and concerns regarding COVID-19? How can these issues be addressed honestly and transparently? And which messengers do they trust most to deliver such messages? Surveys consistently identify personal health care providers as the most trusted sources of COVID-19 information,[4] signaling that communication efforts not only must take place through strategic health communication campaigns but must also involve individual social and clinical networks.

Second, within local networks, physicians and other health care workers who are trusted among the public must be a key part of messaging, supporting the need for toolkits and messaging guides for local health care providers and clinics. When the public observes peers, community leaders, and health care providers (across the political spectrum) engaging in mitigation behaviors—and when trusted health care providers take the time to share their recommendations thoughtfully and honestly—these steps will contribute to a public understanding that vaccination (or masking, social distancing, etc.) is the nonpartisan norm.

Third, as we have learned from decades of public health work, effective health behavior promotion is more than just health communication. Health communication in the absence of other system change can perpetuate inequalities,[7] whereas tailored information combined with supportive environments can promote behavioral and norm shifts. If we want to see more mask wearing, the federal government should invest in more mask production and ensure that high-quality masks are available to everyone by delivering them directly to people and by making them freely available at the places people go (e.g., grocery stores, clinics, take-out restaurants). Similarly, investing in vaccine implementation in locations that are easy to access by target populations (including Republicans) with few barriers is critical.

Fourth, we need to develop and fund social science efforts to identify ways to "depolarize" public health or, more accurately, to confront the asymmetric support for evidence-based public health actions between Democrat and Republicans. Polarization has been an especially prominent feature of health policy for the last 10 years, since the passage of the Affordable Care Act.[3] The persistent partisan patterning of support for all aspects of COVID-19 as well is a concerning sign that this politicized interpretation of public health is "sticky," that is, potentially attached to public health issues for years to come.[8]

If the partisan differences observed in COVID-19 opinions spill over into other public health efforts in the future, this is a grave threat. Public health as a field must mobilize to identify interdisciplinary evidence-supported ways to overcome politicization, including through work with professional communicators and journalists. Researchers in political science, for instance, have examined message strategies to reduce the likelihood of the public processing information through a partisan lens[9]; similarly, messaging work by the de Beaumont Foundation provides critical lessons upon which to build.[10]

Finally, public health scientists must focus on evidence-supported ways to build and sustain public trust. Credibility comes from not only perceived expertise over a topic but also perceptions of shared interests and values.[11] Increasing both expertise and shared interests will require that scientists be centered in federal, state, and local policy responses (not framed as opponents); that they honestly and transparently explain what they know while acknowledging inherent uncertainties; and, above all, that they redouble their empathy toward a public in crisis. AJPH

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Hepatitis C in the United States: One Step Forward, Two Steps Back

Carlos del Rio, MD, and Sandra A. Springer, MD

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See also Holtzman et al., p. 949.

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Hepatitis C virus (HCV) infection is the most prevalent chronic viral infection in the United States, with approximately 2.4 million persons living with HCV infection. Despite not having a vaccine for HCV, the availability of curative direct-acting antiviral agents (DAAs) led the National Academy of Sciences, Engineering, and Medicine in 2017 to conclude that HCV could be eliminated as a public health problem in the United States if considerable will and resources existed to do so.[1]

HCV INFECTION AND THE INJECTION DRUG USE EPIDEMIC

In the current issue of *AJPH*, Holtzman et al. from the Centers for Disease Control and Prevention document the changing epidemiology of acute HCV in the United States between 2010 and 2018 (p. 949). Over the past decade, there has been a decrease in the prevalence of cases of chronic HCV infection, mostly as a result of curative DAA treatments, with a 26% decline in the age-adjusted mortality rate for HCV infection from 2014 to 2018. However, during the same period, the rate of acute HCV infections increased four-fold in men and three-fold in women. This increase in incident infections occurred primarily among young adults ages 20 to 39. Furthermore, this increase was notable because it was also a direct result of the opioid epidemic that has ravaged the country. Although condomless sexual transmission has emerged as the primary mode of transmission of acute HCV among men who have sex with men, injection drug use of heroin was the major risk factor reported in 72% of cases of acute HCV infection in 2018.

The fact that injection drug use is now the major driver of HCV transmission in the United States indicates that any program to eliminate or even control HCV in the absence of a vaccine must directly address treatment of substance use disorders. Because injection of opioids was found to be the major cause of injection drug use–related acute HCV incidence during that period, specifically addressing the treatment of opioid use disorder (OUD) and integrating infectious disease prevention and treatment services with addiction services are critical to eliminating or controlling HCV infection in the United States. Harm-reduction services such as syringe service programs have helped to curb the epidemic of not only HCV but also HIV infection.[2] Importantly, use of medication to treat OUD (e.g., buprenorphine, methadone, extended-release naltrexone) has been shown to reduce transmission of HCV and HIV as well as lead to cure of HCV and increased viral suppression among individuals with HIV infection.[3-6] HCV reinfection is also uncommon among persons who inject drugs on opioid agonist therapy.[7]

A recent report from the National Academy of Sciences, Engineering, and Medicine that evaluated opportunities to improve OUD and infectious disease services outlined a series of recommendations that undoubtedly could impact the HCV epidemic.[8,9] Among them was the elimination of prior authorization policies and removing the X-waiver requirement to prescribe buprenorphine, which would make the effective opioid agonist medications to treat OUD more accessible and available to all who need them. The report also highlighted the need to expand syringe service programs and HCV testing and provide easy access to DAA therapies across community and justice-involved settings. The report identified the need to reduce the stigma of providing addiction-related services across all settings and ensure direct funding to support addiction treatment services as well as associated wraparound services, such as behavioral counseling and infectious disease prevention and treatment services.

Unfortunately, the COVID-19 pandemic emerged at a time when the US response to the opioid crisis was beginning to coalesce, with more persons gaining access to treatment and more patients receiving effective medications for treatment of OUD and HCV infection. Pandemic control measures such as quarantine and isolation and economic collapse have resulted in more people using opioids, particularly synthetic opioids such as fentanyl, and stimulants such as methamphetamine and cocaine, which has led to almost a 40% increase in overdose deaths from June 2019 to May 2020.[10] For persons already receiving OUD and HCV treatment, the interruptions of care—particularly access to medications for OUD—have been disruptive.

The Substance Abuse and Mental Health Services Administration has issued guidance for increasing the ability of opioid treatment programs to transfer to take-home methadone maintenance protocols. The Drug Enforcement Administration has allowed teleprescribing of buprenorphine if two-way audiovisual communication (telehealth) between prescriber and patient is used. However, this change does not help patients without adequate data access plans or allow for transportation-related restrictions. Especially in rural areas, transportation to a pharmacy to pick up a prescription for buprenorphine or to a methadone maintenance program, which is often located in an urban setting, is frequently suboptimal or lacking. Other disparities exacerbated during the pandemic were already noted, including a lack of available clinicians to prescribe OUD medication treatment, such as buprenorphine; a lack of HCV treatment providers; a lack of integrated care programs in which HCV and OUD are treated together, which necessitates patients going to more than one clinic, often physically disparate; and a lack of universal health care coverage, particularly in areas in which needs are greatest, such as the Southern and Southeastern United States. These limitations have exposed well-known racial disparities in health care provision.

As we emerge from the COVID-19 crisis, we need to refocus our efforts on the opioid epidemic. Without an integrated and comprehensive approach to this major crisis, we will not be able to control HCV infection. There must be not only the will to do so but also provision of specific structures (e.g., universal health care and direct state funding) to integrate infectious disease and addiction prevention and treatment services across all settings and help end HCV and related opioid epidemics in this country. AJPH

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The Multiple Benefits of Removing Major Outdoor Air Pollution Point Sources

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See also Komisarow and Pakhtigian, p. 881.

Children's health is a public health priority, and environmental health is a core tenant of public health. Environmental quality is critical for protecting, sustaining, and promoting human and ecological health. Outdoor air quality is vital to our respiratory, cardiovascular, and neurologic health. Although many natural sources as well as human (or anthropogenic) sources of pollutants are in the air, the largest identifiable outdoor point source of multiple pollutants in our modern society is coal-fired power plants. Their emissions are known to have impacts on local, community, regional, national, and global scales. Power plants simultaneously impact surface water bodies, groundwater aquifers, and soil and sediment downwind and downstream.

Copious research appears in peer-reviewed clinical, public health, environmental sciences, and engineering journals concerning exposure to environmental asthma triggers found in outdoor air. Many triggers also are found in indoor air from outdoor sources and separate indoor sources in homes, schools, and childcare centers. Extensive research also appears in the same peer-reviewed literature concerning associations between those exposures and various measures of adverse outcomes defining asthma-related conditions. Susceptible, vulnerable subpopulations include children and adults across multiple age groups. Moreover, disparities—and thus extra vulnerabilities—have existed among racial and ethnic minorities, between urban and suburban and rural areas, and by gender identity. Documented adverse, asthma-related conditions range from daily and nighttime exacerbations of classic symptoms of asthma—cough, wheezing, chest tightness, shortness of breath—to use of controller and rescue or emergency inhaler prescription medication, to more severe metrics such as emergency room or emergency department visits, hospitalizations, and, sadly, deaths. Documented cases include infants and toddlers (i.e., preschool-age children), in whom making a formal diagnosis is harder.[1–6]

The long-term University of Southern California Children's Health Study cohort of school-age children provided evidence of the increased relative risk for developing asthma when boys and girls lived and played outdoors—three or more team sports (i.e., approximately one per season)—in relatively more polluted communities versus in cleaner communities.[7] The study researchers also reported similar evidence specific to estimated traffic-related outdoor air pollution exposure at home and at school but did not report any other specific outdoor point, area, or mobile sources of known environmental asthma triggers.[8]

With respect to large point sources of outdoor air pollution, such as coal-fired power plants, studies have been conducted in the United States with respect to respiratory health, including childhood asthma.[9–11] However, evidence remains limited, and, on more serious adverse outcome measures (e.g., asthma hospitalizations),[9] this evidence does not include indicators of more frequent symptom exacerbation caused by everyday exposure to outdoor air environmental asthma triggers emitted by specific sources, even if controller medications are prescribed and used based on asthma action plans.[12]

REDUCE POTENTIAL EXPOSURE SOURCES TO IMPROVE A CHILD'S LUNGS

In this issue of *AJPH*, Komisarow and Pakhtigian (p. 881) contribute to the public health and environmental health literature by capitalizing on an opportunity for a "natural experiment." In their retrospective differences-in-differences study design, the authors examined nearly a decade of data (2009–2017) surrounding the period from March to August 2012, when three large coal-fired power plants closed within the city of

Chicago, Illinois. The adverse outcome of interest was emergency department visits for asthma-related conditions (e.g., uncontrolled symptom episodes) among children aged zero to four years. Authors used annual data available at the zip-code level for areas within Chicago. They also determined which zip codes (based on their centroid) were within 10 kilometers ("near") of one of the three coal-fired power plants versus more than 10 kilometers ("far") from each of the power plants. Overall, emergency department visits for children aged zero to four years who lived in zip codes closer to one of the three coal-fired power plants in Chicago declined in the years 2014 to 2017 (similar crude and adjusted rates 2012–2014). This finding is notable, even after considering broader economic factors likely affecting crude and adjusted rates for 2009 to 2011. (Similar trends appeared for "near" versus "far" zip codes even if crude rates were approximately twice as high for "near" versus "far" zip codes.)

EVERY STUDY INFORMS FUTURE WORK

In the study by Komisarow and Pakhtigian, the estimated population exposure was limited and ecologic in nature because it explicitly considered only one major outdoor point source of pollution and no other outdoor (e.g., waste incinerators) or known indoor combustion sources of the same (and other) pollutants. However, the point source was properly described and could be repeated—and ideally improved upon—in future research. The authors used government agency data on daily average wind speed and direction (for each day's fastest two-minute reading at nearby Chicago Midway Airport) and annual reported source emissions, in tons, of multiple targeted criteria pollutants subject to regulation in the United States. The pollutants addressed in this study were particulate matter or $PM_{2.5}$ (particulate matter ≤ 2.5 μm), nitrogen dioxide (as emissions of nitrogen oxides or NO_x), and sulfur dioxide. It can be noted how lead, carbon monoxide, and ozone (secondary pollutant not directly emitted by coal-fired power plants) were purposely excluded.

The authors also did not assess other important environmental asthma triggers found indoors and outdoors in typical urban communities. Nevertheless, the study in a major Midwestern US city has merit. The study provided more public health scientific evidence in support of our nation's decision to move away from larger fossil fuel–based sources of electricity to meet the ever-growing population's daily demands for energy. The authors also generate ideas for future research in the United States involving more people, especially lower-income racial and ethnic minority subpopulations, who live within shorter distances of power plants planned to be decommissioned or which are already shut down. (Note: Sierra Club's Beyond Coal Campaign provides updated information for free online at https://coal.sierraclub.org.) Such studies will not prove causation but, at best, statistically significant associations; however, they reemphasize the value of "natural experiments" conducted with appropriate statistical methods and good data. Future research could combine reported source emissions data and more detailed data on power plant operating capacity with daily and annual average government monitoring station data on outdoor air quality and weather as well as similarly available geographic, population, and hospital-based demographics and health data.

FINAL THOUGHTS FOR PUBLIC HEALTH

In their study in *AJPH*, Komisarow and Pakhtigian reiterated, "Exposure to ambient [outdoor] air pollution, especially among young children, is a serious public health concern" (p. 881). The current federal administration, building on recent federal court decisions, plans to implement and enforce the US Clean Air Act and strengthen regulations concerning emissions of criteria pollutants, toxic air contaminants such as heavy metals, and greenhouse gases from coal- and fuel-fired power plants. As public health professionals—researchers, practitioners, and policy advocates—we must do our part to hold agencies accountable. We must stand by the science (i.e., the peer-reviewed published literature to date) and continue to advance the evidence base with more epidemiologic research with refined exposure assessments. We can support local and state initiatives that work to move away from use of fossil fuels in our society. Efforts include energy efficiency, resource conservation, and sustainable low-carbon, low-emission practices. As a result, we can protect children aged zero to four years before they enter schools, where they will learn how to be safer and healthier citizens of the Earth they inherit. AJPH

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Racism and Xenophobia in a Pandemic: Interactions of Online and Offline Worlds

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See also Hswen et al., p. 956.

In "Association of '#covid19' Versus '#chinesevirus' With Anti-Asian Sentiments on Twitter," Hswen et al. (p. 956) examine anti-Asian sentiment expressed on Twitter by comparing the use of the hashtags #Covid19 and #ChineseVirus, which represent two different ways of labeling coronavirus disease 2019—one that follows the World Health Organization's recommendations for disease names and one that appears to be oppositional to them. Focusing on tweets sent between March 9 and March 23, 2020, the authors found that roughly 20% of the 495 289 hashtags associated with #Covid19 showed anti-Asian sentiment compared with approximately 50% of the 777 852 hashtags that were associated with #ChineseVirus. The authors conclude that this analysis further substantiates the stigmatizing potential of language on social media that connects diseases with specific locations or ethnicities.

History suggests that disease outbreaks have often been accompanied by a rise in xenophobic or racist sentiment.[1,2] Such attempts at "othering" reflect misguided efforts to assign social meaning and responsibility to disease, even though illnesses do not recognize socially constructed categories such as race.[3] Although systems exist to closely monitor and report on COVID-19 infection and death rates, we currently lack the capacity to monitor racism in response to the pandemic. The reported increase in verbal attacks and physical assaults targeting Asian Americans during the current pandemic[4] and the fact that many Asian Americans are reporting fear and anxiety resulting from pandemic-related discriminatory behavior[5] demonstrate the need to track racism and its impact during public health crises.

Although the data presented by Hswen et al. cannot conclusively establish a relationship between Twitter hashtags and hate crimes, establishing such a connection is not necessary for this problem to be taken seriously. Racism and xenophobia—independent of violence—are a concern for public health, as research shows that perceived racism and discrimination have real and significant impacts on both physical and mental health.[6,7]

Furthermore, there is ample evidence showing that stigmatizing language can influence public attitudes and perceptions. For example, a recent experimental study showed that compared with a neutral description of the origins of the coronavirus, descriptions emphasizing a connection with China increased negative attitudes toward Asian Americans and general xenophobia, suggesting that language used to describe a disease can actually activate prejudice and racial bias.[4] Another study tracking changes in implicit bias after conservative media channels began using terms such as "Chinese virus" in March found that after declining for nearly 13 years, implicit Americanness bias (the subconscious belief that Asian Americans are "less American" than European Americans) began to increase—a trend reversal that was especially pronounced among those self-identified as being strongly conservative.[8]

Beyond the greater anti-Asian sentiment associated with #ChineseVirus, the more striking findings of Hswen et al. concern the shifts that occurred when the term started garnering more attention owing to a tweet posted on March 16 (see page 956 for details). The researchers found that during the week of March 9, #Covid19 was more prevalent than #ChineseVirus, and the number of anti-Asian hashtags associated with either phrase was relatively low. After March 16, however, #ChineseVirus overtook #Covid19 as the more popular hashtag, and #ChineseVirus became associated with significantly more anti-Asian hashtags than #Covid19.

These findings are noteworthy for several reasons. First, the analysis demonstrates the ability of prominent "influencers" to shape online discussions. It is important to understand how those with significant public influence use social media to increase their offline impact and, conversely, how they use their real-world status to influence social media discussions. There is a tendency to treat social media as separate from the real world, when in fact social media are such a large part of modern life that they do not simply reflect the real world but can actively shape the attitudes, behaviors, and events that occur offline—as recent incidents, including the January 6, 2021, attack on the US Capitol, appear to have demonstrated. In terms of implications for social science research on racism and stigma, this finding suggests a need to focus on the online activities of prominent individuals and institutions because stigma may cause even greater harm when it is reinforced and perpetuated by those in power.

Second, growth in the use of the hashtag #ChineseVirus and the fact that it became more strongly associated with anti-Asian sentiment after March 16 suggest that the phrase may have become a way to signal identity and ideological affiliation. Hashtags serve as both symbols and an organizing mechanism on Twitter: they are used not only to categorize information and direct attention to topics or events but also to connect individuals and build communities.[9]

Previous research suggests that hashtags enable users to assert their identity through "ambient affiliation" and offer a mechanism for members of "networked publics" to increase solidarity and align around values without directly interacting.[10] In this way, the observed increase in anti-Asian sentiment related to COVID-19, and the funneling of this sentiment to a particular hashtag, is likely not accidental but rather reflects a deliberate enactment of group affiliation after the term began being used pejoratively. Use of #ChineseVirus may have served as a way to take a stance and signal alignment with a particular worldview.

The analysis by Hswen et al. highlights the critical role of social media in shaping the context of language: how certain terms are used online, and by whom, can alter their meaning. Words themselves may be neutral, but the way they are used gives them social and symbolic significance: language is a system for expressing and transmitting belief systems.[11] Because social media are highly embedded in the social fabric, they are powerful platforms for social and cultural production—helping to shape language and, consequently, construct social meaning.

Methodologically, Hswen et al. demonstrate the value of using social media for surveillance of racial attitudes generally and in response to health crises specifically. In addition to offering a low-cost and rapid method for collecting vast amounts of data, social media are less affected by the limitations of traditional research tools (e.g., interviews and surveys) when it comes to gathering information about sensitive or potentially socially objectionable topics. Observing online interactions enables researchers to gauge explicit and implicit biases in an unobtrusive and potentially more accurate way than, for example, self-report. Social media could, therefore, serve as a potentially useful early warning system for racism and bias (e.g., researchers and public health organizations might look at geotagged tweets to better identify geographic patterns in racist sentiment and potential "hot spots"). However, in addition to research using social media to *monitor* real-world attitudes, we need research to better understand how exposure to social media content *influences* real-world attitudes, behaviors, and health outcomes.

Finally, the editorial by Hswen et al. largely focuses on harms, but it is important to acknowledge that social media also has the potential to be a force for good. Although #ChineseVirus was used to promote anti-Asian sentiment, hashtags such as #IAmNotAVirus also emerged during the pandemic to fight stigma and reinforce the shared humanity of Asian individuals—demonstrating that social media platforms can also be powerful channels for condemning and countering racist rhetoric, expressing solidarity with minority communities, and providing support to those who have been targets of abuse.[12] AJPH

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Essential Strategies to Curb COVID-19 Transmission in Prisons and Jails

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See also Tompkins et al., p. 907.

As of February 15, 2021, there were more than 464 000 COVID-19 infections and at least 2400 deaths among incarcerated persons and staff members in prisons, jails, and detention centers across the United States.[1] Efforts to prevent and contain outbreaks in correctional facilities have been stymied by entrenched, hyperpunitive attitudes toward people who are incarcerated—held by politicians and members of the public alike—and by prevailing misconceptions that correctional facilities are self-contained. Although prisons and jails appear to be detached from our communities by fences, walls, and bars, their populations are dynamic. Their walls are permeable. Each day, thousands of persons are admitted and released, and staff return home to their families. As a result, disease outbreaks that occur in prisons and jails rarely stay there. In April 2020, nearly 16% of all COVID-19 cases in Illinois were traced back to Chicago's Cook County Jail.[2]

Despite these risks to the lives of incarcerated persons, staff members, and the communities to which they all return, monetary resources, protocols to control and contain outbreaks, and other mitigation activities in correctional facilities have been woefully insufficient. In this issue of *AJPH*, Tompkins et al. (p. 907) document the point prevalence of COVID-19 among incarcerated persons (30.5%) and staff members (2.3%) in a correctional facility in Arkansas. The authors found that among incarcerated persons who tested positive and responded to a questionnaire about symptoms, 81% were asymptomatic. The findings from this research reinforce the urgent need for widespread implementation of three essential strategies to reduce COVID-19 spread in correctional settings: mass testing, prioritized vaccination, and, critically, decarceration.

MASS TESTING

Mass testing of all incarcerated persons at intake, at release, and before any transfer is necessary to quell the spread of COVID-19. This recommendation is needed because correctional facilities often rely on symptom-based testing strategies, which fail to identify asymptomatic and presymptomatic cases and dramatically underestimate the burden of COVID-19.[3] As demonstrated by Tompkins et al., even robust infection prevention and control strategies are ineffective in quelling transmission in the absence of mass testing.

Mass testing of correctional staff members is also essential to identify and prevent cases. According to recent estimates, prison and jail staff work in one of the highest-risk occupations for COVID-19 transmission, second only to health care work,[4] but testing rates among staff remain low. Tompkins et al. discovered that only 24% of staff members consented to receive COVID-19 testing, and evidence suggests that unpaid leave is a key driver. Mandatory routine testing of staff members and paid medical leave for those who test positive are urgently needed to bolster staff testing and protect incarcerated persons and staff alike.

PRIORITIZED VACCINATION

People who are incarcerated and staff members must be prioritized for receipt of COVID-19 vaccines. This recommendation is necessary because as of December 2020, only 14 states have included incarcerated people in phase 1 of their vaccine distribution plans,[5] and only 15 states have included staff members in phase 1.[6] Some states, such as New Mexico, have explicitly excluded incarcerated persons in jails from initial vaccination phases, citing logistical concerns about completing the two-dose requirement in a setting with high population turnover. Rather than ignoring a critical, high-risk population, states should urge correctional facilities to issue referrals to receive the second dose in the community when needed, creating critical partnerships between jails and prisons and their local public health departments. Given the exceedingly high level of risk in both groups, incarcerated persons and staff members must be prioritized in all vaccine distribution plans.

DECARCERATION

Although mass testing and prioritized vaccination will be important in the coming months, decarceration (i.e., reducing the number of people in correctional settings) will be essential to stemming the tide of COVID-19 infection and death. This recommendation is necessary because although decarceration measures were enacted in several states in initial months of the pandemic, incarceration rates in most jurisdictions now meet or exceed prepandemic levels. This trend is concerning, as evidence indicates that operating prisons below capacity is associated with a reduced risk of COVID-19 infection and mortality.[7] By redoubling decarceration efforts, countless additional COVID-19 infections and deaths can be prevented.

Additionally, by curbing our overreliance on carceral systems, we can begin to dismantle many norms that preserve and exacerbate systemic inequality. Tompkins et al. report that racial groups were proportionally represented among COVID-19 cases in their study. However, at the national level, Black people are overrepresented in carceral settings and among COVID-19 cases and deaths. The epidemic of mass incarceration and the COVID-19 pandemic have inflicted outsized harms on communities of color. By dramatically reducing the number of people behind bars, we can begin to unravel longstanding inequalities that affect Black communities, alleviate the dual burdens of overcrowding and underfunding, and mitigate our largest COVID-19 outbreaks.

CONCLUSIONS

The rapid implementation of three strategies—mass testing, prioritized vaccination, and decarceration—is urgently needed to curb COVID-19 infections and death in correctional facilities and the surrounding communities. At both the federal and state levels, efforts must be made to ensure that adequate resources are available to prisons, jails, and collaborating public health departments to implement mass testing and prioritized vaccination in carceral settings. By aggressively reducing the number of people who are incarcerated, additional resources can be allocated to intensive testing and vaccination programs. Mass incarceration and COVID-19 have created a looming crisis, and these three strategies are the key to saving lives.

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Contact Tracing Could Exacerbate COVID-19 Health Disparities: The Role of Economic Precarity and Stigma

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See also Schneider et al., p. 917.

Recent research on COVID-19 contact tracing programs, including the essay by Schneider et al. in this issue of *AJPH* (p. 917), highlights the enormous challenges and opportunities presented by such interventions.[1–4] The efficacy of contact tracing to reduce COVID-19 transmission hinges not only on a well-resourced public health infrastructure, but also on the public's willingness and ability to participate. Against a backdrop of rising inequality and pandemic-induced economic hardship, public health interventions have the potential to reduce racial and socioeconomic gaps in morbidity and mortality. Alternatively, if interventions primarily prevent transmission and save lives among the most privileged, they will exacerbate health disparities.

Here, I discuss two major challenges to implementing effective and inclusive contact tracing programs in underserved communities. First, economic hardship and marginality present difficult choices that make testing, treatment, and isolation intractable for many American families. Second, the COVID-19 stigma that prevents disclosure and access to index persons' social networks is more pronounced in marginalized communities. In making these arguments, I draw on preliminary findings from two ongoing cohort studies that track social behavior and attitudes related to the pandemic.

DATA SOURCES

The state representative, probability-based Person to Person Health Interview Study (principal investigator: Bernice Pescosolido) was fielded face-to-face in Indiana in 2019 and early 2020 prior to the pandemic, and again in April and May 2020 via phone (n = 994); it is currently in the field for additional follow-up (Russell Sage Foundation, grant no. 2005–24212; principal investigator: Brea Perry). VidaSana is a longitudinal cohort study of social determinants of health among new and established Latinx immigrants in Indiana, many of whom are undocumented and thus not represented in traditional survey designs (R01DE025836; principal investigator: Gerardo Maupome). A supplemental COVID-19 wave was collected from the VidaSana cohort in the summer of 2020 (n = 400). These data sets were harmonized using post-stratification survey weights to match the census demographic characteristics of the Latinx and general populations in Indiana. Estimates were generated using predicted probabilities from survey weighted logistic regression models, controlling for gender, education, and age.

PANDEMIC PRECARITY

As Schneider et al. note, "COVID-19 is penetrating the most vulnerable networks in poor, underserved, stigmatized, and marginalized communities,"[3(p. 918)] with consequences extending far beyond morbidity and mortality. Elsewhere, my colleagues and I have documented unprecedented material deprivation and economic anxiety resulting from the COVID-19 pandemic, which we refer to as "pandemic precarity."[5] Economic shutdowns have sent shock waves through vulnerable communities, weakening economic resiliency and reinforcing disadvantage among groups that had not yet recovered from the Great Recession.

Social and economic insecurity disincentivizes participation in contact tracing efforts. In our survey data, adults with higher levels of pandemic precarity (operationalized using an index of food, housing, and financial insecurity indicators; Cronbach $\alpha = 0.76$) were significantly more likely to agree that inability to work if COVID-19 positive is a barrier to participating in testing programs (Figure 1). Similar patterns were observed for Black and Latinx adults, and especially for recent immigrants, 89% of whom agreed that work disruption is a barrier. In other words, the basic survival

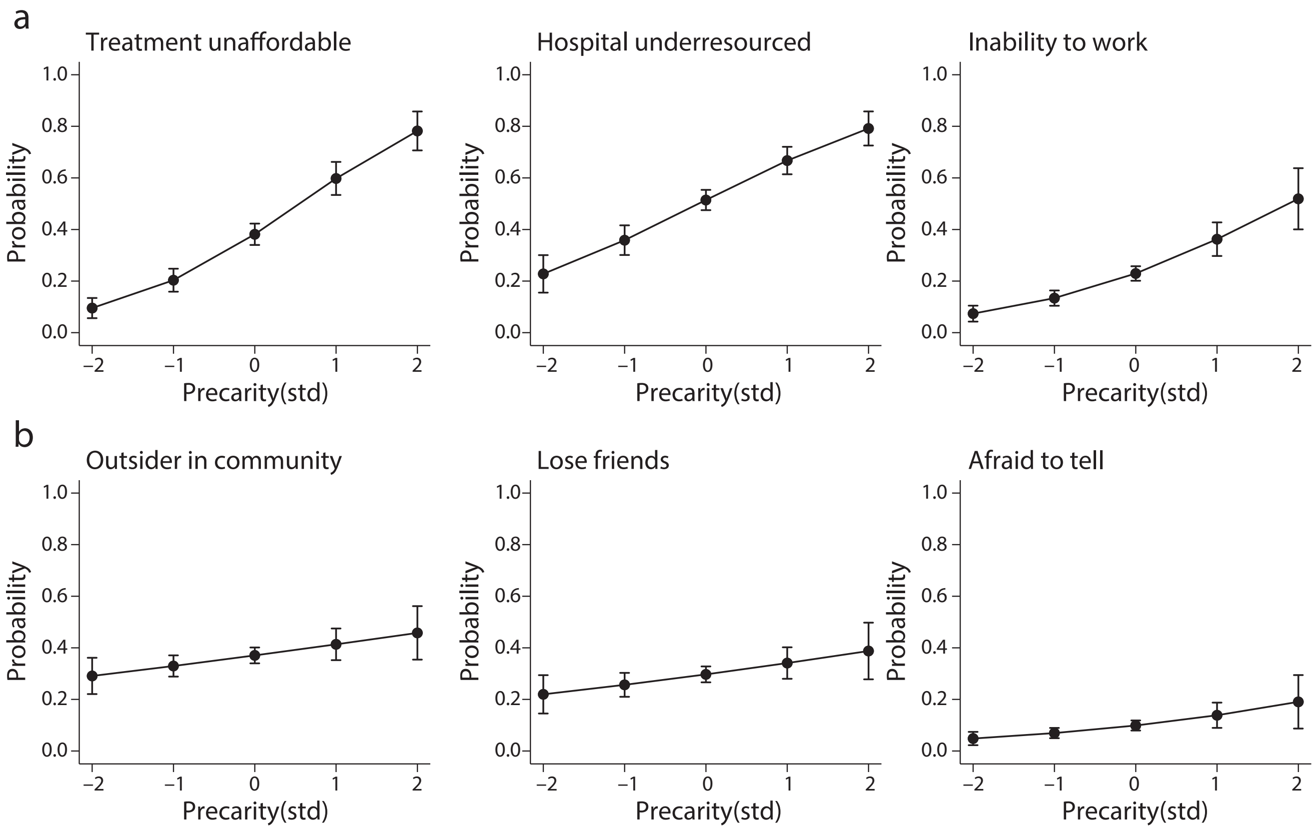

FIGURE 1— **Predicted Probabilities of Factors Affecting (a) Willingness to Participate in COVID-19 Testing Programs and (b) Indicators of Perceived Stigma as a Function of Pandemic-Related Economic Insecurity: Person to Person Health Interview Study, Indiana, April–May 2020**

Note. Predicted probabilities are estimated using multivariate regression models with postestimation survey weights adjusting for gender, age, and educational attainment. All coefficients are statistically significant at $P < .05$ or better. Data are from the COVID-19 follow-up wave of the Person to Person Health Interview Study (principal investigator: Brea Perry). The same size was n = 994.

needs of individuals and families likely outweigh prosocial motivations to comply with contact tracing programs. These same minority and underserved groups also cited as important in testing decisions their inability to afford treatment or to access hospitals that had sufficient resources to care for COVID-19 patients (Figure 1).

Along the same lines, Schneider et al. observe that immigrant communities have been reluctant to access health or social services during the pandemic for fear that doing so would affect their ability to gain permanent residency.[3] In particular, immigrants who are undocumented may avoid interactions with authorities for fear of being detained or deported. For the most vulnerable and marginalized, who do not have insurance or are otherwise unable to access health care, having knowledge of one's COVID-19 status does not improve their ability to achieve a better outcome. Facing constrained choices, participation in contact tracing programs may in fact be an irrational decision for many in the United States.

COVID-19 STIGMA

Stigma is another major threat to the efficacy of COVID-19 contact tracing efforts. Stigmatizing attitudes are most pronounced for diseases that are perceived to be controllable (indicating personal responsibility), when the diseases pose a risk of injury or harm to others (e.g., through contagion), and when uncertainty and unpredictability regarding prognosis create fear—all conditions that apply to COVID-19.[6] The mark of shame associated with COVID-19 positivity provides powerful motivation to refuse testing following exposure, and to avoid disclosing COVID-19 status to others. Stigma may underlie the finding that only 50% of index patients in the Howard Brown Health program provided the name of at least one contact partner.[3]

The organization of personal social networks is likely to exacerbate the challenges of COVID-19 stigma, because people engage in more regular and intimate contact with a core network of family and close friends (i.e., those typically inside a person's COVID-19 "bubble"). Disclosure of COVID-19 status within these core networks is apt to initiate a supportive response, and is often unavoidable at any rate.[7] However, to reduce the chances of an outbreak, it is critical for contact tracing programs to accurately identify and intervene with those contacts that provide a bridge to other networks.[3] An index person is likely to be especially reticent to name these weak, bridging ties as potential vectors of transmission since they pose a greater threat of stigma and widespread disclosure of COVID-19 status relative to trusted core network ties.

Additionally, there is preliminary evidence that COVID-19 stigma may be more pronounced in marginalized and underserved communities. Schneider et al. note anecdotally that a majority of patients reporting COVID-19 stigma were Black or Latinx.[3] Our survey data support this contention, revealing similar patterns across racial and ethnic groups and immigration status. For example, recent immigrants (30%) were nearly four times as likely as nonimmigrants (9%) to report that a person should be afraid to tell other people if they test positive for COVID-19, and were also significantly more likely to report that being COVID-19 positive would make you an outsider in your community (51% vs 36%) and would cause you to lose friends (41% vs 29%). Significantly higher levels of perceived stigma across all items were also reported among adults without a college degree and those experiencing more severe pandemic precarity (Figure 1). To the degree that stigmatizing attitudes circulate disproportionately in the social networks of people of color and those facing economic hardship, contact tracing programs will face greater resistance and be less effective in these communities.

CONCLUSION

Contact tracing may be a viable strategy for reducing COVID-19 transmission rates in the underserved communities where hospitalization and mortality rates are disproportionately high.[8,9] However, history has demonstrated that interventions that are less effective or less accessible to lower-status groups will widen health disparities.[10,11] Where having more knowledge or resources improves the outcomes of a treatment or intervention, the privileged will derive the greatest benefit. Moreover, pervasive racial and socioeconomic segregation in the United States ensures that any such programs that are successful among the advantaged are unlikely to have spillover benefits for the rest of the population.

To avoid widening disparities, it is critical to invest in public health infrastructure that engages marginalized communities, reduces barriers to participation, and redistributes resources. The contact tracing program at Howard Brown Health appears to be an excellent model in this regard, strategically targeting index patients in underserved communities and offering critical social services (e.g., meal delivery, rent and utility assistance) that incentivize participation and foster trust in local institutions.[2,3] Equally important is a robust set of policy initiatives that addresses longstanding health and economic inequalities and strengthens the social safety net for individuals and families in crisis. AJPH

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The Historical North Karelia Project: Commentary From One Who Was There

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See also Jauho, p. 890.

It has been half a century since epidemiological interest in the common noncommunicable diseases focused on their sociocultural determinants and on the community-wide action essential to their prevention. Thus, I welcome the historical perspective of Finnish social scientist Mikko Jauho presented in this issue of *AJPH* (p. 890). Jauho has excellent access to original sources about one of the first community-based programs of cardiovascular disease prevention: the North Karelia Project (NKP).

I was invited to comment on this article because I "was there" as a project officer for the Seven Countries Study surveys, which documented the high risk and rate of heart attacks in Eastern Finland in the late 1950s and 1960s.[1,2] I also served as a World Health Organization (WHO) consultant to the Finnish Heart Association planning conference for the NKP, held in Joensuu, Karelia, Finland, in September 1971. This experience in Finland motivated us to undertake community-based programs and to evaluate them in Minnesota from the late 1970s.[3]

AWARENESS OF A PROBLEM IN NORTH KARELIA

At the close of each five-year cohort survey, beginning in 1958, Seven Countries Study investigators shared findings with participants and local leaders and compared them with findings among other worker cohorts across a spectrum of traditional eating patterns in Northern and Southern Europe, the United States, and Japan. In North Karelia, our initial reports on the province's uniquely elevated rate of heart attack and blood cholesterol levels were accepted with bewilderment but with typical Finnish calm and courtesy. The attendees even made sardonic toasts—with aquavit—to their area's "world champion" ranking!

But in fall 1969 at the close of the 10-year survey, when we once again confirmed the region's burden and spoke of its possible causes, the community representatives were concerned and agitated. They demanded, "If you know why we have so many heart attacks, why don't you help us do something about it?"

At last aware and now impatient, the community was apparently ready to take action.

THE NORTH KARELIA PROJECT INITIATOR–CATALYST

Jauho correctly identifies physician–scientist Martti Karvonen as "the key personality in Finland's cardiovascular research" (p. 891), and to Karvonen goes most of the credit for guiding the Karelian community from this newfound state of readiness through the development of a program and petition to the Finnish government to address the province's alarming status.

Karvonen had long observed the particular eating patterns and cardiac health of the area, and, as a visiting scientist at the Laboratory of Physiological Hygiene in Minnesota in 1954, had suggested to Director Ancel Keys that the east versus west regions of Finland are an "interesting natural diet–heart experiment." He returned to carry out the first systematic comparison of diet and blood lipid levels between those regions[4] and then to join the Seven Countries Study as principal investigator for the Finnish component of the study. He remained professor at the Helsinki Institute of Occupational Health, a leader of the Finnish Heart Association, and consultant to the WHO.

As surgeon general of the Army of Finland, Karvonen also was a political authority close to Finnish president Urho Kekkonen. Soon after the historic Helsinki Declaration, he arranged for our Seven Countries Study team to meet with the president in a traditional evening of sauna and beer. Kekkonen professed to us his pride that his "small country could make such a major contribution to the ethics of medical experiments in humans everywhere!"

In December 1970, after 15 years of persistent awareness raising by Karvonen et al., North Karelian officials formally petitioned the national government with a proposal for a broad program of health promotion to prevent heart attacks in the province. All the elements came together in spring 1972, when the NKP was legislated and implemented under the direction of Pekka Puska, a young physician who later became a member of the Finnish parliament.

THE NORTH KARELIA PROJECT AGENDA AND RESULTS

Jauho's analysis of the NKP deals mainly with the intervention strategy, with focus on the degree to which it was community-wide in origin and in reach while also enhancing health services to the segment at highest risk. As a sociologist, he is clearly interested in the balance between interventions on social norms and behaviors versus those addressing the fundamental social determinants of health in the physical structure and economy of the region.

Furthermore, Jauho does not attempt to evaluate whether the project's stated goal of reducing the heart attack rates in North Karelia was attained. He assumed a priori that the original NKP design as a "quasiexperiment" comparing two nonrandomized units—North Karelia as the educated province versus Kuopio as control—would not allow it to establish a causal role of the NKP for risk trends or disease rates during the course of the program. He also found the design for analysis complicated by the "great public interest in the project and its principles, as well as a simultaneous secular decline in CHD [coronary heart disease] mortality throughout the country" (p. 891). Thus, he avoids conclusions about specific or independent NKP effects on the subsequent trends in the regional or national coronary heart disease risks and rates. And he avoids interpreting NKP's programmatic "success."

Jauho concludes, however, that the NKP's broad public education campaign, with its stimulus to indigenous medical services and nongovernmental organizations, probably contributed to a substantial shift in health behavior throughout Finland. He confirms the NKP's pioneering of community-based intervention and advancement of behavioral strategies of risk reduction and disease control and prevention. And he clarifies that during the initial five-year period, 1972 through 1977, the NKP dealt minimally with the determinants of mass disease in the economy of North Karelia. The program addressed these in the national campaign that followed.[5,6]

THE NORTH KARELIA PROJECT SUBSEQUENT TO 1977

In 1977, the NKP closed down its committed regional comparison and initiated a nationwide campaign. Its new effort, to change the economy, involved extensive NKP consultations with the Finnish food and agriculture industry and its regulatory agencies and continued with legislative proposals to promote the nation's health.[6] By the mid-1980s, North Karelians were enjoying seasonal wild blueberries (*mustikka*) and other healthy delights popularized by the East Finland Berry and Vegetable Project.[5] Berry and vegetable plots were established in Finnish dairy farms and the produce promoted and distributed by a reorganized food industry.

I was impressed by the changed academic scene in North Karelia when I attended the closing celebrations of 25 years of NKP in 1997. The project had become institutionalized at the University of East Finland, where its seminar about community-based health promotion was attended by a substantial delegation from Cuba. The exchange was informed and vigorous among the by-then sophisticated public health practitioners of the two small countries.

THE NORTH KARELIA PROJECT'S LEGACY

The NKP influenced present-day community-based health policies and programs. In Europe at large as well as in Finland, primary care and prevention policy are direct descendants of the NKP, including the WHO Comprehensive Cardiovascular Community Control Program.[5]

For me and my Minnesota colleagues, witnessing the mobilization of the Karelian community and the project that grew out of it was part of our inspiration for designing the Minnesota Heart Health Program, a community-wide approach to lowering cardiovascular disease risk in the US Midwest.[3,6]

Twentieth-century epidemiological observations and clinical trials, along with pioneering community-wide demonstrations such as the NKP, have led to a near-universal understanding that culture and behavior—eating patterns, tobacco use, and habitual physical activity—are molded by the community structure and economy. Developing the public policy and legislation needed to affect the many underlying determinants of these behaviors requires renewed efforts, which, alas, tend to advance and retreat with the shifting winds of society, governments, and political will. AJPH

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Finland's North Karelia Project: Structural Barriers to Changing a Food Economy

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See also Jauho, p. 890.

The North Karelia region of Finland, located along the eastern border with Russia, experienced severe economic and political instability throughout the 20th century. Much of this upheaval stemmed from Soviet annexation of large portions of the area in the 1940s, which resulted in the forced relocation of more than 400 000 Finns and the loss of culturally important lands and waterways. Small-scale farming, particularly animal husbandry, became increasingly important to the North Karelian economy as the population increased as a result of relocation. As the number of dairy and pig farms grew, so too did the region's incidence of coronary heart disease (CHD). By the 1960s, North Karelia suffered the highest rates of CHD mortality in Finland, and the country itself suffered from some of the highest rates in the world.

Evidence of the area's reliance on farming was readily apparent to me when I lived in Joensuu, the capital of North Karelia, as an undergraduate studying Finnish history in 2008. I was reminded once again of the importance of dairy farming when, as a medical history PhD student, I received a Fulbright grant in 2014 to study medical, governmental, and agricultural responses to the heart disease crisis in Finland. I will never forget the spread of food at the opening reception for Fulbright grantees in Helsinki—there was more butter and cheese than I ever thought possible! Not wanting to appear rude, I slathered generous amounts of butter onto the warm, fresh rye bread. As I ate, I wondered what this same reception may have looked like in 1970. Would there have been even more high-fat foods? What would it have looked like in 1980, almost a decade after the start of the North Karelia Project (NKP), the CHD community intervention program that is the subject of Mikko Jauho's article (p. 890)?

PRIORITIZING BEHAVIORAL CHANGE

Jauho provides a thorough but succinct overview of the "pilot phase" of NKP. He explains that the project prioritized behavioral change as the way to reduce risk factors for (and thus incidence of) CHD, whereas larger structural changes were excluded from NKP's initial purview. Because medical and lay communities in Finland believed that CHD was a health emergency that required immediate action, it is unsurprising that NKP focused its initial efforts on behavior modification. But why, exactly, were structural changes excluded? Was urgency a factor? Was there a lack of government support for instituting complex changes? Were insufficient funds a reason? Did investigators fail to grasp the importance and influence of socioeconomic factors on CHD?

Jauho's final paragraph alludes to the latter: the project's foregrounding of individual lifestyle choices eclipsed the larger scale of change necessary to lower CHD mortality rates. Arguably, NKP was hampered by its failure to address social determinants of health. Because dairy farming was an important part of the North Karelian economy and culture, fatty foods were abundant and cheap. Individuals struggled to understand why they should buy specialty items from a store when they could get milk from their own or a neighbor's farm. Beyond this, many individuals simply were not in a position to buy what they could get for free.

REDUCING RISK THROUGH STRUCTURAL CHANGE

My forthcoming dissertation, "Capitalizing on Crisis: Dietary Fat, Scientific Uncertainty, and Coronary Heart Disease as a National Health Emergency, 1945–1995," compares shifting understandings of, and responses to, heart disease in the United States and Finland. In my dissertation, I look to some of the NKP's efforts to address structural barriers to health in its later years. The 1986 East Finland Berry and Vegetable Project, for example, was a multipronged approach that sought to increase fruit and vegetable consumption across the nation, with a specific focus on Finnish-grown foods.[1] In this effort, it sought to increase domestic production by transitioning farmers in North Karelia from dairy products to berries, which would (ideally) result in a more stable product market and, thus, a more reliable and steady income for the farmers. Had NKP instituted this arm of the project in the 1970s, farmers and residents of the region may have felt more empowered to make dietary changes. It could have removed initial monetary barriers to entry while alleviating concerns that people's food choices would hurt their (or their neighbor's) livelihood. In addition to reducing dietary risk, this structural change could have mitigated the manifold health risks that stem from economic insecurity. Seen from this angle, bigger picture structural interventions held the power not only to lower incidence of CHD but also improve people's lives as a whole. AJPH

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The Role of Natural Experiments in Advancing Public Health Science and Practice

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See also Komisarow and Pakhtigian, p. 881, and Kessler et al., p. 927.

Public health has expansive ambitions. From the preamble to the World Health Organization's constitution, which defines health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity,"[1] to recent discussions about the aspirations of public health that grapple with the social and economic forces that shape health,[2,3] public health aspires to create a world that generates health and the opportunity for all to flourish and reach their potential. This is an important vision of what public health can do. It also, however, poses operational challenges. Although, for example, a health in all policies approach has long been at the core of public health thinking,[4] it remains far from the daily reality for most public health practice.

IMPLEMENTING THE VISION OF PUBLIC HEALTH

There are many reasons that implementing efforts that align with this vision of public health is challenging. Although we can envision that getting to a better, healthier world will require orienting our systems—for example, transportation, finance, and urban planning—to generate health, it is often harder to fully grasp *how* to get there. The vision is ambitious, and it is much easier to succeed in a narrowly prescribed set of actions than in a set of actions that requires whole system change. We see the challenges as twofold: (1) we have a paucity of evidence on which systemic interventions will help generate health, and (2) there is a lack of evidence for how to implement and encourage the widespread adoption of such interventions. Although there is a growing body of evidence for such efforts,[5] it remains far narrower than, for example, the literature on behavioral interventions that public health has deployed much longer and more liberally.

The evidence base on how to implement transformative change that aligns social and economic systems to generate health is more limited for many reasons. For one, generating this evidence requires mechanisms that reward and fund such scholarship, and it has been amply demonstrated that funding for such approaches lags behind funding for biomedically or individually oriented approaches.[6] However, it is also true that it is harder to launch efforts that experimentally test whether social and environmental changes improve health than it is to test more focused, individually centered interventions. Changing whole systems takes longer, is more expensive, may be unable to control for all possible alternative hypotheses, and may introduce more ethical challenges than do efforts in a narrowly defined scope. It is not surprising, then, that we have less evidence than we should to implement the broader agenda of public health. This lack of evidence, in somewhat of a vicious circle, results in less investment in the studies that could inform an ambitious and more robust public health practice agenda.

THE ROLE OF NATURAL EXPERIMENTS

This is why natural experiments have tremendous potential to inform public health scholarship, insight into health equity, and public health practice. Natural experiments—studies that take advantage of conditions that are imposed on populations outside the investigators' control—create opportunities for us to study what happens when particular large-scale changes happen. Natural experiments can help us build an evidence base that provides the impetus for implementing systemic change to create health equity and improve health. Two studies in this month's issue of *AJPH* illustrate the potential of natural experiments well.

First, Komisarow and Pakhtigian (p. 881) wanted to investigate whether closing coal-fired power plants reduces asthma-related conditions among children. There is good evidence that children exposed to air pollution have worse respiratory systems.[7] However, that evidence, borne out through a range of observational studies, has limited potential to influence policy that is specifically about coal-fired power plants related to health improvement.

Komisarow and Pakhtigian took advantage of the 2012 closure of three large coal-fired power plants near Chicago, Illinois. Using wind data, population data, particulate matter 2.5 definitions, and zip code–level rates of emergency department asthma visits for children younger than four years between 2009 and 2017, and applying difference-in-difference methods—a useful analytic approach for such studies—the authors showed that asthma hospitalizations decreased by 12% in zip codes close to the plants that were closed compared with zip codes that were farther away. This is an elegant illustration of the potential of systemic intervention. We know that air pollution is associated with worse respiratory symptoms, but now we also know that specific action to close the sources of air pollution—in this case coal-fired power plants—can improve health. Public health can use these important data to contribute to broader discussions that weigh the costs and benefits of such closures.

The second article in this issue of *AJPH* of note on this topic is that of Kessler et al. (p. 927), who capitalized on the development of a family health strategy in Bagé City, Brazil, that aimed to reorganize and restructure the health system and, in doing so, strengthen primary care. Although this was a health intervention, the authors used the intervention to assess an outcome that was well beyond the initial intent—socioeconomic gaps in health. The authors correctly note that it is not yet known whether health programs and policies on reducing health inequalities are effective. While seeking to clarify this question, they found that family health strategy implementation reduced social inequalities in both all-cause and avoidable mortality among older adults, suggesting that family health strategy implementation may help achieve better health for all in a rapidly growing economy marked by substantial inequality, such as Brazil.

LOOKING AHEAD

What brings the Komisarow and Pakhtigian and the Kessler et al. articles together is their building on an opportunity presented by a change that was out of their control—a natural experiment—to assess what import this change had for a desirable public health outcome. In showing that the changes studied did indeed promote health and health equity, the authors point the way to advocacy efforts that can extend their work, consistent with the mission of public health. Other articles in this issue of *AJPH* employ empirical methods to study the natural experiment that has perhaps occupied most of our attention over the past year: COVID-19. We hope these studies will begin to illuminate how policies have affected transmission rates and vaccine rollout. We look forward to discussing the evolving insights that will emerge from the study of COVID-19.

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H. Jack Geiger: A Pioneer Physician for Human Rights

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Jack Geiger, a leader in promoting health equity, racial equality, and prevention of nuclear war, is less known for his seminal role in international human rights. We came to know Jack because he cofounded and served for decades on the board of Physicians for Human Rights, where each of us has served as executive director. It was one of many organizations he helped create that have been transformative in demonstrating the power of combining public health and science with activism to address poverty, discrimination, violence, and abuse. Jack coauthored studies of violence inflicted on health workers and people seeking care and on the all too frequent complicity of the health professions in human rights abuses in El Salvador, South Africa, the United States, and elsewhere. He insisted on rigorous, impartial reporting while infusing his passion for justice into every aspect of the organization's work.

Jack never shied away from audacious goals and he remained forever hopeful, even in dark times. Shortly after the 2016 US presidential election, Donna McKay called Jack, trying to figure out what to tell medical students who were distraught about the threatened repeal of the Affordable Care Act. "Jack," she asked, "what words of hope can I offer to these students?" Jack replied: "Try taking away health insurance from the more than 20 million Americans who now have it." Underlying his quip were his savvy political strategies and clever tactics. When seeking federal funding for community health centers in the South, he had to find a way around the veto power of governors of projects funded by the Office of Economic Opportunity and the reticence of federal officials to antagonize them. He accomplished both, establishing the program to circumvent the possibility of a gubernatorial veto and in one instance staging a sit-in in the office of Sargent Shriver, director of the Office of Economic Opportunity.[1]

Yet he was a realist, too. In 2002, at height of the Second Intifada, Len Rubenstein and Jack led a Physicians for Human Rights delegation to Israel and the occupied Palestinian territory to investigate the violence, including Palestinian attacks on Israeli civilians and the Israel Defense Forces' killing of six emergency medical responders in a two-week period.

In drafting the final statement for the delegation's findings and recommendations, Jack pulled no punches. He insisted on calling Palestinian assaults on Israeli buses, shopping malls, and hotels homicide as opposed to suicide bombings. He wrote that "suffering and death is silently exacted" on Palestinians as a result of Israel's imposition of curfews, arbitrary refusal of passage of patients in urgent need at checkpoints, and interruption of electricity for vital services. The statement demanded protection of the rights of Palestinians within their own state and of Israelis to live within secure borders but warned that the bombings and Israeli interference with medical care amounted to "a race to the bottom in terms of respect for human rights and international humanitarian law, with the danger that both communities will come to support violence as normal and acceptable."[2] His analysis proved all too true as the Intifada continued.

In that statement, Jack also called on the international medical community to demand protection of human rights during the crisis. It mirrored Jack's deep belief, reflected in all of his work, in the role the medical and public health communities could play in documenting human rights violations and social injustice, demanding change, and pointing the way to reform. But Jack did not idealize the health professions. He called them to account when they became apologists for or complicit in human rights violations, as when the American Medical Association defended the virulently discriminatory health system under the Apartheid regime in South Africa.[3] Most of all, he stood against professional complacency, that inequity and injustice are someone

Joanna Redfield, daughter of an anthropology professor, at the University, and Jack Geiger, campus AVC civil liberties committee chairman at U. of C. rally, Dec. 8.

U. of C. Student Walkout Sparks Move to End Race Discrimination

Spearheaded by the U. of C. chapter of AVC, 1,200 students left their classes Monday, Dec. 8, to join a campus picket line and street meeting in protest against alleged racial discrimination practiced at the university hospitals and medical school.

The street rally, held on the border of the campus, climaxed a two-hour "Operation Walkout" called by 26 student organizations after evidence of discrimination had been presented to the student body and Chancellor Hutchins by AVC and the Committee on Racial Equality.

SIGNS AND SONGS

Students and faculty members marching in the quarter-mile long picket line through the university's quadrangles, carried some 150 signs and sang chants written expressly for the rally.

Such signs as "Football is Gone—what kind of a game is this?" and "Practice what you teach" symbolized the walkouts. Maynard Krueger, econ professor, atacked the conflict between stated policy and practice within the university. He added:

"It is sometimes necessary for a great institution to compromise, but it is not necessary for the University of

(Continued on page 4)

U. of C. Chapt. in Van of Walkout

(Continued from page 1)

Chicago to compromise where racial discrimination is concerned . . . I urge the students to continue their fight until discrimination is entirely wiped out in the university community."

FACULTY, STUDENTS SPEAK

Other speakers included Malcolm Sharp, professor of law, Robert Ming, area vice-chairman, also of the law school, Sidney Ordower, AVC leader and radio commentator, Dave Green, chairman of the student government civil liberties committee and Jack Geiger, chairman of AVC's civil liberties committee on the campus.

Both student speakers promised that the rally was only the beginning of a concerted drive to end discrimination, and asked students to be ready for further action.

Students, in a well-documented report, charge that Billings hospital and Lying-in hospital exclude, refuse or segregate Negro patients, and point to the absence of Negro medical students from the school since 1941 in charging that Negroes are excluded there.

At the last meeting of the area council, the delegates unanimously pledged complete support for the student walkout, and for the continued effort of the U. of C. chapter to fight for the end of discrimination at the school.

Chicago Sun, December 8, 1947,
P. 1

FIGURE 1— Clipping From *Chicago Sun*, December 8, 1947

else's problem. He challenged medical educators who drained the idealism out of their students.

Somehow, though, Jack managed to combine his fiery commitment and uncompromising stance on human rights with warmth and support for us and so many others. He was always available for counsel, inspiration, and wisdom. That extended to students. In his 80s, he said that "I see my task as doing what I can to nurture the student activists and young professionals who will be the change agents of the future."[4] And nurture them he did. No one could better motivate students preparing to join the health professions to take their social responsibilities seriously. Jack's speaking style was quiet, but what he said mesmerized them.

He was adept at instilling a commitment not just to serving patients and communities but to tackling the inequities that so deeply impair health. Students loved his stories of the fights he fought, often told with a twinkle in his eye, as we did. In one of them, he described his campaign in 1947 to end the University of Chicago's discrimination against Black medical school applicants and patients at its teaching hospitals. He organized a demonstration involving more than 1000 people, but the university kept stonewalling. Jack decided to follow the money. On the eve of a scheduled meeting between university officials and a foundation that provided extensive financial support to the university, Jack met with foundation staff and, with reams of documents, asked why it would fund an institution that so blatantly discriminated. Two days after the university had its meeting, an official asked Jack "What do you want us to do?"[4]

Jack will be deeply missed by people for whom he achieved a measure of justice and by those of us he taught how to pursue it. AJPH

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Dr. H. Jack Geiger, a Towering Public Health Leader

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H. (Herman) Jack Geiger, MD, MSciHyg (1925–2020) was a deeply respected and charismatic figure in US medicine and public health. Geiger was the model for principled health advocacy for us and for many of our contemporaries. Through his life's work, he became one of the most persuasive leaders and tenacious fighters for health equity and human rights in the world. His remarkable accomplishments include leading the national effort in the United States to promote community-oriented primary health care, especially for the poor and disenfranchised; being a brilliant spokesman for the conceptualization and implementation of the field of social medicine; influencing multiple generations as a teacher of community medicine and public health at Tufts University, the State University of New York at Stony Brook, and the City University of New York; and being a recruiter and role model as a founder and leader of International Physicians for the Prevention of Nuclear War and Physicians for Human Rights.

Geiger's inspiring leadership and achievements were lauded by his receipt in 1998 of the National Institute of Medicine's Gustav O. Lienhard Award for "creating a model of the contemporary American community health center to serve the poor and disadvantaged, and for his contributions to the advancements of minority health."[1] We were especially and personally proud that in that same year he was also awarded the American Public Health Association's (APHA's) Sedgwick Memorial Medal for distinguished service in public health. The International Physicians for the Prevention of Nuclear War and Physicians for Human Rights both received the Nobel Peace Prize while Geiger served in leadership positions in 1985 and 1998, respectively. In 2010, it came as no surprise to us that he received the Albert Schweitzer Award for Humanitarianism.

Geiger received these awards for his inspiring achievements and for his brilliant and consistent advocacy of social justice in health over the span of his long career, accomplishments that sprang from his deep understanding of the roots of health inequalities in the social order. His understanding was profound, and for many of us Geiger served as the best contemporary role model and most direct link to the principles of social justice that are the foundation of public health and health reform.

In a story first told by Geiger on national public radio's *This American Life* in 1997 and made familiar in several retellings since, Geiger explained that he first came to understand these principles as a "runaway teenager" directly exposed to leaders of the African American artistic, political, and literary community.[2] Geiger further explained that when he left home and went to college and medical school, first at the University of Wisconsin, then at the University of Chicago, and eventually at Case Western University Medical School, he acted on these principles in direct nonviolent civil rights actions and persistent advocacy.

Geiger interspersed his education with stints as a journalist and as a member of the Merchant Marine, a service in which he enlisted during World War II because it was the only integrated service in the US military. He transformed his early civil rights actions and advocacy into concrete accomplishments as a young health professional when he helped found the Medical Committee for Human Rights in the 1960s; went to Mississippi during "Freedom Summer"; and brought a radically innovative model of health service, reform, and political action from Pholela, South Africa, which he had encountered as a visiting medical student in the late 1950s, to Mound Bayou, Mississippi, in the 1960s.[2]

Geiger always, amazingly, saw the big picture. He wrote the following in 1969:

> Right now we health professionals are standing in the middle of an endlessly revolving door . . . doing some good on a short-term basis. . . . [But] we cannot go on providing

FIGURE 1— H. Jack Geiger with his wife Nicole Schupf, and their dog, Cooper (date unspecified). Printed with permission.

> health services without regard to the system in which the roots of poverty, sickness, and many other social ills are embedded. We have to be willing to identify the real problems and confront them . . . we have to create new social institutions appropriate to the problem; and, finally, we need a sense of passionate commitment to bring about the changes that are so urgently needed.[3](p2436)

Geiger saw the Mound Bayou community health center as one of those "new social institutions," a health center that had "as its primary thesis that the determinants of health are in the social order, not health care. . . . We think there's a better way to . . . [improve a community's health] by using health services as a route of entry for these other kinds of social change."[4](p139) This health center and a companion one in Columbia Point, Boston in Boston, Massachusetts, were the vanguards of what became the Federally Qualified Community Health Center program, a program that has dramatically expanded access to health care in underserved communities.

That, of course, was a radical vision, and Geiger never lost sight of it; he worked to make sure that we never lost sight of it either. But he also never lost sight of how important properly organized and accessible health services are (hence his lifelong commitment to the primary care movement), nor did he lose sight of the central importance of equity in access to quality health services. He articulated the critical connections between equity in access and social justice in the brilliant essay "Medical Care," published in Barry Levy and Victor Sidel's influential book *Social Injustice and Public Health*.[5] Geiger wrote as follows:

> Medical care . . . makes a difference to both personal and public health— one that is most clearly revealed when care is absent or denied. For example, failures to provide immunization have repeatedly led to outbreaks. . . . Lack of prenatal care is associated with higher rates of infant and maternal mortality. . . . Studies of poor adults removed from programs that fund access to care . . . have documented the occurrence of uncontrolled illness— and some preventable deaths.[6](pp208–209)

And more generally, he wrote:

> Because poor health care and poor health so profoundly limit opportunities . . . for the full realization of one's potential . . . justice in health care is good for the public's health, and the public's good health, in turn, broadens opportunities and facilitates a more just society.[6](pp208-209)

In that same essay, Geiger identifies the basic source of injustice in access to health care in our country: ideological and political biases that:

> treat medical care as a market commodity . . . rather than as a social good to be distributed in response to medical need, a responsibility of government, and a fundamental right embodied in a social contract.[6](p207)

To Geiger, the alternative to our present system was clear: a universal, equitable, single-payer, "Medicare for All" health system in the United States. And thus, among the many other admirable things Geiger did, he was also a passionate supporter of the single-payer cause. He did this in the context of the APHA and other professional and advocacy organizations in the 1970s and 1980s; as a founder of Physicians for a National Health Program (PNHP) in the late 1980s; as a stalwart member and advocate of PNHP in the 1990s (including one memorable appearance in 1998 as a speaker at a rally on the steps of the Canadian embassy after a march from the APHA meeting through the streets of Washington, DC, led by APHA president Quentin Young in search for "health care asylum"); and as a strong, clear voice for "Everybody In, Nobody Out" at the local, state, and national levels in recent years.

Geiger continued his passionate and brilliant analysis and advocacy during the past two decades of his life. He continued to publish articles, essays, book chapters, and opinion pieces in leading newspapers, magazines, and list serves, and he remained much in demand as a speaker and commentator at national and local meetings and at universities. He was a familiar and inspiring presence, and he made several appearances at APHA conferences in the 2010s that we remember vividly. Eventually, failing health and increasing visual impairment kept Geiger at home although he still maintained inspiring e-mail and telephone contact with colleagues and friends as long as he could. He died on December 28, 2020, at the age of 95. He was a giant whose towering impact is for the ages. AJPH

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Targeting Youth Transportation Equity and Self-Efficacy to Reduce Youth Physical Activity Disparities: A Novel Approach for a Public Health 3.0 Agenda

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Approximately 76% of US youths aged 6 to 17 years do not meet the recommended guidelines for 60 minutes of moderate-to-vigorous physical activity (MVPA) per day.[1] Routine youth physical activity supports healthy habits early in life, with lasting benefits into adulthood, including protection against high blood pressure, obesity, diabetes, and depression.[2] Disparities in MVPA levels exist between White, Hispanic, and Black youths. For example, 49% (95% confidence interval [CI] = 44.4, 53.1) of White youths engage in at least 60 minutes of MVPA at least 5 days per week compared with just 42% (95% CI = 37.7, 46.4) of Black and 45% (95% CI = 41.7, 48.1) of Hispanic youths.[1] Similarly, age and income are shown to be significantly associated with youth physical activity.[3] Significant declines in MVPA are observed with increasing age, with 43% of elementary school–aged youths compared with 5% of high school–aged youths meeting physical activity guidelines.[1] Low-income youths are less likely than high-income youths to participate in organized sports (70% vs 88%), and individuals (children and adults) in high-poverty neighborhoods spend fewer weekly person-hours in community parks compared with those in low-poverty neighborhoods (1380 vs 1690 person-hours, respectively).[1] Low rates of MVPA in non-White and low-income youths predict significant disparities in youth health-related physical fitness by race and income,[4] as well as chronic health conditions and health inequities throughout the life course.[2]

Urban planning plays a critical role in the availability and accessibility of both active transportation options, such as walking, running, and biking, and public transportation options, such as city buses or trains. Safe active transportation relies on the presence of high-quality sidewalks, bike lanes, or trails. Similarly, positive physical attributes of the built environment, such as traffic volume and presence of sidewalks, influence levels of youth physical activity. For example, neighborhood walkability, which is increased with the presence of sidewalks and lower traffic volumes, is positively associated with youth MVPA.[5–7] However, minority and low-income youths are more likely to face built environment barriers to active transportation, including lack of sidewalks,[8] which might in turn reduce transportation self-efficacy (people's beliefs in their ability to influence events that affect their lives)[9] and subsequent active transportation participation among youths.

Perceived safety can also have an impact on self-confidence among youths, and parents' support of youths to independently navigate neighborhood transportation systems. Just 53% of Black and 54% of Hispanic youths live in environments that are perceived to be safe, compared with 72% of White youths.[1] Moreover, whereas three out of four youths report living close to a park area, park use is significantly lower in low- compared with high-income neighborhoods,[1] again conveying inequitable opportunities for safe, accessible, and affordable active transportation for youths by race/ethnicity and income, resulting in downstream disparities in youth MPVA.

In this editorial, we propose a novel framework to discuss the relationship between youth transportation equity, transportation self-efficacy, and opportunities to promote youth physical

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activity. We also advocate enhanced transagency collaboration among public health, urban planning, transportation, and community recreation departments to reduce youth MVPA disparities. We frame this discussion by using a Public Health 3.0 approach, a model that aims to achieve health equity by addressing the social determinants of health through collaboration among health and nontraditional partners.[10] Exploring this novel area of research presents an important opportunity to reduce gaps in youth health equity that influence long-term health among non-White and low-income populations in the United States.

CONCEPTUAL FRAMEWORK

We propose a framework drawing from Public Health 3.0 to increase youths' opportunities for active transportation and access to recreation spaces to reduce physical activity disparities (Figure 1). This framework presents a pathway connecting structural factors to youth transportation equity and physical activity behaviors that supports youths to independently navigate transportation systems, while increasing their self-efficacy to do so.[8]

To begin, the proposed framework highlights the relationship between access to recreation spaces, transportation equity, and youth physical activity. First, as reflected in the proposed framework, we know that the proximity, availability, and density of accessible, safe, and quality health-promoting resources (such as community parks) are associated with youths' utilization of community resources.[11] Second, inequities exist in the accessibility of safe, active transportation, such as traffic volume, which predict disparities in youth pedestrian deaths across race/ethnicity and income. For example, Black children and low-income individuals are two times more likely to be killed while walking outside than White children and high-income individuals, respectively.[2] However, land-use policies that limit pedestrian and cyclist exposure to traffic volume can reduce traffic injuries.[12] Third, public transportation has been proposed as a mechanism to increase active transportation among youths, given that accessing public transportation often requires a 10- to 20-minute walk to a transit stop.[13] Research has begun to explore the role of policy and urban planning to increase public transportation access as a means to promote youth physical activity, for example by supporting youths to independently navigate transportation to recreation spaces and activities.[14]

Our proposed framework also directly connects youth transportation self-efficacy to physical activity. Although targeting transportation infrastructure factors can promote youth MVPA, these measures do not address psychosocial factors, including the relationship between youth self-efficacy and transportation. Previous literature

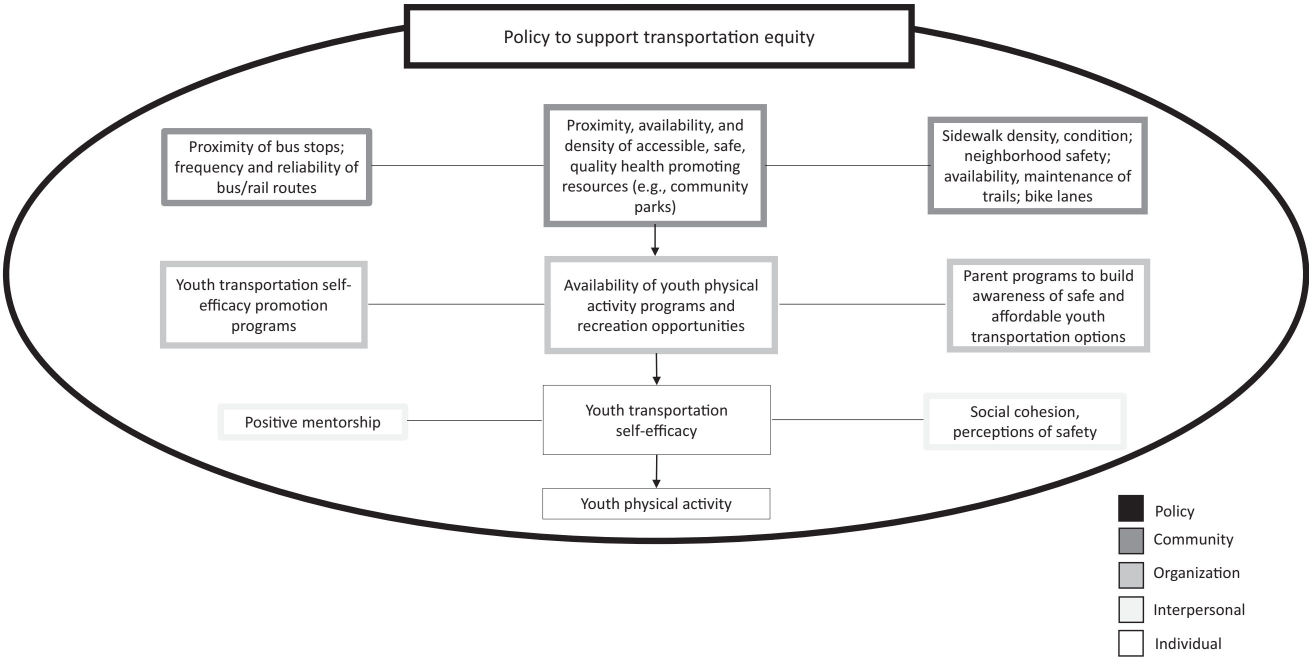

FIGURE 1— Conceptual Framework: Targeting Youth Transportation Equity and Self-Efficacy to Promote Youth Physical Activity

has established a strong association between children's self-efficacy and active commuting to school.[8] Also, a systematic review conducted by Rhodes et al.[15] found an interaction between elements of social cognition, such as self-efficacy, and the built environment, including walkability, that led to higher levels of leisure-time physical activity. Carlson et al.[16] similarly identified an association among self-efficacy, the built environment, and levels of physical activity. Self-efficacy also has frequently been explored as a psychosocial construct that can be leveraged to increase physical activity participation.[8] However, the relationship between access to community recreation spaces, transportation self-efficacy, and physical activity has not been examined. As such, we include self-efficacy in our framework and argue that it is an important factor to consider in the pathway connecting structural factors to youth active transportation behaviors.

In addition, the proposed framework draws directly from a Public Health 3.0 approach.[17] Both government and nongovernment public health actors have acknowledged the transportation sector as a nontraditional partner that can offer critical expertise for improving health equity.[2,10] Public Health 3.0 regards nontraditional partnerships as integral to strengthening existing public health infrastructure.[10] Therefore, to address upstream social drivers of youth physical activity disparities, we argue that this work must be done in partnership with transportation experts, urban planners, policymakers, community organizations, and local stakeholders.

Furthermore, our proposed framework connecting youths' access to community recreation spaces, transportation self-efficacy, and physical activity draws from a socioecological context to inform future research in this area. Namely, multiple levels of societal influences, ranging from policy to interpersonal relationships, influence individual behavior[18] and are needed to improve youth transportation self-efficacy and use of transportation systems. While community programs can be developed to promote youth transportation self-efficacy, policy and urban planning can improve transportation availability, accessibility, and safety for youth active and public transportation.[2,8,16] These multiple levels of influence should be incorporated into designing and testing interventions that apply the proposed framework to planning, transportation, and community organization initiatives.

IMPLICATIONS FOR PLANNING AND POLICY

In alignment with our proposed framework to promote youth transportation self-efficacy and physical activity, applying the framework to developing and implementing planning initiatives similarly necessitates a Public Health 3.0 approach. For example, cross-sector collaboration is needed to create planning measures that promote equitable transportation access; implement measures that increase youth physical activity proximity, accessibility, and safety; and provide opportunities (such as with transportation initiatives) for youths to participate in community programs that provide safe, affordable, and engaging youth physical activity.[8] Improving youths' access to recreation spaces through active transportation initiatives (e.g., increasing access to well-maintained, well-lit sidewalks and bike lanes), or public transportation initiatives, such as providing free bus passes and connectivity between sidewalks and city buses, will facilitate more physical activity among youths.[5] Expanding density of green and open spaces can also provide youths with increased motivation to navigate transportation systems to meet friends or attend programs to participate in physical activity recreation. Trans-agency collaboration in this sense is necessary to reduce physical activity disparities by promoting youth active transportation participation and access to health-promoting and engaging community spaces and programs.

We must also consider the larger context of policy to support youth transportation efficacy and related physical activity. Applications of our proposed framework can guide policy at national and state levels to facilitate greater prioritization in transportation use at local and community levels. For example, the federal government invests a percentage of funding into sidewalks, bike lanes, and trails.[2] Funding can also be directed toward Public Health 3.0–style partnerships to support cross-sector collaboration to improve transportation accessibility, affordability, and use. Land use policies also play a role in improving youth transportation self-efficacy such as by supporting road safety programs, including Rails-to-Trails, Safe Routes to Schools, and Safe Routes to Parks initiatives.[12,19] Policies can furthermore be enacted within schools that support greater active transportation, including bike racks at schools, traffic calming on school properties, and promoting biking and walking to school.

Given that public transportation availability does not equate to uptake and utilization, local youth community organizations can also foster youth transportation self-efficacy through evidence-based, stakeholder-driven programs to promote health equity. For example, partnerships among public health professionals, transportation specialists, and local youth organizations can improve youths' and parents' awareness of safe transportation options. Past interventions have targeted youth self-efficacy to increase participation in MVPA.[2,16] Research also demonstrates a reciprocal relationship between environment and individual-level social cognitive constructs, such as walkability and the ability to overcome perceived barriers to physical activity.[16] Therefore, coupling planning and policy changes with community-level programming will be critical for educating and motivating youths to use available transportation methods to increase their access to physical activity programs and recreation.

Consistent with the Public Health 3.0 "upgrade," our framework also infers that a shift in current public health policy is necessary, away from spending targeting health care and toward supporting upstream structural drivers of health, mobilizing community stakeholders with actionable data, and including urban planning and transportation.[9] Planning and policy measures therefore have potential to reduce physical activity inequities and associated disparities in chronic conditions by addressing youth transportation equity and self-efficacy and by engaging planning, transportation, and community organization partners to contribute expertise toward the common goal of improving youth public health.

CONCLUSION

Large inequities exist in MVPA between White and minority youths, and across socioeconomic status, resulting in health disparities tracking into adulthood. Current literature lacks exploration of youth transportation self-efficacy as a means to promote youths' access to community recreation and opportunities for MVPA. However, transportation planning is increasingly linked to health outcomes, including reducing disparities in cardiovascular disease, obesity, diabetes, air pollution–related illnesses, and traffic injuries, and should be considered an important avenue for population health promotion.[12] Our proposed framework advocates transagency collaboration among nontraditional partners including public health, urban planning, transportation, and community recreation departments to address the intersection of transportation inequities, community recreation access, and youth physical activity. This framework presents an opportunity to reduce critical gaps in youth health equity and long-term health among minority populations, and propels us toward a Public Health 3.0 model for achieving a 21st-century public health infrastructure.

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A Call to End the Use of Dental Radiographs for Age Estimation

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I was recently reminded of the intersection of dentistry and policy when I read an article in *AJPH* titled "Dental Radiographs for Age Estimation in US Asylum Seekers: Methodological, Ethical, and Health Issues."[1] In this article, Kapadia et al. describe the policy of the US government whereby radiographs are taken to ascertain the chronologic age of unaccompanied minor children entering the country who do not have age documentation. The use of radiographs (likely panoramic radiographs, although it is not stated) to establish the relationship between dental age and chronologic age has been and continues to be extensively studied, debated, and employed for orthodontic, anthropologic, and, often, forensic purposes.[2–4] For asylum seekers entering the United States, age is a critical legal threshold—you are either younger than 18 years, in which case you are a minor and afforded those protections and social benefits, or you are 18 years old or older and have reached the age of legal majority. The authors succinctly discussed the ethical and legal implications of this radiographic determination, which are not well, if at all, known to most dentists in the United States. I would like to expand on the scientific basis for this procedure.

Orthodontists are taught that chronologic age is not an accurate way to determine the level of maturation. In William R. Profitt's textbook *Contemporary Orthodontics*, it is noted that the correlation between dental and chronologic age is "one of the weakest."[5] In addition to other biological indicators, such as pubertal changes, orthodontists rely on the patient's stage of dental development to assess overall growth and development. Determining a patient's dental age from a panoramic radiograph is critical for timing treatment and recommending a treatment plan. Dental age and chronologic age are often not aligned, and there is significant variability in dental development not only by chronologic age but also by race/ethnicity and sex.[6]

There are significant concerns regarding the applicability of the specific radiographic method described, namely the "Demirjian method," to assess chronologic age. In their 1973 seminal article "A New System of Dental Age Assessment," Demirjian, Goldstein, and Tanner described and illustrated tooth formation as divided into eight stages (A–H).[7] This classification is based on descriptive criteria and, although it has been modified, remains the best way to assess the dental maturity of an individual child. A dental maturity score indicates whether a child of known age is dentally advanced or delayed compared with the average same-sex child. This method, however, was never designed or intended to estimate chronologic age.[8]

Demirjian's method was initially applied to a sample of French Canadian children aged 3 to 17 years. The development of seven left permanent mandibular teeth (central incisor to second molar) were rated on an eight-stage ordinal scale from "A" to "H." Third molars were excluded. Currently, a modified Demirjian method is used to assess the root development of the mandibular third molar to determine whether an individual has reached 18 years. The third molar is used because it is the last tooth to complete development. In this modified classification system, two additional root stages (F1 and G1) were added to improve precision.[9] If the individual has reached Demirjian stage "H," she or he has likely reached the age of 18 years.[3]

Studies of different racial/ethnic populations in the United States show variation in the rates of third molar development.[3] American Hispanics are approximately one half year ahead of American Whites, whereas American Blacks are one half year ahead of American Hispanics.[9] In a study of third molar development in Hispanics, it was found that the mean absolute difference between chronological age and estimated age was plus or minus 3.0 years in females and plus or minus 2.6 years in males.[9] In addition, the American Board of Forensic Odontology conducted a study of third molar development and concluded that third molars can develop up until the age of 30 years.[10]

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A study comparing methods to estimate age based on third molar root formation concluded that most methods using third molar root formation had significant bias.[1] In fact, there is a large SD in third molar formation that translates into a 95% confidence interval of between four and six years.[4] In addition, there is sexual dimorphism: among Hispanic children, males develop their third molars earlier than females.[9] Overall in fact, third molar root formation and development occur earlier in males than in females—which is the opposite of what we expect for all other earlier-forming teeth.[10] Age in individuals who are dentally advanced will be overestimated, and, conversely, age in those who are dentally delayed will be underestimated. Studies have found that there is consistent overestimation of age by Demirjian's method.[11,12]

Kapadia et al. state that the use of radiographs to assess chronologic age is often the "primary and exclusive" means of age verification for unaccompanied migrant minors.[1] This practice persists, despite its lack of accuracy and reliability, most likely because it is low cost and noninvasive. Several questions come to mind. Who is taking and reading these radiographs? Are they physicians, dentists? Are they trained and calibrated? Is intraobserver and interobserver reliability assessed? Who makes a decision if it is a borderline case? Is this practice justified given that the radiographs are not being used for diagnostic purposes and the determination method is not reliable? Are the individuals who are taking and reading these radiographs aware of the concerns about the misappropriation of this methodology? Is it ethical to expose a child to radiation for nondiagnostic purposes?

I was not aware of this practice of age determination, and I think that I am probably not alone. Although we are living in a highly polarized political climate, I do not think this is a matter of whether one is "red" or "blue." What matters is the science and our roles as ethical health care providers. I believe it is the responsibility of dentists, and in particular orthodontists who specialize in the growth and development of human dentition, to bring attention to this practice. In Europe, where there are also many asylum seekers, the practice of chronologic age determination by radiographic means has been denounced for both scientific and ethical reasons by prominent medical organizations, including the European Academy of Pediatrics, the British Royal College of Pediatrics and Child Health, the British Royal College of Radiologists, the French Academy of Medicine, the French National Ethic Committee, and the Dutch National Society of Physicians.[13]

Although it is unlikely that we will see greater transparency by the US government regarding these questionable practices, I would like to see our national dental organizations, as well as the boards of the specialties of orthodontics, pediatric dentistry, public health dentistry, and oral and maxillofacial radiology, develop a consensus statement regarding this scientifically and ethically questionable method of chronologic age determination that carries no therapeutic or diagnostic purpose.

Until there is an accurate and reliable diagnostic test to assess chronologic age, I think that as representatives of our distinguished profession it behooves us to have the best interests of vulnerable children in mind and uphold the scientific and ethical principles we were taught.

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The Impact of COVID-19 on American Indian and Alaska Native Communities: A Call for Better Relational Models

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American Indian and Alaska Native (AI/AN) health outcomes improve when institutions and governments seek input from tribal leaders. In multiple instances, the historical failure to recognize the necessity of this inclusion has resulted in poor health outcomes in tribal communities; the ongoing impact of the COVID-19 pandemic serves as yet another example. The current pandemic is, however, also an opportunity for pivotal change in the way health programs interact with tribal communities. With the equal voice of tribal leaders, effective methods of consulting with tribes can be developed. Now is the time for governments and institutions to implement ongoing consultation regarding the current and long-term effects of COVID-19 on tribal communities and, in concert with tribal health leaders, to create new strategies for improved health outcomes among AI/ANs. We note the particular health system and socioeconomic effects of COVID-19 on tribal communities, and we highlight recent intergovernmental interactions—all with emphasis on the necessity of a consultative model in government– or institution–tribe interactions.

A UNIQUE DISEASE WITH A CLASSIC EFFECT

The epidemics introduced with the arrival of Europeans to the Americas, and the ensuing disease rates and death tolls on AI/AN communities, contribute to intergenerational trauma experienced in the daily lives of AI/ANs.[1] Yet, these epidemics are not just a reality of days long past, and each replay adds another layer of injury to already traumatized communities.[2]

Throughout Indian Country, many tribal members have either experienced epidemics firsthand or have heard stories passed on about affected family and community members. COVID-19 has been no exception in its magnified effect on AI/AN communities; AI/ANs in many regions are dying at a higher rate than any other population, and the disparity is alarming. As an example, since early 2020, the Minnesota Department of Health compiled weekly data comparing positive COVID-19 cumulative cases among its ethnic populations. Although age-adjusted total cases among AI/ANs remain lower than other populations in the state, AI/AN case mortality has consistently been approximately 50% higher than all other populations—including other minorities.[3] It is most likely that such a magnified effect of COVID-19 on mortality is multifactorial, and understanding the reasons for such high mortality rates requires close study of the unique health needs and resources of AI/AN communities—knowledge that usually exists and can be accessed from within the communities themselves.

STRESSED SOCIOECONOMIC AND HEALTH SYSTEMS

Mortality is not the only deleterious outcome of COVID-19. AI/AN communities are also reeling from the social, cultural, and economic consequences of sheltering in place. For thousands of years, culture and traditional practices have served as survival mechanisms for AI/AN people and communities; they are essential to healing and resilience in the direst of circumstances. The pandemic has prohibited tribal members from gathering and engaging in many community, cultural, and traditional practices, thereby excluding a fundamental element of creating and maintaining individual and collective well-being.

For most tribal communities, even in the best of circumstances, services and infrastructure are vastly underfunded. Many tribes rely on revenues generated by the gaming and tourism industries as means to supplement funding for housing; education; health care; courts and law enforcement; emergency services; roads, water, and sewer systems; and social services.[4] The pandemic has forced the loss of these integral revenue sources, which will result in significant long-term economic effects.

As happened to most clinics and hospitals, when tribal clinics limited access to care as a means to mitigate the spread of COVID-19, significant revenues were lost. However, the per patient care funding for the Indian Health Service (IHS), the primary source and system of tribal health, is less than half that of the per patient funding expenditures among major federal health care programs nationally.[5] Thus, the health impacts of COVID-19 are expected to be greater on patients receiving their care from tribal clinics, despite the best efforts of the IHS, than other patients receiving care through government-funded mechanisms. Furthermore, in 2018 fewer IHS patients reported any health insurance coverage than did the general population (22.0% compared with 8.5%), further decreasing revenues and increasing share in the burden of cost for tribal health programs and the IHS.[6,7]

CHALLENGES AND SUCCESSES

In an attempt to reduce the impacts of COVID-19, both state and federal governments offered assistance. In retrospect, we argue that major aspects of the initial federal response did not include significant input from tribal leaders and resulted in challenges in pandemic preparation in tribal communities. As a primary case in point, the federal government provided Tribal Nations with Coronavirus Aid, Relief, and Economic Security (CARES) Act and Centers for Disease Control monies. But, despite tribal leaders' requests that the health care funds be distributed via long-standing IHS mechanisms, they were distributed as noncompetitive grants.

The grant application system for funding the response in tribal communities was problematic for multiple reasons. The CARES funding grants were time consuming and effort intensive, resulting in delays as long as three months before payments reached communities. Such funding is managed like other grants, requiring building administrative management and reporting infrastructure in tribal organizations and often shifting tribal health professionals' attention away from ongoing and critical work. Additionally, it resulted in inappropriate funding scenarios. In a particularly concerning example, CARES funding specifically for AI/AN health was allocated to for-profit corporations in Alaska that do not manage tribal health—effectively creating a scenario of treating corporations as federally recognized tribes and reducing funding that would otherwise have been available for the pandemic response among tribal entities providing health services. With CARES, a greater consultative model with tribal health leaders could have saved time and money, as well as prevented a lawsuit brought by tribal leaders to modify eligibility guidelines. Indeed, modifications to better address direct funding to IHS, and extensions of CARES grant funding, were included in the provisions for the Coronavirus Response & Relief Supplemental Appropriations Act of 2021.[8]

Yet by contrast to the initial federal response through CARES to the needs of tribal communities, the Minnesota state government engaged tribal leaders early and regularly to assess tribal preparedness for COVID-19. This occurred through two different avenues. In 2018, Minnesotans elected a Native American lieutenant governor. Her presence increased state government respect for, and attention to, the needs of tribal communities. With the onset of the COVID-19 crisis, the lieutenant governor and her staff began to hold regular meetings with tribal leaders to hear their concerns about the consequence of the pandemic on their communities.

Additionally, since the early days of the pandemic, the Minnesota Department of Health has convened biweekly meetings with tribal health directors, providing updates on the status of infections and hospitalizations across the state as well as state and regional efforts to address COVID-19. This ultimately led to the state providing training for tribal community health members to perform their own contact tracing—a more effective mechanism for understanding the pandemic in tribal communities. Indeed, Tribal health directors in Minnesota report that this has resulted in a better response from community members. Although it is difficult to ascertain yet whether these efforts reduced mortality in Minnesota AI/AN populations, more accurate and available epidemiologic data provided by tribes themselves to the state would be expected to help with public health efforts and overall case reduction in tribal communities. That is, the deadly impact of COVID-19 on AI/ANs might otherwise have been worse.

CONSULTING TRIBAL HEALTH LEADERS

COVID-19 has significantly affected and continues to significantly affect tribal communities and will likely worsen the already poor health outcomes of AI/AN communities for many years. Altering these outcomes for the better will require significant funding of AI/AN health services and infrastructure as well as continued strengthening of collaborations with state governments and the US federal government. Most importantly, improving the health status of AI/AN people will require the presence of AI/AN health leadership at the forefront of any discussions that affect their communities. AJPH

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An Overburdened Charitable Food System: Making the Case for Increased Government Support During the COVID-19 Crisis

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The COVID-19 public health crisis has led to a historic increase in food insecurity throughout the United States. Long lines of people—some on foot, some in cars—waiting to receive food assistance have made headlines since March 2020. Photographs of these lines, reminiscent of photographs of the bread lines of the Great Depression, have highlighted the need for stronger coordination between government and the charitable food system to adequately address food insecurity.

In 2020, Feeding America conservatively projected a 36% growth in national food insecurity rates: from 11.5% in 2018 to 15.6%.[1,2] The proportion of disadvantaged adults receiving charitable food rose 61%: from 9.0% in December 2019 to 14.5% in June 2020.[3] To address this increased need, the charitable food assistance system has quickly adapted. However, the charitable system alone cannot meet this staggering hunger crisis. Federal and state government assistance must be expanded to support the charitable food system, as the repercussions of the pandemic are likely to continue for years to come.

AN OVERBURDENED CHARITABLE FOOD SYSTEM

In June 2020, Massachusetts had the highest unemployment rate in the country at 17.4%,[4] driving COVID-19 food insecurity rate projections to increase by 59%: from 8.9% in 2018 to 14.2% in 2020.[1,2] This increase is the highest in the nation. According to reports from The Greater Boston Food Bank's (GBFB's) network of 600 food distribution partners across Eastern Massachusetts, the number of people receiving food from GBFB's food pantry network doubled from 280 000 in May 2019 to 560 000 in May 2020 and remained at similarly high levels throughout 2020 (Figure 1). The actions taken by GBFB are representative of how the charitable food system has scaled rapidly to address the increased demand for food assistance. GBFB has had to increase food acquisition by 55%, primarily through increasing privately funded food purchases by approximately 130% for March through December 2020 (Figure A, available as a supplement to the online version of this article at http://www.ajph.org).

GBFB distributed this influx of food by relying on a robust and resilient food pantry network and partnerships with our state agencies. GBFB's long-term support of the network through annual infrastructure grants for items such as refrigerators and trucks prepared it to receive a sudden increase in food. From March through December 2020, 62% of the pantries ordered more food from GBFB than they had during the same period in the previous year, and 95% of the network remained open at any given time during the pandemic (GBFB unpublished administrative data). As the pandemic evolved, GBFB increased funding to food pantries and bolstered support of high-need communities by developing new partnerships with organizations that served as pop-up distribution centers. Through its network,

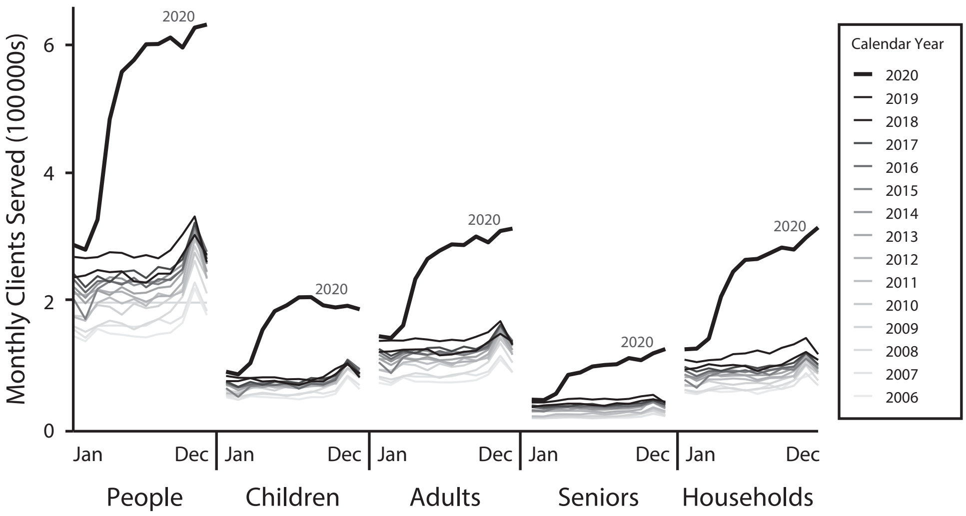

FIGURE 1— Monthly Clients Served by The Greater Boston Food Bank's (GBFB) Food Pantry Network: Boston, MA, 2006–2020

Note. Of 334 GBFB partner food pantries, 99% submitted data for December 2020. November spikes are attributable to increased pantry use around Thanksgiving. These are not unique counts because they do not take into account that some households attend multiple pantries each month.

GBFB distributed 94 million pounds of food from March through December 2020, a 58% increase compared with the same period in 2019 (Figure A). Fruits and vegetables continued to make up more than a third of food distributed (Figure A).

Charitable organizations have used their networks creatively to respond to the pandemic. However, these adaptations are unsustainable without systemic policy changes: 75% of GBFB's partner food pantries anticipate food supply challenges, 43% report limited physical space, and 36% report not enough staff and volunteers as their key concern (Massachusetts Food Security Task Force, food pantry and meal provider survey, November 2020). The substantial burden placed on the charitable food system must be mitigated by long-term government assistance to food banks and individuals. We can meet the hunger crisis only if our charitable, federal, and state food systems work together.

FEDERAL AND STATE SUPPORT

Since 1983, the US Department of Agriculture (USDA) has provided federal assistance to food banks by providing surplus commodities through the Emergency Food Assistance Program (TEFAP). TEFAP has expanded since 2019, partly as a result of the USDA's increased purchase of food directly from US farmers—designed to address decreased exports attributable to trade wars—and, as a result, food donations are expected to drop by 50% in 2021. The federal government also increased funding for TEFAP through the Coronavirus Aid, Relief, and Economic Security (CARES) Act and the Family First Coronavirus Response Act. Additionally, the USDA created the Coronavirus Food Assistance Program, which contracts regional vendors to provide food to individuals in need. However, some of these pandemic-specific programs were only temporarily extended as part of the relief package that was passed in December 2020.

States also support charitable food assistance. The Massachusetts governor, Charlie Baker, pulled together the Food Security Task Force, composed of state agencies and hunger relief organizations, which prioritized food assistance in the state's COVID-19 response and helped focus the state's collective response. The Salvation Army, in partnership with the Massachusetts Emergency Management Agency, created nonperishable food boxes that were distributed to hot spot areas of high need from May through August 2020. The state also led the way in rolling out the Pandemic Electronic Benefit Transfer (P-EBT) program, which came out of the CARES Act. The Massachusetts Emergency Food Assistance Program, a state economic stimulus program created in 1995 to support food banks in Massachusetts with funding to purchase food, was provided a significant increase, from $20 million to $30 million, in the fiscal year 2021 state budget.

Similar programs exist in Pennsylvania, Ohio, New Jersey, and New York.

THE GOVERNMENT'S ROLE IN REDUCING HUNGER

As these temporary, acute pandemic-response programs end, perilous food insecurity rates continue in Massachusetts and throughout the country. Following previous recessions, elevated food insecurity rates typically persisted for multiple years; after the Great Recession ended, it took nine years for food insecurity to return to prerecession levels.[5] Long-term federal and state support is essential to support household food security for the duration of an extended economic recovery.

Although the charitable food system is vital to addressing food insecurity in the United States, it is only one component. For every meal provided through food banks, nine are provided through the Supplemental Nutrition Assistance Program (SNAP).[6] Although the December 2020 stimulus package included temporary boosts for SNAP and TEFAP and improved guidance for P-EBT, this is just the first step in sustainably addressing food insecurity. President Biden's January 2020 executive orders to increase P-EBT by 15%, increase SNAP benefits for the lowest-income households, and revise the Thrifty Food Plan, on which SNAP benefits are calculated, are stronger steps in the right direction. The Biden–Harris administration has also called on Congress to extend the 15% SNAP benefit increase and invest another $4 billion in Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

As the charitable food system continues to experience an increased demand for food, the increased cost of food, and supply chain disruptions, it cannot guarantee a consistent food supply without continued government support. Throughout the economic recovery, the federal government must increase funding for programs that support the charitable food system, like SNAP, WIC, P-EBT, school meals, and TEFAP. Greater transparency and accountability in new USDA programs will allow charitable food providers to adequately plan for program changes and disruptions. States should create food-purchasing programs, similar to the Massachusetts Emergency Food Assistance Program, and support state emergency management agencies to create large-scale emergency food programs, such as the Massachusetts Emergency Management Agency food box program.

Many people facing food insecurity in the United States are unable to access federal safety net programs because of income level, immigration status, work requirements, or other disqualifying factors. Even before the pandemic, it was not just those in poverty who were experiencing food insecurity: 32% of the nation's food insecure population was ineligible for federal food assistance because they had a household income above the eligibility income threshold.[2] Now, more than ever, these eligibility barriers need to be reevaluated and increased to successfully reduce hunger in the United States.

Further, long-term policy initiatives are necessary to meet Americans' food needs and offset the pandemic-induced unsustainable reliance on food banks as emergency programs sunset. Systemic policy solutions include increasing the minimum wage to $15 an hour nationwide, expanding eligibility and permanently increasing benefits for SNAP and WIC, building on the existing Community Eligibility Program to create a nationwide universal school meals program, and installing P-EBT as a permanent program to allow low-income students to access food during school breaks to supplement overburdened charitable food organizations.

Food insecurity was an emergency long before the COVID-19 crisis. The United States has the potential to transform its hunger crisis response into a sustainable solution if it uses the multifaceted approach of addressing the wealth gap while boosting and sustaining federal nutrition programs to systematically address food insecurity in the United States. AJPH

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The Ocean Decade—Opportunities for Oceans and Human Health Programs to Contribute to Public Health

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The COVID-19 pandemic reminds us that our health is vulnerable to immediate threats emerging from the ecosystems we inhabit. More insidious global threats include the increasingly overt consequences of climate change, biodiversity loss, and pollution. As the largest connected ecosystem on Earth, the global ocean exerts a greater influence than any other on our climate and weather, affecting global food production and international trade. Much more importantly, human health is intricately linked to "ocean health."[1,2]

The United Nations has announced the Decade of Ocean Science for Sustainable Development from 2021 to 2030 (http://bit.ly/3kePT9f). Public health and medical professionals should embrace this timely opportunity to transform the way we interact with our seas. We call for a revitalized, inclusive endeavor to repair the damage we have done during our careless past and to protect the myriad benefits available in the future. Making amends will necessitate bringing together ocean researchers, health professionals, coastal communities, policymakers, and other stakeholders to work on delivering a resilient, sustainable ocean that fosters improvements in public health.

DANGERS AND BENEFITS FROM THE DEEP

Dangers to health and well-being arising in coastal waters, regional seas, and the global ocean have long been recognized by marine scientists but less so by the medical and public health community.[1] Our past and present use of our seas as a waste sink has already had severe, wide-ranging effects on sea life but also on humans. The mosaic of risks and occurrences includes drowning, injury, loss of livelihood, and property damage from extreme weather events, tsunamis, and coastal flooding, together with exposure to harmful algal blooms, chemical pollution, and microbial pollution. These threats are compounded by the sea-level rise, ocean warming, acidification, and deoxygenation associated with global change.

Worldwide, more than 250 million clinical cases of gastroenteritis and respiratory disease are linked annually to swimming in contaminated seas.[1,3,4] Other direct health threats arise through disease transmission and ingestion of toxic substances. For example, in indigenous Arctic communities, persistent organic pollutants accumulate to dangerously high levels. Indirect health effects arise as fisheries collapse and livelihoods are damaged, especially in vulnerable coastal communities. Human activities continue to degrade estuaries and coasts; and they have even contaminated the deep abyss and polar seas, leading to the destruction of habitats and severe losses of biodiversity.[1–4] Further adverse consequences for humanity are likely to follow.

But it is not all bad news. Healthy oceans foster healthy people. For more than 4.5 billion people, approximately 15% of their daily per capita intake of animal protein comes from marine products.[5] Seafood provides a source of micronutrients and omega-3 fatty acids essential for good physical and mental health. Other natural extracts from marine organisms have been turned into disease treatments (e.g., for cancer) or used in diagnostic tools (e.g., key enzymes incorporated into tests for COVID-19 and other viral diseases; https://bit.ly/37Ekc4b).

The lockdowns during the current pandemic have been a vivid reminder of our huge reliance on being able to visit natural settings, in particular coastal areas, for health and well-being. Studies over the past 10 years have demonstrated that spending time in high-quality "blue" spaces (through leisure activities or living in a coastal environment) directly supports and enhances health and well-being, combatting obesity and mental health problems, particularly in deprived populations.[6] This highlights an enormous potential for these well-being promotion initiatives and healthcare interventions to address both preexisting and emerging health issues beyond the lifetime of the pandemic.

LAUNCHING A PLAN OF ACTION

During the past three decades, Oceans and Human Health (OHH) researchers have explored how the health of the ocean influences the social and environmental determinants of human health and well-being. This is a practical attempt to engage public health and biomedical professionals with marine and more general environmental scientists to create evidence-based policies and actions in partnership with affected communities and decision makers (https://bit.ly/3qXBAst).[1]

Starting in the United States in the 1990s (https://bit.ly/3aJ1nP4), the OHH approach has provided a method for setting priorities for adaptation and mitigation as the global marine ecosystem transforms. In Europe, the Horizon 2020 SOPHIE Project (https://sophie2020.eu/strategic-research-agenda) has identified three key areas where interdisciplinary teams from the OHH community can push forward innovative actions with diverse multilevel stakeholders to respond to current and future circumstances:

- sustainable seafood for healthy people;
- biodiversity, biotechnology, and medicine; and
- blue spaces, tourism, and well-being.

An example of innovative action is the OHH Chair, jointly created in 2018 by the City of Roses, the University of Girona, the Fishermen Association of the Town of Roses, and the Fishmongers Guild of Catalonia, with the support of diverse publics (http://www.oceanshealth.udg.edu/en/where-is-it.html). To facilitate such sustainable management in partnership with local citizens, information systems need to be established to measure and link ocean–human health indicators, providing baselines and enabling changes to be monitored over time.

The drama of social injustice is also being played out in the OHH arena. Globally, small island nations, low-income countries, and poor vulnerable populations living along coastlines are already experiencing the often dangerous consequences of the climate and biodiversity crises. They have contributed the least to the problem but are the most at risk, and they are without the resources to respond.[1] Nevertheless, as the current global pandemic is demonstrating, when humanity faces a great challenge, extraordinary measures can be taken. There is now a tremendous opportunity and public momentum for health professionals to join with ocean researchers to help policymakers, the business community, and the wider public to address systemic global challenges in a new way (http://bit.ly/2ZDFMS3).[7]

We need international alliances, transdisciplinary collaborations, and global governance that support innovative, systemic ways of managing ocean resources. Examples include natural marine products as ecological alternatives to plastics, marine renewable energy as an alternative to fossil fuels, and marine protected areas for restocking fisheries and helping biodiversity recover. The last of these can also serve as natural blue infrastructure to protect against climate change, while giving people access to nature to promote their physical and mental well-being.[1,6,7]

These first steps toward integrating public health into OHH will need to involve us all (see box on pp. 830–831). Success can be achieved only by instilling proenvironmental behavior at individual and community levels and by involving affected communities and stakeholders in participatory governance to develop local solutions to the issues they face. The personal meaning of the challenges that communities face and the sense of personal vulnerability can generate greater awareness and create engagement. Providing practical solutions locally can empower sustainable actions, especially when supported by national and international higher-level policies and regulatory frameworks (http://bit.ly/3btc7Ao).

Ideas on Possible First Steps to Improve Ocean and Human Health (OHH) Interactions for the Public Health and Other Communities, Not Exhaustive

Actors	Possible (First) Steps[a]
Medical and social care sector (doctors, nurses, mental health experts, social workers), public health experts	• Integrate with individual and community health promotion activities, "Blue prescriptions" (and monitoring)[b]
	• Include OHH in medical curriculum
	• Work with environmental and city planners to seek cobenefits in planning for humans and the environment
	• Get involved in advice and activities at local, national, and global levels
Researchers	• Build on the OHH Strategic Research Agenda (a first step)[b]
	• Research the evidence gaps and provide evidence to policymakers
	• Promote transdisciplinary training
	• Design and support implementation of dedicated OHH indictors, data streams, and repositories
	• Get involved in community cocreation and listen!
	• Get involved in science advice activities at local, national, and global levels to facilitate evidence-based policy
Citizens (local residents and tourists)	• Enjoy the sea, coasts, and blue spaces safely and sustainably
	• Encourage school projects on ocean literacy, respect for the sea, sustainability, and citizen responsibility and involvement
	• Participate in clean-up activities (e.g., Plogging, Sweden; Surfers Against Sewage, United Kingdom)
	• Seek out science activities near your home involving citizens (monitoring, counting)
	• Listen to stories from the elderly and others about the sea
Private organizations (tourism operators, holiday rentals, camp sites, etc.), businesses, and nongovernmental organizations	• Inform clients on what a stay by the sea can do for their health and the importance of ocean health for their health
	• Involve clients in citizen science projects
	• Ask their feedback on their experiences including impact on their health and well-being
	• Share these experiences (Web site, OHH platform)
Large international and local businesses	• Review and act on the impacts of supply chain, waste, and other business activities on ocean health
	• Share these actions within and beyond the individual business (Web site, OHH platform)
	• Support employee and local community activities that support ocean health
	• Join with other similar businesses and supply chains to share best practices and drive innovation toward a healthy ocean
Local planners and policymakers	• Integrate OHH as part of your local programming
	• Engage in listening and cocreation events with local citizens

Continued

SUMMARY

The devastating COVID-19 pandemic and the perilous state of our seas have made clear that we share a single planet with a single global ocean. Our moral compass points to addressing the myriad threats and opportunities we encounter by protecting and providing for everyone, both rich and poor, while learning to sustain all ecosystems. The UN Ocean Decade is a chance to truly transform the way we interact with the global ocean. Given how critical the link is between the oceans and human health and how important the ocean is for humans, achieving the aims of the Ocean Decade should not be left to just the ocean community. By working together, we add impetus to finding powerful, effective, new ways to foster a step change in public health. AJPH

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Actors	Possible (First) Steps[a]
	• Secure equitable access to the coasts and sea in spatial plans with environmental sustainability and quality at the forefront
	• Work with public health and environment officers on benefits and risks from the ocean
National and regional ministries (health, water, environment, fisheries and agriculture, industry)	• Monitor continuously the effects on downstream usages in policy development (system-based approach) on health of humans and the environment
	• Assess environment and human health in collaboration with citizens and experts
	• Develop a common language and work with diverse stakeholders
Policymakers	• Prioritize the OHH agenda and work on awareness across different directorates
	• Develop a common language on OHH
	• Facilitate interdisciplinary discussions and funding for OHH research and training cocreated with communities
	• Include the interdependencies of environment and health in all policy development
Diverse groups	• Consider coming together to propose specific local, regional, and global UN Ocean Decade Actions (e.g., networks, dedicated resources, research programs, etc.)[c]

[a] Examples can be found at https://sophie2020.eu; https://en.unesco.org/biosphere; https://www.blueclimateinitiative.org.

[b] Examples can be found at https://sophie2020.eu/strategic-research-agenda.

[c] Examples can be found at https://www.oceandecade.org/events/134/United-Nations-Decade-of-Ocean-Science-for-Sustainable-Development-2021–2030–Call-for-Decade-Actions-No-012020.

Project] and 666773 [H2020 BlueHealth Project]); the UK Natural Environment Research Council and the UK Research and Innovation's Global Challenges Research Fund for the Blue Communities Project; the Blue Climate Initiative Health and Wellbeing Subgroup (https://www.blueclimateinitiative.org); the University of Girona; the City Council of Roses; the Catalan Fishmonger's Association; the Roses Fishers' Association; the Town Council of Tossa de Mar; and the government of Catalonia (the sponsors of the Roses Oceans and Human Health Chair).

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Alcohol, Binge Drinking, and Cancer Risk: Accelerating Public Health Messaging Through Countermarketing

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A number of public health groups, including the American Public Health Association (APHA), have recently called for warning labels on alcoholic beverages to inform the public of the increased risk of cancer.[1,2] The International Agency for Research on Cancer classifies alcohol as a group I carcinogen, in the same league as tobacco, human papilloma virus, and hepatitis.[3] Epidemiologists have reported a link between cancer and alcohol consumption for decades (e.g., Flamant et al.[4]; Williams and Horm[5]), with consistent associations with cancers of the (1) oral cavity and pharynx, (2) esophagus, (3) larynx, (4) liver, (5) breast, and (6) colorectum (ranked by strength of association). The American Society of Clinical Oncology's (ASCO) Committee on Alcohol and Cancer also calls for (1) promoting public education, (2) supporting policy efforts through the use of evidence-based strategies, (3) providing education to oncology providers, and (4) identifying research gaps between alcohol and cancer risk and outcomes.[6]

Together the APHA and ASCO statements are timely, as warning labels have the clear advantage of ensuring messaging directly to the consumers of a product, but such messages are less effective when health providers do not reinforce them. ASCO's influence is critical because there is a documented lack of physician, as well as general public, awareness of the association between alcohol and cancer risk (for a recent systematic review, see Scheideler and Klein[7]). The lack of awareness of cancer risk, and reinforcement if risk is known, may be because the relative risk between alcohol and common cancers, like breast and colorectal cancers, is much more modest than the relative risk for alcohol and oral cavity and liver cancers. There has been some consistent evidence supporting a cardioprotective effect of moderate alcohol consumption that only recently has been debunked.[8] Thus, now is the time to push for broader awareness of the alcohol and cancer connection. In addition to the strategies put forth in the APHA and ASCO statements, we believe that the strategic use of countermarketing, a marketing strategy successfully used to change risk perceptions and behavior toward smoking, may hold the key to helping create awareness of alcohol as a carcinogen.[9]

COUNTERMARKETING

Although the use of warning labels is one component of many product-based public health campaigns, it is likely to have only a limited impact without structural changes, as we have seen with cigarette smoking.[10] The recent APHA policy statement on reducing population-level health effects from alcohol outlines some of these structural approaches.[11] For reducing population-level effects of alcohol on different cancers, given the long latency between exposure and cancer diagnoses as well as the recognition that alcohol habits start in adolescence and early adulthood, structural changes that can augment the use of warning labels and other public health measures specifically to younger adults is needed. Aggressive public policy changes, such as restrictions on alcohol advertising and economic disincentives, may work to reduce alcohol use in young adults; however, we believe an approach that focuses on the success of the antismoking advertising campaign "truth" using countermarketing may be an effective first step.

Beyond the medical community, the commonly held belief that moderate alcohol consumption is physically beneficial is mainly owing to the alcohol industry's strategic focus on maintaining its "health halo."[12] For instance, using public relations to support breast cancer charities with "pink-washed" products.[13] Efforts to communicate the risks of alcohol consumption at any level are challenged by both a media landscape of widespread unrestricted alcohol marketing and the cultural view that drinking is a social norm.

Lessons learned from more than 50 years of antismoking messaging and other public health interventions may be useful for successfully cutting through the bombardment of positive messaging on alcohol consumption from advertising, product placement, and portrayals of drinking in the mass media. For example, even with the full support of the health care community and government policies—such as warning labels, tobacco taxation, a ban on TV and radio advertising, and antismoking public service announcements—youth smoking in the United States (12th graders) was reduced by only 0.07% from 1980 to 2000.[14] By contrast, the next 19 years show a striking difference, with a decline of 18.9%.[14] There are numerous contributing factors at play that can, in part, explain this decline; however, the most notable from a marketing perspective was the implementation of a countermarketing strategy.

Countermarketing focuses on discrediting an opponent's message and has been a powerful strategy in public health campaigns when corporations are depicted as bad actors.[15] The Truth Initiative's countermarketing "truth" campaign, which rolled out nationally in 2000, became one of the most successful antismoking campaigns to date.[16] This campaign successfully changed adolescents' risk perception of smoking not through fear appeals or loss-framed messages but through countermarketing that discredited the message presented by the tobacco industry. For example, the "truth" TV commercial "Squadron" shows a number of small planes flying over a crowded beach pulling an airplane banner with the question "What's in cigarette smoke?" followed by dozens of planes with banners listing toxic chemicals. The commercial ends with the tagline "Knowledge is contagious."[17]

Countermarketing campaigns are often particularly successful among adolescents, as the industry, not the consumer, is depicted as the bad actor. In addition to the successful antismoking "truth" campaign, countermarketing techniques have been employed to raise awareness about unhealthy foods and beverages.[9] We propose that by using the alcohol industry's focus on maintaining their health halo and their practice of pink washing, countermarketing may provide the necessary impact to produce attitudinal change.

CAMPAIGNS AGAINST BINGE DRINKING?

Important recent epidemiological[18] and laboratory evidence[19] on the independent role (on cancer risks) of binge drinking and the biological effect of alcohol on stem cells, respectively, provides a promising path for public health action on binge drinking over more general campaigns about alcohol avoidance. There is the practical reality that alcohol consumption is woven into the fabric of many cultures, but binge drinking is not. Countermarketing campaigns that inform the public that cancer risk can be reduced by eliminating binge drinking may be more palatable than complete abstinence. However, recent data from the Centers for Disease Control and Prevention demonstrated that most adults are not asked specifically about binge drinking by their health care professional even if they are asked about alcohol use.[20] Even more sobering, of those who reported to their health care provider that they did engage in binge-level drinking, less than half of the admitted binge-drinking individuals (41.7%) were provided with information about the harms of heavy drinking, and only a fifth (20.1%) were specifically told by their health care provider to reduce their level of drinking.

The first step in creating awareness regarding the link between cancer and alcohol can be best accomplished by focusing on a multifaceted communication approach, including the use of warning labels, community provider education, and countermarketing campaigns. The similarities between the alcohol industry's and the tobacco industry's misuse of health data set the stage for another "truth"-like countermarketing campaign focused on exposing the alcohol industry's creation of a health halo while delivering the message that binge drinking, in addition to overall alcohol consumption, is linked to cancer risk. Although COVID-19 may have increased alcohol use,[21] the pandemic disrupted behavioral routines that may provide a more receptive audience to marketing interventions to change attitudes and behavior toward alcohol.[22] Using public health communication tools such as warning labels and community provider education is critical for creating public awareness of alcohol as a carcinogen, but to change attitudes and ultimately behavior toward alcohol use will entail creating persuasive health communication focused on truth telling and individual well-being. AJPH

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White Supremacy and the Core Functions of Public Health

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Global outrage followed the murder of George Floyd by now former Minneapolis, Minnesota, police officers. The outrage was targeted at police brutality—police conduct that dehumanizes through the use of physical, emotional, or sexual violence as well as verbal and psychological intimidation, regardless of conscious intent—one of the oldest forms of structural racism.[1] In decrying police brutality, many public health organizations issued statements declaring racism a public health crisis, with promises of change. However, change is stymied if we do not critically evaluate how the discipline (scholarship, conceptual frameworks, methodologies), organizations (governmental, nonprofit, and private institutions that seek to promote population health), and public health professionals (in academia or practice) contribute to structural racism that is manifested in police brutality, among many other outcomes.

"Structural racism" here refers to policies and practices, in a constellation of institutions, that confer advantages on people considered White and ideologies that maintain and defend these advantages, while simultaneously oppressing other racialized groups.[2] Structural racism is sustained through White supremacy: the glossary of conditions, practices, and ideologies that underscore the hegemony of whiteness and White political, social, cultural, and economic domination.[3,4] White supremacy makes it possible for structural racism to reproduce over time, albeit with different mechanisms, from the enslavement of Black people to mass incarceration. Consideration of White supremacy makes visible that structural racism is "White controlled,"[4] and without examining the former, we will not dismantle the latter in public health.

Public health is organized in a framework of three core functions—assessment, policy development, and assurance—and 10 essential public health services (EPHSs). The framework is meant to help public health "speak with one voice" about what public health is and what it aspires to do.[5] This framework has been immensely influential. Accreditation of public health departments and educational programs partially relies on EPHSs and is included in some state statutes. The EPHSs are taught in our classrooms, are used for performance measurement and evaluation, and have helped to communicate to the public and policymakers what public health is about.[5]

The revised EPHSs were recently released, 25 years after the original framework was developed. The most important change is that the framework now centers equity, defined as a "fair and just opportunity for all to achieve good health and well-being."[6] In the equity statement, racism is mentioned as one of the "forms of oppression" that the EPHSs should address. Living up to the potential of equity requires directly addressing structural racism and White supremacy. We provide examples of strategies in the core functions and EPHSs to do so (Table 1 presents a summary of these).

ASSESSMENT

The core function of assessment is a focus on surveillance. The first EPHS is to "assess and monitor population health status, factors that influence health, and community needs and assets." The revision to this EPHS emphasizes "root causes of inequities." If police brutality and structural racism are root causes, then our health surveillance systems and surveys, such as the National Health Interview Survey and the Behavioral Risk Factor Surveillance System (BRFSS), should routinely track experiences of police brutality, as well as exposure to structural racism. Embedding geocoded information on racial inequities in socioeconomic status in the National Longitudinal Study of Adolescent Health is a good example of this approach.[7] We should assess indicators of structural racism, such as racial inequities in

TABLE 1— Public Health's Core Functions and Essential Services as an Organizing Framework for Dismantling White Supremacy

Core Functions	Essential Services	Example Strategies for Dismantling White Supremacy
1. Assessment	1. Assess and monitor population health status, factors that influence health, and community needs and assets	Routinely track and report respondents' exposures to and experiences of police brutality and other indicators of structural racism and White supremacy
	2. Investigate, diagnose, and address health problems and hazards affecting the population	Investigate the complex mechanisms through which White supremacy shapes health outcomes
2. Policy development	3. Communicate effectively to inform and educate people about health, factors that influence it, and how to improve it	Educate the public and policymakers on indicators of White supremacy and how these might shape the social determinants of health
	4. Strengthen, support, and mobilize communities and partnerships to improve health	Ensure equitable allocation of resources and redistribution of power in community partnerships
	5. Create, champion, and implement policies, plans, and laws that affect health	Policies must center the experiences of those most affected by structural racism and White supremacy
	6. Utilize legal and regulatory actions designed to improve and protect the public's health	Develop and enforce regulations and policies to dismantle practices that maintain structural racism and White supremacy
3. Assurance	7. Ensure an effective system that enables equitable access to the individual services and care needed to be healthy	Acknowledge racist systems, advocate antiracist policies, and link Black people, Latinx people, Indigenous people, and other people of color with a range of resources
	8. Build and support a diverse and skilled public health workforce	Set clear expectations for education on equity. Schools of public health and public health institutions should set measurable goals on racial equity competency for students and practitioners
	9. Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement	Focus on critical race conceptual frameworks and antiracist methodologies. Mandate measuring and reporting diversity, equity, and inclusion efforts
	10. Build and maintain a strong organizational infrastructure for public health	The infrastructure for teaching, research, and practice should be grounded in critical race theory so that the implications of historical and contemporary manifestations of White supremacy are addressed

opportunities, legislation, and policy outcomes; criminalization and incarceration; and neighborhood- or zip code–level inequities in assets, debts, political participation, housing, and employment patterns.[8,9]

In 2002, BRFSS added an optional module, Reactions to Race, but few states administered it. That our surveillance systems do not routinely collect data on racism is one indication of how White supremacy plays out in public health: ignoring everyday experiences of, and exposures to, salient stressors among Black people, Indigenous people, and other people of color (BIPOC). Expanding analyses of the impact of structural racism and White supremacy on the distribution of needs and assets in communities should be a critical aspect of assessment.

The second EPHS is to "investigate, diagnose, and address health problems and hazards." Using the example of police brutality, scholars need to continue to identify mechanisms such as mass incarceration, stress proliferation, institutional mistrust, and economic and financial strain that link health with exposure to and experiences of police brutality.[1] We must also investigate the mechanisms through which other indicators of structural racism and White supremacy shape health outcomes. Hitherto, public health has accounted for race in health disparities research but has rarely examined the role of structural racism.[10]

POLICY DEVELOPMENT

Public health's third essential service is to "communicate effectively to inform and educate people about health, factors that influence it, and how to improve it." Global protests against racism and the attention to racial inequities in the impact of COVID-19 present no better time to confront White supremacy in communication. However, public health institutions such as the Centers for Disease Control and Prevention did not issue any specific official statements on structural racism. Statements that some other public health organizations have released fall short. For example, the American Public Health Association stated:

> [The organization] denounces the use of violent methods by law enforcement against peaceful protesters. The current protests are the result of the American people rightfully demanding an end to the racial profiling by some police officers and a system of structured racism resulting in disproportionate harm to the health of individuals and communities of color.[11]

Although the full statement acknowledges racism as a public health crisis, it neither educates readers on the meaning and manifestations of racism nor implicates White supremacy. Public health has largely failed to take advantage of this opportunity to educate the public about racism and White supremacy, beyond well-intentioned statements that can often be distilled to "racism is bad" and "'they' [the police, other institutions, and people who are racist] need to do better." Public health organizations, institutions, and practitioners must actively educate the public about the role of racism in producing health inequities. For example, speaking up against the recent surgeon general's report on maternal mortality,[12] which does not mention racism as a fundamental cause of racial inequities in maternal health outcomes, and against policies such as former president Trump's Executive Order 13950, which banned training in critical race theory, are necessary actions for educating the public about factors that influence health.

The fourth EPHS is "strengthen, support, and mobilize communities and partnerships to improve health." The revised version focuses on authentic relationships to promote equity. Authenticity is difficult to achieve given inherent power differentials. Public health leaders, most of whom are White, primarily make decisions about the allocation of resources for research and practice, shape engagement of stakeholders, and determine whether and how the perspectives of community members are used.[13] Redistributing power in community partnerships can help challenge White supremacy. Our community partnerships should be characterized by frequent open conversations about power dynamics that are at play. We also think it is time for our funding agencies to not fund community-based research unless researchers demonstrate that the allocation of resources is fair and there is equitable compensation for community partners.

Public health's fifth EPHS is to "create, champion, and implement policies, plans, and laws that affect health." The knowledge that informs policy should be grounded in the experiences of those most affected. But policymakers and academic researchers are predominantly White.[14,15] As a result, White intellectual dominance characterizes the production of knowledge, its translation into practice, and the formulation of policy. As a profession, we need to address the reality that research led by Black scholars who have the experiential knowledge of how racism and White supremacy affect health is less likely to be funded than research led by their White counterparts.[16] We must also prioritize work that centers the experiences of historically excluded populations most affected by White supremacy. One way forward is to engage more meaningfully with grassroots organizations such as Black Lives Matter and to extend our professional responsibilities to include community-engaged advocacy for the policy priorities these organizations have articulated. Public health must be intentional about finding ways to create space for those without formal power to influence decision-making through the expertise of their lived experiences, especially experiences of racism.[13]

The sixth EPHS is "utilize legal and regulatory actions designed to improve and protect the public's health." Public health performs this service well when it comes to enforcement in areas such as immunization, tobacco, and alcohol regulations. However, the field is yet to develop regulations to dismantle practices that specifically uphold structural racism and White supremacy. For example, public health should be at the forefront of enforcing regulations to prevent disposal of toxic waste in Black and Indigenous communities. Mandating restorative justice practices that prevent the disproportionate incarceration of BIPOC is necessary.

ASSURANCE

Under the core function of assurance, the seventh EPHS is ensuring "an effective system that enables equitable access to the individual services and care needed to be healthy." We must first recognize areas of significant need and acknowledge how historical and contemporary forms of racism act as barriers to accessing services that meet these needs. For example, public health institutions and organizations should address the ongoing mistrust in medical institutions and the COVID-19 vaccine hesitancy by first acknowledging the harm science and medicine have inflicted on Black, Latinx, and Indigenous communities. Promoting vaccine uptake must be done simultaneously with advocating policies to ensure access to testing, treatment, and other resources needed to survive the pandemic. For communities to trust in public health and utilize the services and systems we provide, public health must first be trustworthy.[17]

The eighth EPHS is "build and support a diverse and skilled public health workforce." We know that the public health workforce is disproportionately White, especially at the supervisory and managerial levels.[14] Schools of public health are also disproportionately White. In 2017, only 0.2% of tenured faculty were Native American, 3.8% were Black, and 7.4% were Latinx/Hispanic, and those numbers have barely budged in years.[15] That a predominantly White profession and discipline is charged with educating and addressing the needs of communities that are disproportionately Black, Indigenous, and Latinx sustains White supremacy within public health. White frames dominate the information we convey, the interventions we develop, and the policies we implement, all of which are often completely disconnected from the experiences of the people most likely to experience health inequities.

The training that public health practitioners often receive is partially responsible for our inability to address structural racism and White supremacy. Leading textbooks intended for undergraduate education often fail to critically analyze the concept of race and barely touch on racism. Moreover, a recent review of 59 accredited schools of public health found that only 33% mentioned diversity, inclusion, or equity in their public mission, vision, or values statements, and 20% made no mention of any of these terms in their goals, objectives, or strategic plans.[18] It is encouraging that the revised EPHS now mentions building a workforce that "practices cultural humility." But cultural humility in place of discussions of structural racism and White supremacy will not change much and echoes hanging our hats on the term "implicit bias," rather than talking about forms of racism. To begin to make antiracist training real, it is imperative that the Council on Education for Public Health set clear expectations for education on equity and racism and that schools and organizations set goals for racial equity competency for students and practitioners that are measurable and for which someone is accountable. Metzl and Hansen[19] have made the case for structural competency to be integrated into medical education, and the same should be promoted in public health.

The ninth EPHS is "improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement." It has been 10 years since Ford and Airhihenbuwa[20] laid the foundation of how critical race theory could help examine and address health inequities, but much of public health research still documents how health risks, behaviors, and outcomes vary by race, rarely naming racism[10] and with the concept of White supremacy almost invisible. We fully support the recommendations of Boyd et al.[21] for standards that include rejecting the publication of articles that use race but do not examine racism. Dismantling White supremacy through quality improvement also requires us to make diversity, equity, and inclusion a meaningful part of the Public Health Accreditation Board and Council on Education for Public Health accreditation standards by requiring institutions and organizations to publicly report student, faculty, and workforce statistics by racial group.

The 10th EPHS is to "build and maintain a strong organizational infrastructure for public health." This service emphasizes ethical leadership, transparency, inclusivity, accountability, and equitable distribution of resources. Yet, many public health teaching institutions reside on land and have built endowments by selling land taken from Indigenous people through displacement and genocide.[22] The wealth of other institutions is grounded in the selling of Black persons who were enslaved.[23] Public health institutions have to thoughtfully engage with the reparations movement within their own institutions and nationally. And the infrastructure for teaching, research, and practice should be grounded in critical race theory so that the implications of historical and contemporary manifestations of White supremacy are addressed.

CONCLUSIONS

The core functions and EPHSs have alternatively been called "guidelines," "vocabulary standards," a "framework," and "principles." They provide a way of making sense of what public health is to us and to others. It is encouraging that the most recent revision centers the concept of equity. But to live up to equity in our EPHSs, they must also tackle structural racism and its roots: White supremacy. In the tradition of public health, we advocate going upstream to deliver the EPHSs, but fully going upstream requires naming and dismantling White supremacy. Success requires building alliances across systems to address the range of social determinants of health caused by White supremacy.

Assessment must include data collection, monitoring, and reporting racism pertinent to the health of BIPOC. Policy development must center on communication about White supremacy, building authentic community partnerships, eliminating regulations that sustain White supremacy, and centering the experiences of people most affected by White supremacy. Assurance requires us to analyze the impact of White supremacy on training curricula, scholarship, the racial composition of the public health workforce, and the public health infrastructure.

Sustained underinvestment in public health is a considerable barrier to achieving equity in the EPHSs, but this barrier fades in comparison with the disproportionately greater underinvestment in people who are more likely to experience early mortality because of White supremacy. We believe that addressing White supremacy does not require more money; it requires the reallocation of resources.

Although the strategies presented here are based on deeply and honestly examining the field and profession of public health, we echo an earlier call for self-reflection by individual scholars and practitioners: "We must ask ourselves if our own research, teaching, and service are fundamentally and unapologetically antiracist."[1(p664)] AJPH

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The authors have no conflicts of interest.

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Systematic Reviews Should Consider Effects From Both the Population and the Individual Perspective

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Risks of adverse health effects because of exposure to environmental factors or diet vary widely. People who smoke one to 10 cigarettes a day have a 2.6-fold higher risk of dying early and an 18.4-fold higher risk of lung cancer than nonsmokers.[1] In contrast, the risk of dying because of air pollution is only 1.08 times higher for a person living in a European city than for a person living in a rural area with an average annual 10 micrograms per cubic meter lower exposure to particulate matter (particulate matter with a diameter of ≤ 2.5 μm; $PM_{2.5}$).[2]

It may seem that the magnitude or relevance of the relative risk of air pollution is trivial in comparison with the relative risk of smoking. Some authors have even proposed that it would be better not to inform the public about very small environmental relative risks.[3] Nevertheless, interventions to reduce the effects of air pollution are considered at least as important as interventions to reduce smoking because, on the basis of the same relative risks, the number of people at the global level dying each year because of air pollution is estimated at 4.9 million and the number dying from smoking is estimated at 8.1 million.[4] Therefore, authors have argued that it is important to consider the effects of health determinants and health outcomes from a population perspective.[5]

Authors of systematic reviews summarize and synthesize the effects of exposures or interventions. Preferably, this will include judgments of the importance of these effects for an individual and a population. Systematic review authors typically present their results as the relative risk for the intervention or exposed group versus the control or unexposed group. The relative risk makes the effects of interventions easily comparable, but the impact is impossible to judge without knowledge of the baseline rate. A relative risk of 0.5 will result in a change in the risk of death of 0.25% if the baseline rate of death is 0.5%, but the same relative risk will result in a change of 25% if the baseline rate is 50%. That is why risk communication studies have revealed that effects of interventions are best understood as changes in absolute risks. To be able to calculate an absolute risk or risk difference, we need to know the baseline rate of the disease or event that is being measured.[6,7]

To explore the importance of a preventive effect from the population perspective, Rose put forward the "prevention paradox,"[8] according to which a small mean reduction in exposure for the entire population is more beneficial than a very large exposure reduction for only those who are at high risk. This paradox is especially relevant for decisions in which individual or population exposure reduction options exist, such as in lowering cholesterol or alcohol consumption.[9,10] However, it remains unclear how the relevance of a small reduction in the population mean risk should be judged by systematic reviewers or decision-makers.

Here we use Cochrane reviews to explore how presentation of effect sizes from the individual or population perspective can influence judgments about the importance of these effects and prevention strategies. We provide guidance for systematic review authors on how to consider the individual and the population perspective.

Judging the importance of effects can be confusing because people use different terms for the population perspective. Some use population risk, but this is inaccurate as there is only one risk that applies to both the individual and the group. Therefore, we use the term perspective because it is the perspective that changes the judgment. Here we use this as a public health perspective. We define the population perspective as the judgment of the impact of a risk or intervention for a group of individuals, similar to the concept of population health.[5] Usually this is expressed as the number of individuals affected by the risk or the intervention. From the population perspective, it is also possible to observe differences in the distribution of the risks or effects in the group, which is important for judging equity.

WAYS OF ACCOUNTING FOR THE INDIVIDUAL PERSPECTIVE

The individual perspective is typically used when considering the effects of a medical treatment. When the beneficial effects of an intervention outweigh the harmful effects, treatment effects will be judged as meaningful if they exceed a minimally important difference. The minimally important difference is defined as the smallest change in the outcome measure that is experienced as an improvement by individuals.[11] This typically involves the use of patient-reported outcomes that measure functioning or symptom burden or severity.[12] For other outcome measurements such as survival or mortality, it is unclear how people judge what degree of risk is meaningful; this may depend on individual preferences. For example, chemotherapy in early-stage breast cancer is associated with only a small increase in 5-year survival, and it is unclear whether such an increase would be judged as meaningful by patients.

The number needed to treat (NNT) metric has been developed to facilitate judgments of the effects of treatment, expressed as relative risks from the individual perspective. This measure is not better understood by patients than an absolute risk reduction. It also lacks a cutoff such as the minimally important difference to judge its relevance, and therefore it is not helpful in making a judgment about the importance or magnitude of an effect size from the individual perspective.[6,13] Presenting risks on a risk ladder that arranges several comparable risks in order of magnitude could be a helpful aid in communicating mortality risks.[13]

Prevention can be defined as an intervention to stop healthy people from experiencing future adverse health effects. From the individual perspective, judging the effects of prevention is more complicated. There is no minimally important difference that can help in this case because the intervention is applied to healthy people without symptoms or complaints. An individual will balance the costs of an intervention and the effort needed to implement it versus the intervention's future benefits.

Even though good systematic reviews are missing, studies consistently report that people are willing to put effort into individual preventive action only if they expect considerable absolute risk reductions. For example, it has been shown that people are willing to take preventive cardiovascular disease medication only if it results in an absolute risk reduction of at least 30%[14,15]; such a desired risk reduction is much larger than the clinical effects of the medication. These findings are consistent with the theory of discounting, in which future costs or health risks are valued less than those faced today.[16]

WAYS OF ACCOUNTING FOR THE POPULATION PERSPECTIVE

From the population perspective, the difference between therapy and prevention seems less important. To make a judgment about treatment from the population perspective, the risk difference between the intervention and control groups should be used. This risk difference can then be expressed as the number of events that can be prevented for a given population, such as the number of people dying from a myocardial infarction or tuberculosis. The population can be the population of the country or jurisdiction in which the study has been performed. It can also be expressed for an average country size of 30 million, which will facilitate comparisons between countries.

Several attempts have been made to better express the impact of treatment at the population level. Heller and Dobson proposed that, by taking into account the incidence of a disease and the implementation of an intervention, one can calculate an NNT for a specific disease at the population level.[17] The population NNT is the number of individuals in the entire population for whom the intervention must be available to prevent one event. According to Smeeth and Ebrahim, it would be better to take decreases in effectiveness into account when health care trials are implemented. The community effectiveness NNT would thus be substantially larger than an NNT derived from a trial.[18]

With respect to prevention of health effects from environmental or lifestyle risk factors, the impact at the population level also depends on the prevalence of the exposure, in addition to the baseline rate and the relative risk.[19] The prevalence of the exposure and the relative risk of the effects of exposure are used to calculate the population-attributable fraction (AFp).[20] The assumption that all exposures can be avoided leads to a relative risk of intervention equal to 1 − AFp. This calculation is similar to those used for the global burden of disease due to risk factors.[4] Table 1 shows, as an instructional example, that reducing air pollution can have a higher impact on mortality at the population level than reducing smoking. It is important to note that this is a simplification that does not consider a time horizon and uncertainty. It is also assumed that all smokers can be turned into nonsmokers and that all air pollution can be decreased by three units of exposure, which is not the same as a well-defined intervention.[21]

Judged from the individual perspective, environmental risks such as those resulting from air pollution will hardly be relevant. Reducing $PM_{2.5}$ with three units of exposure (30 $\mu g/m^3$) could potentially reduce mortality by 30%. This would reduce the average absolute risk of mortality from 8.0 per 1000 to 6.6 per 1000. Relative to the individual expectations of the preventive interventions described earlier, this absolute risk reduction of less than 1.4 per 1000 will be only minimally relevant from the individual perspective.

Air pollution and mortality is an exceptional case because the baseline rate is high, and all individuals are exposed to polluted air. In the case of other risk factors, the resulting number of preventable events could be much lower. It is therefore important to make assumptions explicit and to model consequences, as in the earlier-described example.

SALT REDUCTION AND CARDIOVASCULAR DEATHS

Salt reduction in preventing cardiovascular deaths provides another good example to judge the relevance of results from the individual perspective and from the population perspective. From the individual perspective, there should be a substantial reduction in absolute mortality risk that will be balanced against the effort needed to decrease individual salt consumption. From the population perspective, a reduction in salt intake, albeit a small reduction, should lead to the prevention of a considerable number of deaths.

TABLE 1— Hypothetical Comparison of the Effects of Reducing Smoking to Zero and Decreasing Air Pollution by Three Levels of Exposure From the Population Perspective

	Smoking	Air Pollution
Prevalence of exposure	0.137	0.85
RR of effects of exposure[a]	2.6	1.3
AFp[b]	0.18	0.18
Mortality base rate per 1000	8	8
RR of effects of intervention (1 − AFp)	0.82	0.82
Intervention mortality rate per 1000	6.6	6.6
Risk difference per 1000[c]	−1.44	−1.45
Number needed to treat	695	691
Deaths prevented per 30 million population	43 150	43 400

Note. AFp = population-attributable fraction; RR = relative risk.

[a] Chen and Hoek[2] reported a pooled relative risk for mortality of 1.08 per 10 $\mu g/m^3$. Three levels of exposure lead to a risk of 1.3 (1.08^3).

[b] AFp = p(RR − 1)/p(rr − 1) + 1 (Rothman et al.[20]).

[c] RD = BR × (RR − 1) (Newcombe and Bender[19]).

The Cochrane Library includes three reviews of the preventive effects of salt reduction.[22–24] In one review, Adler et al. synthesized randomized controlled trials that examined whether low-salt diets lead to reductions in cardiovascular events and mortality.[22] They found relative risks of cardiovascular disease mortality of 0.67 (95% confidence interval [CI] = 0.40, 1.12) among normotensive individuals and 1.00 (95% CI = 0.86, 1.15) among hypertensive individuals. The authors concluded that "there is insufficient power to confirm clinically important effects of dietary advice and salt substitution on cardiovascular mortality. They [the interventions] generally required considerable efforts to implement and would not be expected to have an effect on the burden of cardiovascular disease commensurate with their costs."[22] However, they did not provide a definition of "clinically important effects" and whether they considered these effects from the individual or the population perspective.

In another Cochrane review, He et al. synthesized randomized controlled trials of the effects of low-salt diets on blood pressure.[23] Their review showed that low-salt diets led to mean difference reductions of −4.18 millimeters mercury (95% CI = −5.18, −3.18) in systolic blood pressure and −2.06 millimeters mercury (95% CI = −2.67, −1.45) in diastolic blood pressure. The authors concluded that "there is high certainty evidence that a modest reduction in salt intake causes significant and, from a population viewpoint, important falls in BP [blood pressure].” Although He et al. were clear about the perspective, they did not define “important falls in BP.”

One way to judge the relevance of a blood pressure reduction from the population perspective is to model what the reduction would mean for mortality.[25] We used the meta-analysis of cohort studies on blood pressure and mortality by Lewington et al. to make these calculations (Table 2).[26] In this simplified model, we assumed that effects on stroke, ischemic heart disease, and other vascular disorders would be independent and could be averaged over all age categories. We calculated that this change in blood pressure would reduce the mortality risk for an average person from 0.65 per 1000 to 0.57 per 1000, which would probably be judged as trivial from the individual perspective. At the population level, it would lead to a number of preventable deaths that seems modest relative to the effects of reducing air pollution. A decision-maker would balance the number of preventable deaths against other factors important in decision-making such as costs and other burdens associated with the intervention.

The authors make seemingly contradictory conclusions in these reviews. When transformed to the same metric and judged from the same perspective, the review by He at al. yields a relative risk for mortality of approximately 0.86 (Table 2). This is well within the confidence interval of the review by Adler et al. It is difficult to judge whether the almost 8000 deaths prevented outweigh the costs of an intervention aimed at individual salt reduction. Adler et al. are probably correct in pointing out that implementing a reduced-salt diet might be too demanding for an individual given that only 10% of salt consumption is the result of individually added salt. However, salt reduction implemented at the population level (e.g., by reducing salt in food products) could be an alternative that does not require individual effort.

Population-level interventions[27] for dietary salt reduction were studied in another Cochrane review.[24] The authors evaluated whether interventions such as food product reformulation (i.e., food companies putting less salt in food products) and public information and education campaigns, among others, were effective in reducing salt intake. They included 15 studies, 10 of which provided quantitative data. The authors concluded that population-level interventions can influence dietary salt consumption but that there are large variations in effects, probably related to context and intervention components. They called for better evaluation studies.

From these reviews, we can conclude that it is highly unlikely that reduction of salt implemented either at the individual level, as a reduced-salt diet, or at the population level, as food product reformulation, will lead to effects on cardiovascular disease events or mortality that are relevant from the individual perspective. However, from the population perspective and based on modeling, salt reduction may lead to an important number of preventable deaths. Stating the perspective clearly and modeling the results from the population perspective makes

TABLE 2— Hypothetical Effects of Salt Reduction on Blood Pressure and Cardiovascular Mortality From the Population Perspective

	Cause-Specific Mortality			
	Stroke	**Ischemic Heart Disease**	**Other Vascular**	**Total**
Prevalence of “exposure” to BP[a]	1	1	1	
Reduction of systolic BP (mm Hg) with low-salt diet	4.2	4.2	4.2	
RR of mortality that relates to 4.2-mm BP reduction[b]	0.84	0.88	0.86	
Mortality base rate per 1000	0.47	1.00	0.50	
Intervention mortality rate per 1000	0.39	0.88	0.43	
Risk difference per 1000[c]	−0.08	−0.12	−0.07	
Number needed to treat	13 084	8239	14 764	
Deaths prevented per 30 million population	2293	3641	2032	7966

Note. BP = blood pressure; RR = relative risk.

[a] Prevalence of blood pressure is set at 1 because everyone is exposed.
[b] Conversion based on hazard ratios per 20-mm decrease in systolic BP provided by Lewington et al.[26]
[c] RD = BR × (RR-1) (Newcombe and Bender[19])

seemingly contradictory results compatible. These reviews also highlight the need for evidence from trials of individual and population-based interventions, as well as observational studies, to evaluate the importance of population-based public health interventions.

CONCLUSIONS

Here we have presented options for systematic reviewers to present risks from the individual and the population perspective. The individual perspective on the effects of therapy is best expressed by comparison with the minimally important difference or absolute risks ranked on a risk ladder. For preventive interventions, the individual perspective is best provided by the absolute risk decrease that considers the baseline risk. The literature suggests that an absolute risk decrease of 300 per 1000 can be used as a rule of thumb for relevance to individuals. The population perspective is best provided by presenting the NNT to prevent one event or the number of events or deaths at a concrete population level (e.g., an average country size of 30 million inhabitants).

The population perspective is dominant for questions addressing public health topics. When making judgments about the relevance of an effect size, we recommend that systematic reviewers clearly state and define whether they are taking an individual or population perspective. Information from different perspectives will help policymakers come to transparent and well-founded decisions. Policymakers must also weigh the trade-offs of reducing risks for a population even when individuals may see no benefit from a particular intervention. Both perspectives should be considered to recognize effects that are important from the population perspective.

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Addressing Public Health Needs With Health Technologies During COVID-19: A Medical Student Perspective

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The challenges posed by the COVID-19 pandemic were met with rapid scaling up of health technologies, which has affected health care access in public health settings. We highlight the benefits of technology in addressing social determinants of health and discuss its limitations for communities at risk for health disparities. Additionally, we consider Penn State Project ECHO (Extension for Community Healthcare Outcomes) as an interdisciplinary tool to meet clinical and community health needs. We end by examining how the pandemic has molded the current and next generations of medical students.

Early in the pandemic, the need to avoid physical, in-person contact to contain the spread of COVID-19 created a new standard of health care delivery. A recent study observed a reduction of office-based visits by 1520.8 visits per 10 000 people from April 2019 to April 2020.[1] Emergency department visits also decreased by 42%, comparing March 29 through April 25, 2020 to 2019.[2] Although in-person visits were decreasing, telemedicine, the use of telecommunication to remotely diagnose and treat patients, rapidly escalated by 4081% from April 2019 to April 2020.[1] Before COVID-19, telehealth services, which broadly encompasses telemedicine and tele-education, faced barriers to widespread implementation. The pandemic created the perfect storm for rapid telehealth integration, allowing providers to treat patients more conveniently and safely in the patients' homes.

Telehealth can also serve as an innovative intervention to address key social determinants of health, including health care access, socioeconomic conditions, and transportation. In 2018, a quarter of rural Americans reported traveling an average of 34 minutes to the closest acute care facility, 15 minutes longer than their urban counterparts.[3] Rural barriers are compounded by a lack of public transportation and personal vehicles. This situation is further exacerbated by hospital closures, including 21 in 2020, abruptly suspending outpatient, inpatient, and emergency services to its respective populations.[4] Telehealth can increase hospital geographic catchment, in turn combatting barriers to health services, especially in rural settings.

An increased reliance on technology, however, may perpetuate gaps in care among populations at risk for health disparities and limited health care access. In 2018, only three quarters of US adults had broadband Internet services at home.[5] Those who were the least likely to have these services included racial/ethnic minorities, older adults, rural residents, and those with lower levels of education and income.[5] This year, the highest utilization of telemedicine was among White (≥ 80%) populations and those in zip codes with populations living at greater than 400% of the federal poverty line.[1] This suggests that telemedicine has less opportunity for impact among our most underserved populations, demonstrating the challenge of using technology to improve equity without systemic solutions.

The urgency for virtual care has opened the floodgates for the rapid implementation of other health technologies. Bluetooth-enabled apps that automate contact tracing have set a precedent for surveillance tracking and outbreak response. Technology for the distribution of COVID-19 vaccines has been imperative for dose tracking, monitoring adverse events, and delivering information to the public. Other areas have also expanded, such as artificial intelligence for cough analysis and radiology findings, e-triaging tools integrated into emergency department electronic health records to decrease transmission risk and predict patient outcomes and readmissions, and products to monitor vitals for populations vulnerable to COVID-19. Understanding the boundless opportunities of health technology during the pandemic has exposed the next generation of physicians to innovative solutions to public health needs.

Using existing technology infrastructures during COVID-19 has been an efficient way to promote care collaboration with a reliance on virtual interdisciplinary teams. For example, Project ECHO is a global telementoring initiative that brings health care providers and subject matter experts together via video conference technology.[6] During COVID-19, Project ECHO has united physicians, nurses, social workers, pharmacists, researchers, and educators across the country to disseminate information on evidence-based practices for COVID-19 management, telehealth training, and vaccine safety and education. These educational efforts widened expertise on a variety of COVID-19 topics, increasing the knowledge, confidence, and competencies of all providers and enabling the collaboration of various disciplines for patient care.

Another opportunity for interdisciplinary team-based care and education is to assist in addressing the COVID-19 pandemic's disproportionate impact on racial/ethnic minority communities in the United States.[7] For example, Project ECHO partnered with Better Together REACH (Racial and Ethnic Approaches to Community Health) in March 2020 to conduct community-facing webinars in Spanish.[6] The goal was to educate the local Hispanic population about COVID-19, empowering community members to actively engage and ask questions in their native language. In this way, Project ECHO can provide education directly to communities at increased risk for health disparities and to providers who serve them. With ECHO "hubs" spanning the globe, Project ECHO offers institutions and academic centers the opportunity to improve care delivery and medical students to gain experience in clinical case-based learning and community health programs.

As first-year medical students during the onset of COVID-19, my cohort was in a unique position to view the health system with fresh eyes and begin to develop the skillsets that would prepare us for the changing landscape of health care. Immediately, all educational lessons, including physiology lectures, anatomy lab sessions, and clinical skills sessions, were moved to a virtual platform, creating a more flexible and personalized educational experience. Virtual clinical sessions with reduced physical exam capabilities were a stark contrast with traditional hands-on learning. Although initially challenging, this experience augmented the communication skills necessary to conduct effective virtual visits earlier than would be expected, preparing us for the increasing number of telehealth visits during rotations and residency. As future physicians, we must recognize not only telehealth's many benefits but also its limitations, especially in regard to populations with health disparities, and identify the conditions and situations for which telehealth will be beneficial. With deeper knowledge about health technologies, we will also be more equipped to overcome barriers to care for our patient populations.

Furthermore, the pandemic offered an opportunity for my cohort to address critical community and hospital needs in real time with out-of-the-box thinking, catalyzing a more macrolevel and hands-on understanding of health care. Our Penn State Health student body promptly assembled interdisciplinary COVID-19 task forces, focusing on topics such as contact tracing, technological advancements, clinical engineering and supply chain, and community health education. The quicker integration of emerging protocols, initiatives, and technologies at health institutions allowed students to make considerable contributions. Future generations of medical students would undoubtably benefit from curricula that use COVID-19 as a case study to explore the interdependency of public health and clinical medicine, technology use to address social determinants of health, and other aspects of public health, such as epidemiology and community health education.

COVID-19 was an impetus for the almost overnight shift in reliance on health technologies, and it has transformed public health. Although the pandemic created a great deal of uncertainty for medical students, it irrefutably shaped our generation and lent us a more robust educational experience with unparalleled opportunities to gain skills and knowledge of the health care system from a multidisciplinary approach. As we step into our roles as future physicians, we will be better equipped to address public health needs with existing or unconventional technologies. It is, however, imperative for us to ensure that current and future technology allows equitable and equal access to care for all Americans, including populations with significant health disparities. AJPH

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OSHA Enforcement to Protect Health Care Workers From Violence

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In 2018, the Cleveland Clinic seized nearly 30 000 weapons in its northeast Ohio emergency departments through metal detectors and 24/7 police staffing.[1] Its CEO and president called it "a national epidemic of violence against healthcare workers, especially in emergency departments."[1] Homicides are the third leading cause of all occupational fatalities,[2] which includes an annual average of 20 health care worker homicides.[3] From 2011 to 2013, health care workers suffered 15 000 to 20 000 workplace violence injuries—nearly as many as all other private industries combined.[4] The Joint Commission's accreditation standards include prevention of workplace violence.[5,6] However, the problem remains an escalating issue, with incidence rates of violence injuries in health care increasing every year since 2011.[3] Moreover, researchers estimate that up to two thirds of violent incidents in health care go unreported.[7,8]

GENERAL DUTY CLAUSE INTERPRETATION

Three recent decisions[9–11] clarify the Occupational Safety and Health Administration's (OSHA's) authority to protect health care workers from workplace violence. OSHA enforces workplace safety for the majority of employers in the United States, including health care facilities. No federal standard specific to violence exists for health care, only nonlegally binding OSHA-issued guidance.[4] Only nine states have created health care workplace violence laws. The US House of Representatives passed the federal Workplace Violence Prevention for Health Care and Social Service Workers Act in 2019, but it remains pending in the US Senate. Thus, for workers not protected under workplace violence laws—including non–health care workers—these three decisions may have far-reaching effects, even though they have not received widespread attention in the public health field.

Workers are protected under law by the Occupational Safety and Health Act's General Duty Clause, which states under 29 US Code §654(a)(1):

> Each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.

To enforce a violation, OSHA must establish that (1) the employer failed to keep the workplace free of a hazard to workers; (2) the hazard was recognized or recognizable; (3) the hazard was causing, or likely to cause, death or serious physical harm; and (4) there were feasible means to eliminate or materially reduce the hazard. No worker has to actually be killed or injured for OSHA to find a violation; the existence of the hazard creates the violation. These violations are often OSHA's last resort to protect workers when a more specific regulatory standard has not been violated at an unsafe workplace and are not necessarily easy to establish.

Citations of violations are appealable to an Occupational Safety and Health Review Commission (OSHRC) administrative law judge (ALJ), then to a panel of OSHRC commissioners, to the federal DC Circuit Court of Appeals, and, ultimately, to the US Supreme Court. In a matter of first impression, OSHRC in *Secretary of Labor v. Integra Health Management* upheld OSHA's citation under the General Duty Clause for an act of violence by a patient–client.[9] A caseworker was fatally stabbed by a mentally ill client who had a history of violence and noncompliance with medication. She had worked only three months with Integra and had no previous work experience in social work or with mentally ill patients. She was not required to complete Integra's two-hour online slideshow training session on violence before visiting the client and never attended the less than 45-minute face-to-face safety training with a trainer who was "not qualified."[9] After her initial meeting in the client's home, the worker raised safety concerns with her supervisor and requested that a co-worker accompany her on future visits, pursuant to Integra policy. That request was never granted.

OSHRC rejected Integra's arguments that violent behavior cannot be reasonably foreseeable and that human "free will" to attack with violence is inherently unpredictable, as well as that the "ubiquity of violence in society" absolved Integra.[9] The hazard was foreseeable because a "direct nexus" existed between the work and the hazard of workplace violence attributable to the types of clients, including their mental issues, medication noncompliance, and history of violence and because workers were alone with clients in their homes.[9] OSHRC found that the violence hazard required more than Integra's "inadequate" training and its unenforced policies.[9]

After Integra, the next violence case involved a decision by the federal DC Circuit Court of Appeals, upholding an ALJ decision finding a violation *in BHC Northwest Psychiatric Hospital v. Secretary of Labor*.[10] BHC argued that a lack of feasible methods existed to reduce violence.[10] The court found that sufficient evidence supported the ALJ's conclusion that that BHC had an inadequately implemented workplace violence training program, which consisted of a PowerPoint presentation with no evidence of how it was provided to workers.[10] Emergency alert systems relied on an inadequately distributed telephone system or walkie-talkies that staff often lacked or that frequently did not work.[10] Violence debriefings required by BHC's policies did not consistently occur or had such limited scope that they "did not meaningfully contribute to workplace safety."[10] BHC had a method to estimate patient aggression incidents, but staff were not actually required to report violent incidents.[10] The court stated that if the program on paper was actually implemented, OSHA's citation would likely be overturned.[10]

A third violence citation in *Secretary of Labor v. UHS of Westwood Pembroke*[11] was upheld by an ALJ and remains on appeal by the employer to the OSHRC. The psychiatric facility had a violence program, but the ALJ found that it was brief, generic, and focused on patient care and not on staff safety.[11] Despite the existence of the program, violent incidents continued.[11]

These three cases are not the sole violence citations issued by OSHA. However, these decisions form ongoing jurisprudence establishing that OSHA possesses the authority to enforce against violence. This should place all employers on notice that OSHA may enforce violence prevention.

METHODS TO REDUCE HEALTH CARE VIOLENCE

Employers should have effective workplace policies and training for workers. Policies on paper alone are insufficient. Policies should incorporate ongoing hazard assessments and understand the risks at the individual level and by patient type, including illnesses, medications, and background and history. The physical environment should reduce hazards, including emergency call methods, lockdowns, and the removal of weapons from the premises. Trainings must be mandatory and conducted by qualified trainers; they cannot be merely cursory in time and quality. Industry best practices and peer-reviewed research should be consulted with input from frontline staff, including security and violence response teams.

Employers must know when workers are injured by violence to address problems. Thus, employers should encourage and require workers to report violence, including near misses. In California's first year with a mandatory state reporting system, researchers found associations between types of facilities, ownership of facilities, and departments within facilities and the reporting of violence and police involvement.[7] Thus, employers must understand and tailor violence programs to reflect their own worksites.

THE FUTURE OF HEALTH CARE

With increasing injuries owing to violence, will health care facilities and the public health community become leaders in reducing violence? Further applied research on antiviolence methods in collaboration with health care employers would provide insight into ways to reduce workplace violence. If we have learned anything in the face of COVID-19, it is how fragile our health care system is and how much it relies on healthy workers. In places where shortages of nurses, aides, and doctors exist, can we afford to lose workers to preventable violence? AJPH

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Sterilization in US Immigration and Customs Enforcement's (ICE's) Detention: Ethical Failures and Systemic Injustice

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On September 14, 2020, Project South, in conjunction with four other human rights organizations, filed a whistleblower complaint on behalf of detained immigrants at the Irwin County Detention Center (ICDC) in Georgia and Dawn Wooten, a licensed ICDC nurse. The complaint alleged numerous grievances and, alarmingly, raised concerns regarding "the rate at which hysterectomies are performed on immigrant women under ICE [US Immigration and Customs Enforcement] custody at ICDC."[1] Although each concern raised in the complaint—including improper COVID-19 safety procedures, fabrication of medical records, and delays in receiving necessary medication—adds to an already disturbing list of medical mistreatment of migrants detained in US detention facilities, the issues surrounding reproductive treatments most poignantly underscore the damage done in the area of medical ethics. The ethically unacceptable treatments and practices that have been alleged contribute to a broader pattern of reproductive injustice as a tool of oppression that contributes to an already present, and growing, mistrust of our medical system.[2]

We examine these allegations as a case study highlighting how the US immigration detention system violates core tenets of medical ethics. We argue that, in the context of long-standing systemic racial biases in our medical system and a baseline mistrust of that medical system on the part of historically oppressed populations, these harms are dangerously amplified. These abuses contribute to a chilling effect that prevents vulnerable patients from seeking care; this compromises the health of everyone, particularly in the era of COVID. This case study has implications for the new presidential administration that has become accountable for ICE and will set the tone of US immigration policy at large.

THE COMPLAINT

ICDC is operated by the for-profit company LaSalle Corrections and has been used as an ICE facility since 2010. Project South has been collecting allegations and data from ICDC for many years through direct interviews; in 2017, it reported a long list of human rights violations, including lack of medical and mental health care, due process violations, and unsanitary living conditions.[3] The recently filed complaint discusses the high rates of hysterectomies performed on detained patients and describes reports by numerous women who did not understand why they had received a hysterectomy. It raises alarming concerns regarding informed consent, detailing how medical providers would attempt to explain procedures by "Googling Spanish" or asking other detainees to interpret rather than using the available translation telephone services. The complaint also gives troubling accounts of miscommunications that left patients unable to bear children because of hysterectomies they may not have needed.

Outside the context of a detention facility, allegations that life-altering surgeries were being performed without fully informed consent would raise alarm bells with hospital ethics committees and attorneys alike. As the complaint states, however, these repeated grievances about human rights abuses went unaddressed for months. Finally, deeper ethics concerns have surfaced more recently with reports that ICE has deported six women who contributed allegations to this complaint and notified at least seven others that the holds on their deportations had been lifted, making their deportation imminent.[4]

Ethical Concerns

Ethical shortcomings in this context are not new, and medical ethics and reproductive justice concerns in immigration detention facilities have been documented for many years, including recently in this Journal by Messing et al.[2] and Fleming and LeBrón.[5] Building on these prior illustrations, we argue that this complaint is part of a pattern of documented medical injustice perpetuated by the Trump administration against vulnerable migrants that includes family separation, the prohibition of abortion for minors seeking asylum, and medical neglect of pregnant migrants, to name just a few.[2]

Informed Consent

First, with respect to autonomy, the allegations described here fall drastically short of meaningful informed consent. The ICE National Detention Standards, a document intended to set forth consistent conditions of confinement and program expectations for nondedicated facilities like ICDC, cites the obvious requirement that detainees provide informed consent to medical procedures. Notably, the standards state that "facilities shall provide appropriate interpretation and language services ... related to medical and mental health care," that "detainees shall not be used for interpretation services during any medical or mental health service" except in an emergency medical situation, and that medical staff are to explain the risks of treatment and ensure that any questions are answered.[6] Indeed, one attorney who, in 2018, represented women seen by the doctor repeatedly referenced in the complaint reported that, for the two years she worked with detainees at ICDC, there was only one facility employee fluent in Spanish, indicating that perhaps meaningful language services were not accessible.

Justice

Second, with respect to justice, it is difficult to read a complaint alleging a disproportionately high rate of hysterectomies for detained immigrants without applying a lens tinted with the deeply troubling history of eugenic sterilization of non-White people in the United States. Fleming and LeBrón detail the history of nonconsensual sterilization of Latinas in California in the 20th century, noting that "laws that allowed nonconsensual sterilization in California were in place between 1909 and 1979 and resulted in the sterilization of more than 20,000 individuals."[5] These practices were part of a dehumanizing policy to "limit childbearing by immigrants and people of color."[5] The Trump administration's repeated overt messaging that migrants are not welcome brings the picture into alarming focus. Put bluntly, these new allegations echo a revival of the same xenophobic desire to decrease the population of undocumented immigrants and their children living in the United States, resulting in tolerance for, or even promotion of, practices that result in the sterilization of migrants.

A CHILLING EFFECT

Apart from the harms directly affecting detainees, these violations of patient autonomy could have a devastating impact on the broader population of black and brown patients in the United States. A wealth of literature has demonstrated that a history of racist experimentation and medical mistreatment has led Black, Brown, and immigrant populations in the United States to harbor a higher rate of mistrust of the health care system than do other populations.[7] Mistrust can negatively affect the care-seeking behaviors, quality of care, and overall health of these populations,[7] and is particularly concerning for vulnerable immigrants.[8] It is therefore paramount that detention health workers ensure not only that procedures are properly executed, but that communication and shared decision-making are prioritized to mitigate the perception of deceit or abuse by the medical profession.

It may be that procedures were followed appropriately in the cases detailed in the complaint, and there may be reasons why procedures evolved from, for example, cyst drainage to total hysterectomy. But even if this is the case and consent was technically given, the failure to communicate about medical procedures and obtain fully informed consent from these vulnerable women, whose autonomy is already dramatically decreased by their detention at the hands of the federal government, indicates a systemic failure that cannot be overlooked.

For the government's part, the ICE director has called these allegations "very serious" and has committed to holding individuals accountable if verified. But it is precisely this type of post hoc, reactionary response that allows systems of oppression to perpetuate, continuing unimpeded until legal action is initiated and then only eliciting a superficial response. By failing to address the myriad ethical shortcomings sewn into the fabric of the provision of health care for detainees, we not only harm the patients within that system but risk exacerbating a chilling effect on marginalized migrants who may fear seeking medical care in this country.

CALL TO ACTION

The new administration is faced with the challenge of implementing an ethical immigration policy and addressing longstanding policies that have filled America's for-profit ICE detention facilities. This and future administrations must ensure that the highest standards of medical ethics are upheld. In pursuit of this, we make the following recommendations to the government, to clinicians, and to public health practitioners. First, the Biden administration must ensure that ICE is in compliance with its own policies by requiring, and enforcing, the placement of bilingual medical staff at all facilities, per the agency's own standards and guidelines. Second, whereas clinicians may provide services to detainee patients, they cannot be complicit in the system of oppression and harm. They have a duty not to participate in care when the standards of informed consent are not met to maintain trust in their profession, both within the immigrant detention system and beyond. Clinicians in detention facilities must exert extra diligence in carrying out their obligations of beneficence, nonmaleficence, autonomy, and justice, and stand ready to act as whistleblowers, as nurse Dawn Wooten did in this case.[9] Finally, we in public health must recognize that allegations of forced sterilization are a clear public health issue. We must continue to do the daily, deliberate work of calling out and challenging systems of oppression present in the health care system. Without this work, cases like this one will continue to erode trust in the health care system and chill the care-seeking behaviors—and overall health—of already vulnerable migrant populations. AJPH

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Enhanced Telehealth Case Management Plus Emergency Financial Assistance for Homeless-Experienced People Living With HIV During the COVID-19 Pandemic

Jennifer K. Brody, MD, MPH, Serena Rajabiun, PhD, MPH, MA, H. Joslyn Strupp Allen, MSW, and Travis Baggett, MD

Boston Health Care for the Homeless Program, in Boston, Massachusetts, implemented an intensive telehealth case management intervention combined with emergency financial assistance for 270 homeless-experienced people living with HIV (PLWH) to reduce COVID-19 transmission and promote HIV care retention during Boston's first pandemic peak (March 16–May 31, 2020). Our telehealth model successfully maintained prepandemic case management and primary care contact levels, highlighting the importance of such programs in supporting the care engagement of homeless-experienced PLWH and addressing the dual COVID-19 and HIV epidemics. (*Am J Public Health*. 2021;111:835–838. https://doi.org/10.2105/AJPH.2020.306152)

The Boston Health Care for the Homeless Program (BHCHP) is a federally qualified health center located in Boston, Massachusetts, that provides HIV medical care and intensive case management to approximately 300 homeless-experienced people living with HIV (PLWH). BHCHP serves a highly sociomedically vulnerable population and receives funding from the Ryan White HIV/AIDS Program.

INTERVENTION

During the COVID-19 pandemic, BHCHP implemented an intensive telehealth case management intervention for homeless-experienced PLWH with the following goals: (1) maintain HIV care engagement during a period of severely disrupted outpatient services, and (2) reduce COVID-19 transmission risks by proactively assessing and addressing acute socioeconomic needs.

PLACE AND TIME

In response to the COVID-19 pandemic, BHCHP suspended in-person services that were not related to COVID-19 in mid-March 2020 and transitioned nonemergent care to telehealth platforms. On April 15, 2020, BHCHP received one-time funding (to last through March 2021) from the Ryan White HIV/AIDS Program and the 2020 Coronavirus Aid, Relief and Economic Security (CARES) Act to prevent, prepare for, and respond to COVID-19 among PLWH. We describe results from the intervention between March 16 and May 31, 2020, corresponding with the first wave of the COVID-19 pandemic in Boston, Massachusetts.

PERSON

A total of 270 PLWH were actively in care during the study period. Patients were predominantly male (72%), identified as racial/ethnic minorities (40% Black, 36% Hispanic/Latinx), and had a mean age of 51 years. Twenty percent were monolingual Spanish speakers. All had a lifetime history of homelessness or unstable housing. During the study period, 54.1% were housed (defined as residing in a place with a lease in their name) and 45.9% were unhoused. Sixty-nine percent resided in zip codes with a high prevalence of COVID-19 (defined as higher than the average unadjusted

COVID-19 case rate in Boston of 1970/100 000 on June 25, 2020).[1]

PURPOSE

Housing instability is a critical determinant of risk for contracting COVID-19 infection in the United States.[2,3] Although the health consequences of COVID-19 for PLWH are not fully understood, concern remains that PLWH may be more vulnerable to severe COVID-19 illness[4] and may be at heightened risk for loss to medical follow-up because of severe care delivery disruptions, thus undermining efforts to end the HIV epidemic in the United States.[5] Patterns of racialized structural disadvantage that contribute to COVID-19 transmission and mortality risk overlap with HIV risk, leading to the inequitable concentration of these conditions among low-income communities of color.[6] Intensive case management to address the social determinants of health has shown great promise in supporting unstably housed PLWH to engage effectively in medical care, thus closing equity gaps in HIV health outcomes for this vulnerable group.[7] BHCHP adapted these strategies during the pandemic in an effort to maintain HIV care engagement and prevent COVID-19 transmission.

IMPLEMENTATION

Case managers contacted all HIV patients who could be reached by telephone and gave them information about COVID-19 prevention and how to access COVID-19 medical assessments and testing. Patients without telephones were provided low-cost mobile phones with unlimited minutes for three months to ensure reliable contact with program staff. Patients were proactively contacted approximately every two weeks to assess their access to COVID-19 prevention supplies (i.e., cleaning supplies, hand sanitizer, face masks), medical needs, and prescriptions and to assess other key social determinants of COVID-19 risk, including food security, housing stability, status of rental and utilities payments, telephone access, and transportation needs.

Face coverings and hand sanitizer were distributed by mail to housed patients and during walk-in clinic visits for unhoused patients. Those in need received grocery store gift cards, food deliveries, utilities and rental support, vouchers for short-term hotel or motel stays, and transportation to urgent medical visits using shared ride apps rather than public transportation.

BHCHP staff recorded patient contacts, housing status, and services provided in the electronic health record during every medical and case management encounter. BHCHP tracked all SARS-CoV-2 polymerase chain reaction (PCR) test results initiated by BHCHP, major partner hospitals, and affiliated health centers. HIV patients received tests in diverse settings, including as part of BHCHP's universal COVID-19 testing efforts in participating shelters and for symptomatic and occasionally asymptomatic presentations at outpatient clinics, emergency rooms, and hospitals. (Asymptomatic testing was not widely available during this period.)

EVALUATION

We conducted a retrospective review of electronic health record data for the 270 PLWH in care to assess delivery and receipt of program services and outcomes of COVID-19 testing.

An average of 5.75 (SD = 4.7) case management contacts per patient (telephonic and in-person) occurred during the three-month study period, with a statistically significant difference in contacts between housed and unhoused patients (6.43 vs 4.95; $P = .010$). The same three-month period the previous year showed an average of five contacts per patient.

Attendance rates for HIV primary care provider visits (telehealth and in-person combined) during the study period was 71% (414 of 586 scheduled visits). Housed patients kept 74.7% of appointments compared with 57.1% among unhoused patients ($P = .01$). The overall attendance rate in the three months before the intervention was 63% (447 of 708 scheduled in-person visits).

A total of 56 patients (20.7%) were tested for COVID-19 during the study period. Among housed patients (n = 146), 15 (10%) underwent SARS-CoV-2 PCR testing, and none were positive. Of unhoused patients (n = 124), 41 (33%) underwent testing, and 14 (34%) were positive (Table 1). Six of the 14 positive patients resided in Boston shelters affected by COVID-19 outbreaks.

Of the 56 patients tested for COVID-19, case management contacts did not differ significantly between unhoused and housed patients (7.2 [SD 5.2] vs 5.2 [SD 3.6]; $P = .19$).

ADVERSE EFFECTS

We observed no adverse effects.

SUSTAINABILITY

BHCHP's augmented telehealth case management intervention during the first COVID-19 pandemic peak was successful in maintaining regular engagement in HIV case management and primary care despite interrupted in-person services. Importantly, high-intensity case management

TABLE 1— COVID-19 Testing and Positivity Rates and Case Management Visits by Housing Status: Boston, MA; March 16–May 31, 2020

	Housed (n = 146), No. (%) or Mean ±SD	Unhoused (n = 124), No. (%) or Mean ±SD	P
Total patients tested for COVID-19	15 (10.3)	41 (33.1)	< .001
Total COVID-19–positive patients	0 (0.0)	14 (34.1)	.012
Case management contacts per patient	6.43 ±4.7	4.95 ±4.6	.01

Note. We used the independent *t* test to examine differences in case management visits by housing status and COVID-19 polymerase chain reaction positivity, and we used the Fisher exact test to examine the association between housing status and COVID-19 polymerase chain reaction positivity. We considered *P* values of < .05 statistically significant. We used SAS version 9.4 (SAS Institute, Cary, NC) for all statistical analyses.

by telephone was feasible regardless of housing status despite risks for being lost to follow-up. Case management engagement intensity and total primary care visit volume were similar to prepandemic levels, and overall attendance rates for scheduled HIV primary care visits improved in the pandemic period.

There were no diagnosed cases of COVID-19 in BHCHP's housed HIV population despite their heightened structural vulnerability for transmission. Conversely, the COVID-19 positivity rate among unhoused HIV patients at BHCHP matched that found among individuals experiencing homelessness in Boston shelters.[3] Further study is warranted to determine what role similar outreach programs may have on mitigating COVID-19 transmission risk among PLWH and whether these benefits depend on housing status. Longer-term follow-up is needed to assess program impacts on HIV viral suppression.

Telehealth case management does not require new staff or equipment and will remain an integral engagement and retention strategy for the foreseeable future. However, costs for patient telephones and financial assistance to address socioeconomic barriers were funded via a one-time award through the CARES Act, potentially limiting sustainability of these measures should the pandemic continue beyond March 2021.

PUBLIC HEALTH SIGNIFICANCE

Telehealth case management and targeted resources to address unmet social needs of homeless-experienced PLWH have the potential to support consistent HIV care engagement when nonurgent in-clinic visits are limited. Securing appropriate levels of federal, state, and local funding for structurally vulnerable PLWH throughout the COVID-19 pandemic could play a key role in mitigating impacts and inequities of these dual pandemics. Continued progress on national goals to end the HIV epidemic may depend on it. AJPH

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J. K. Brody and S. Rajabiun conceptualized and designed the study and drafted the article; they had full access to all study data and take responsibility for data integrity and data analysis accuracy. S. Rajabiun and T. Baggett performed the statistical analyses. All authors provided data acquisition, analysis, or interpretation and critically revised the article for important intellectual content.

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The authors have no conflicts of interest to declare.

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This study was exempted by the University of Massachusetts, Lowell institutional review board because no human participants were involved in the study.

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Hennepin County Adult Detention Center's Response to a 2019 Hepatitis A Outbreak in Minnesota

Lucas Zellmer, BS, Laura Peters, RN, BSN, and Rachel Sandler Silva, MD, MPH

Hennepin County Adult Detention Center (Jail) is Minnesota's largest jail. In August 2019, the Minnesota Department of Health declared a statewide hepatitis A outbreak. Within three days, Hennepin County Jail Health Services made significant changes to vaccination protocols that increased vaccination rates from 0.6% to 7.1% among detainees, who have a greater risk of contracting hepatitis A. We highlight the opportunity for jails to develop sustainable public health interventions in the setting of community outbreaks. (*Am J Public Health*. 2021;111:839–841. https://doi.org/10.2105/AJPH.2021.306159)

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We describe Hennepin County Adult Detention Center's (Jail) response to Minnesota's hepatitis A outbreak that began in August 2019.

INTERVENTION

In response to the declared outbreak, Hennepin County Jail Health Services, in collaboration with county public health officials, adopted significant changes to hepatitis A vaccination protocols for those in detention. The vaccination strategy outlined herein was pursued with the goal of preventing further spread of hepatitis A among high-risk groups in the community who also interfaced with the criminal justice system.

PLACE AND TIME

Hennepin County is Minnesota's most populous county, with more than 1.2 million residents. From 2010 to 2018, Minnesota averaged 25 total hepatitis A cases per year. From January to May 2019, there were seven total hepatitis A cases across the state, with a steady increase thereafter. The Minnesota Department of Health declared a statewide hepatitis A outbreak on August 8, 2019; at that time there were 3 confirmed cases in Hennepin County and 23 confirmed cases across the state. On August 12, 2019, Hennepin County Jail Health Services successfully implemented sustained changes to their detainee vaccination protocols. To date, the outbreak encompasses 127 total hepatitis A cases, 46 of which occurred in Hennepin County, that have resulted in 88 hospitalizations and one death. Most of the state's cases, 86 in total, were confirmed between August 31, 2019 and April 18, 2020.[1]

PERSON

Hennepin County jail averaged 32 000 bookings per year from 2015 to 2018.[2] Located in downtown Minneapolis, Minnesota, Hennepin County Jail's detainee population is composed of both men and women who are awaiting trial. The average length of stay is approximately nine days. Evaluation of the health status and chronic disease risk factors of people experiencing incarceration in the United States has consistently shown this population to possess an increased prevalence of known risk factors for viral hepatitis, including intravenous drug use. Facility data show that approximately 50% of detainees report using illicit drugs. These factors, in addition to general living conditions and barriers to accessing health care after release, create a greater risk of acquiring infectious and chronic diseases for individuals experiencing incarceration.[3]

PURPOSE

Because of the inherent risk of hepatitis A transmission among populations experiencing incarceration, rapid, effective changes to existing vaccination strategies were a key strategy to prevent transmission. Although significant health disparities exist among those who interface with the criminal justice system,[4] jails possess a relatively untapped capacity to meet the basic health care needs of vulnerable individuals and function as an effective public health entity. Hennepin County Jail was well positioned to play a central role in minimizing the spread of hepatitis A for those who were experiencing incarceration. The highly transient nature of this group poses challenges for accessing the traditional medical system but allowed Hennepin County Jail a unique opportunity to provide necessary care to individuals who may otherwise be difficult to reach.[5]

IMPLEMENTATION

Before Minnesota's hepatitis A outbreak, the Hennepin County Jail Health Services offered the hepatitis A vaccine at each detainee's initial nursing health assessment within 14 days of jail admission. Within three days of the outbreak being declared, Jail Health Services effectively modified their strategy to vaccinate detainees against hepatitis A. At that time, protocols were changed to offer the hepatitis A vaccine at the initial intake nursing assessment and were subsequently administered by a nurse circulating to the different housing units daily during weekdays. If a detainee was unavailable, the nurse would attempt to return within 48 hours to reoffer the vaccine. All detainees already in detention were offered vaccination in their housing units during the initial week of the intervention. Vaccinations occurred typically within 48 hours of initial offer. Although vaccinations continued to be offered at the initial health assessment, significant changes to vaccination messaging and education were also employed pertaining specifically to the outbreak. This included educational materials available during the booking process along with signage in the housing units.

EVALUATION

Before the declaration of the hepatitis A outbreak, the initial rate of hepatitis A vaccinations at the Hennepin County Jail for the six months preceding the outbreak was 0.6%, or about 16 vaccinations per month. With the new protocols in place, administration of the hepatitis A vaccine increased to 7.1% (202) in August, 3.3% (90) in September, and 5.4% (137) in October. Although initial rates were significantly higher owing to offering testing to detainees already in custody, monthly rates have stabilized to between 2% and 5%.

Although rates increased significantly, challenges remain in the uptake of vaccination because of the rapid turnover of the jail population. In the initial months of the intervention, 28% to 47% of detainees expressing interest in vaccination were released before receiving the vaccine. Another 15% to 28% declined vaccination after initially expressing interest. Ongoing monitoring of the workflows includes tracking detainees interested in vaccination and reviewing statistics monthly regarding vaccination efforts. Continued collaboration with local public health allows contact tracing and postexposure prophylaxis if needed.

ADVERSE EFFECTS

Hennepin County Jail's changes to hepatitis A vaccination protocols presented certain challenges. Although incomplete vaccination records are common, repeat hepatitis A vaccination poses no significant risk to the detainee. Other challenges include the need for vaccine education and needles as possible triggers for patients with substance use disorders.

SUSTAINABILITY

Program sustainability is a persistent challenge for many public health programs because of various financial, political, and societal factors. Through thoughtful planning by the Jail Health Services team, the changes made to hepatitis A vaccine administration were achieved by adjusting existing protocols. Neither additional funding nor additional personnel were needed to offer this preventive service more efficiently to all detainees. Moreover, all vaccines provided to individuals by Jail Health Services are made accessible through the Minnesota Department of Health's Uninsured or Underinsured Adult Vaccine Program. Although a two-part vaccine series is the gold standard for protection against hepatitis A in adults, anti–hepatitis A immunoglobulins have been shown to be present for up to 11 years after a single vaccine dose.[6] Although this intervention may not impart lifelong immunity for all detainees, this strategy remains important as a short-term intervention during an outbreak. Additionally, all jail vaccinations are entered into a statewide database, and subsequent vaccination can be performed when accessing care at other facilities to complete the series.

PUBLIC HEALTH SIGNIFICANCE

Disparities among incarcerated populations are numerous and substantial, and they span both clinical and social determinants of health. Each year spent inside prison is associated with a two-year decrease in life expectancy.[7] Although the reasons for such gaps are likely multifactorial, pre-[8] and postincarceration[9] utilization of health care services can contribute to health disparities and limit access to preventive care, such as vaccination.

The response to Minnesota's hepatitis A outbreak by Hennepin County Jail Health Services showcases the role that jails can play in meeting the health needs of marginalized populations, particularly those with illicit substance use. Changes to vaccination protocols to include immediate education on and offering of the hepatitis A vaccine yielded greater protection at the individual, facility, and community levels. As traditional public health entities struggle to address upstream determinants of health for the communities they serve, jails are uniquely positioned to meet the basic health needs of individuals that interface with the criminal justice system.

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L. Zellmer and R. Sandler Silva conceptualized the work and drafted the article. L. Peters collected the data and critically revised the article. All authors analyzed the data and approved the final version of the article.

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The authors have no conflicts of interest to declare.

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Institutional review board approval was not necessary because no human participants were involved in this descriptive work.

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Strengthening Social and Economic, Medical, and Public Health Systems Before Disasters Strike

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

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This special section of *AJPH* represents a collection of COVID-19 treatises that highlight some of the deep flaws in the American social and economic, health care, and disaster response systems—present before the onset of the current pandemic—that contribute to national mitigation challenges. Rao et al. (p. 849) provide an important comparison between Hurricane Katrina and COVID-19, two major public health disasters that devastated the United States. They demonstrate how both situations have revealed the concentrated impact on vulnerable populations who live in social, historical, and political environments in which health disparities and barriers to care exist under routine circumstances. The authors suggest using science to inform methods of addressing social determinants of health and public health policy, with the goals of increasing access to care and reducing health care costs. Self et al. (p. 854) examine shelter characteristics and infection prevention practices in relation to severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) infection point prevalence during universal testing at homeless shelters. They conclude that sleeping arrangements and staffing policies, such as excluding symptomatic staff and having medical services on site, are modifiable factors that may be associated with transmission of SARS-CoV-2. They also emphasize the requirement of continuing services for people experiencing homelessness.

Goralnick et al. (p. 844) meet disaster structural frameworks and health disparities head on by critiquing the Hospital Incident Command System, which is activated during events to coordinate hospital-wide disaster responses. Based on lessons learned in the COVID-19 activation, they argue for embedding health equity specialists within the Hospital Incident Command System as an important next step to address hospital-based contributions to institutional racism, which led to disproportionate illness and loss of life in marginalized communities. Riley et al. (p. 860) expose another structural defect in the health care system: long-standing challenges of the blood collection and distribution system to ensure an adequate blood supply for medical emergencies. The authors describe the US blood supply system, its gaps and vulnerabilities, and the impact of the pandemic upon it, all of which have contributed to public health emergency response challenges. McLaughlin et al. (p. 867) describe another structural component of the public health system in the COVID-19 response: the importance of laboratory diagnostics. The authors explain the complexities of an effective laboratory response system and highlight the difficulties and lessons learned when demand for laboratory testing capacity surges beyond routine expectations.

REEXAMINING RESPONSES TO DISASTERS THROUGH A CONTEXTUAL LENS

Disasters, both natural (famine, floods, pestilence) and man-made (wars, political unrest), have always been part of the human experience. In the past, the effect of disasters on human populations was, to some extent, more geographically restricted. However, life in the 21st century and all that goes with it—changes in rapid transportation availability and world travel, centralized methods for producing and distributing food, political and civil upheavals contributing to mass migrations, proliferation of organized terrorism, and effects of climate change—have expanded the potential for and possibility of large-scale, mass public health emergencies affecting thousands of persons per event.[1] The long-term, unforeseen consequences of 20th-century medical interventions have contributed to the natural evolution of microorganisms producing hardy pathogenic strains that are resistant to available treatments.[2]

For the past five decades, global scientists and public health professionals have been concerned about calamitous worldwide disasters similar to the influenza pandemic of 1918, which infected more than one third of Earth's population and resulted in more than 50 million deaths.[3] Government and public health agencies in the United States have devoted millions of dollars in resources to constructing response infrastructures and developing structural frameworks or models for mobilizing and coordinating multiple stakeholders across city and state bureaucracies and emergency and health care systems to mount responses.[4] After the events of September 11, 2001, public health efforts to prepare for emergencies received renewed focus, energy, and resources[5] and stimulated scientists from a plethora of disciplines to study disasters from various perspectives. Henry Fischer, a sociologist who studies the effect of disasters on social groups, offered a linear model for understanding the natural course of a catastrophe. He suggested that all or part of an existing social structure first experiences the mass emergency, then social structure is disrupted, the mass emergency is mitigated, and an adjusted social structure carries on after the event. Severity of disruption was measured on a 10-point scale based on extent, scope, and duration of the emergency.[6]

It is important to note here that in parallel with the build-up of efforts to address emerging threats that require large-scale mitigation and scientific inquiry to understand the potential impact on human populations, the way people communicate, receive, and understand information has changed in the past 50 years. The internet and its contentious offspring—social media—have become ubiquitous features of everyday life through home computers, workplace computers, and mobile devices, which may obfuscate receipt of accurate messaging.[1,7,8]

In February 2020, when COVID-19 spread globally, I began to understand that disaster models and structural frameworks developed by public health and social scientists were based on several unwritten assumptions: (1) before a mass emergency, a social structure is assumed to be sound and cohesive, with individuals acting in ways to mutually support the whole; (2) a health care system is assumed to work reasonably well, with most people able to access care; and (3) a society's communication system is efficient for delivering unambiguous, life-saving messages to most of an affected population. Disaster responses in recent years, particularly the response to COVID-19, unmasked persistent structural flaws in organizational capacity, reaffirmed unresolved social and economic inequities, and identified systemic flaws in communication channels. The content in this issue of *AJPH* calls for a reexamination and strengthening of social and economic, medical, and public health systems before the onset of emergencies.

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Equity and Disasters: Reframing Incident Command Systems

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

"Predictable surprises" should be anticipated and can be better institutionalized in hospital response systems for crises.[1] An opportunity exists to implement strategies for hospital-based disaster management by explicitly integrating equity principles and expertise as central components of the Hospital Incident Command System (HICS).

During the COVID-19 pandemic, many hospitals and health care systems have activated HICS to coordinate hospital-wide disaster responses. HICS are a structural tool used to clarify roles, responsibilities, authority, and accountability to streamline decisions and action during complex crises. In the late 1980s, the hospital emergency incident command system (now HICS) was developed to align with the National Interagency Incident Management System, the federal plan for improving coordination among agencies in a broad range of large-scale emergencies.[2]

As HICS have been deployed over recent decades, we have deepened our understanding of the strengths and weaknesses of their structure for addressing the needs of diverse populations. Recurrent experiences with large-scale disasters, including the COVID-19 pandemic and Hurricanes Katrina, Maria, Harvey, and Sandy, have underscored the ways in which health care responses, emergency preparedness, and broader social determinants of health lead to preventable morbidity and mortality in marginalized communities.[3]

Here we share the case for embedding an equity element in HICS, our institutional experiences in operationalizing equity, and our recommendation for a structural change in the national HICS guidelines: including a defined equity officer (EO) and subject matter experts in health care equity to ensure that actions are taken to improve outcomes for diverse groups during public health emergencies or disasters. Although our focus is on HICS, these concepts can and should be more broadly applied in all emergency support functions. Emergency support functions are groupings of governmental and private-sector capabilities into an organizational structure to provide support, resources, and services that are needed to save lives, protect property and the environment; restore essential services and critical infrastructure; and help victims and communities return to normal after domestic incidents.

EMBEDDING AN EQUITY RESPONSE WITHIN THE HICS INFRASTRUCTURE

The key principles of HICS are a unified command, a clear organizational structure, and an incident action plan guided by objectives. The incident commander leads a team of section chiefs in charge of operations, planning, logistics, and finance. Several command staff members also report to the incident commander: a public information officer, a safety officer, a liaison officer, and medical technical specialists. However, HICS guidance as currently written does not explicitly specify an EO role or list equity as a responsibility or operational priority in hospital crisis response. Ideally, the incident commander would embed equity principles and objectives implicitly in HICS planning.

Recent events illustrate the need to explicitly name roles and responsibilities to address health equity within the HICS structure. The absence of equity as an emergency management principle in responses to COVID-19 has resulted in a slow and incomplete hospital response to the disproportionate mortality and morbidity in several historically marginalized populations.[4] For example, hospitals have access to detailed information on the demographic composition of their inpatient populations, the ability to screen patients for social needs, and the opportunity to conduct coordinated community outreach to address the needs of communities of color through HICS infrastructure. However, the extent to which communities of color, particularly African American, Latinx, and Native American groups, were disproportionately dying from COVID-19 did not become clear until weeks into the pandemic.[5]

Additional issues, including disparate access to hospital-based viral testing and access to emerging therapies for treating coronavirus, have not been evenly reported or monitored. The response to rising food insecurity reported during the pandemic speaks to the absence of health-related social needs planning in the HICS pandemic response. Importantly, scarce resource allocation frameworks, called crisis standards of care, have incompletely incorporated the values of marginalized communities.[6] As we have observed over the past year, crisis standards of care frameworks have improved—with greater diversity, equity, and inclusion expertise involvement—but demand long-term involvement and change to mitigate inequities. One recent example is the Massachusetts Department of Public Health's revision of the Sequential Organ Failure Assessment score, which includes "appropriate modifications for people with disabilities and modification to mitigate the disproportionate impact of chronic kidney disease [and is to be used] to characterize patients' prognosis for hospital survival."[7]

Each of these deficits reflects structural racism and the need for long-term institutional infrastructure building to address deeply entrenched historic inequities.[8] However, the need for structural change does not obviate the need for hospitals to develop institutional responses to meet acute crisis needs of African Americans and other groups at risk for inadequate care and outreach. Indeed, one expression of structural racism is the failure to assign responsibility and procure the expertise needed to meet acute needs during times of crisis, even as longer-term planning and structural changes progress. HICSs are designed to ensure a streamlined, effective response, but the current pandemic has demonstrated that not all needs of all populations have been met. There is a need to integrate explicit responsibilities for efforts to strengthen data collection and monitoring, to build liaisons for community engagement, and to embed activities that address equity in each phase of a disaster, and mitigation, preparation, response, and recovery are needed to ensure that the needs of marginalized groups are equitably addressed.

OUR INSTITUTIONAL EXPERIENCE EMBEDDING EQUITY

Approximately two months into the activation of HICS activities within our hospital during the COVID-19 pandemic, at the direction of our corporate incident command center, our hospital established a diversity, equity, and community health response team that was chaired and docked within our HICS. As a part of the response, our team established several work streams to augment and accomplish core functions of the HICS response, including employee equity, health care access, communications, public policy and advocacy, and data and monitoring.

Through these work streams, our team embedded several activities in our hospital response to ensure that hospital and corporate entity resources were used to meet the needs of historically marginalized groups, including patients, employees, and local communities. These activities included ensuring adequate protective personal equipment for nonclinical staff, leading efforts to provide community-based virus testing, and engaging in community outreach to address food insecurity as a social determinant of health.[9] Future work will add further work streams to augment recovery and reimagining as our hospital reopens to provide emergent clinical care that could not be provided during the crisis response.

OUR AFTER-ACTION REVIEW DEFINED THE GAP

A critical learning process in emergency management is the after-action review. An after-action review is a structured process developed by the US Army to identify strengths and weaknesses in event response.[10] This concept has been adapted as a critical step after public health emergencies to gather information on quantitative and qualitative issues to improve preparedness, mitigation, response, and recovery for future incidents.[11] Our institution has conducted several after-action reviews within the past decade after local events including the Boston Marathon bombings and an active shooter incident in our hospital.[12–14] We have also facilitated reviews in the wake of other large-scale events such as the urban terror attacks in Paris and Brussels.[15]

Since our initial patient surge in Boston, Massachusetts, in April 2020 (and given the concern for future surges), we have conducted several debriefings with more than 150 staff members across an academic medical center and community hospital within our larger multihospital health care system.

The most frequently mentioned topic in our review was equity. Many comments highlighted the positive effects of the existing work streams and our ongoing efforts. Key areas identified were to embed equity experts in the HICS, display and use COVID-19 dashboard data that systematically stratify demographic characteristics, empower equity experts to lead within and beyond the organization, aggressively communicate initiatives, ensure that all materials are inclusive of various reading levels and languages, and actively encourage engagement by frontline staff whose voices may have previously been marginalized.

However, many of those involved in the process acknowledged that we are at the beginning and have much work to do to ensure that equity is a core function of our response during the COVID pandemic and in future disasters. A consensus research agenda will be critical to understanding the effects of future interventions designed to mitigate structural racism during disasters.[16] On the basis of our observations, we recommend a structural change to the national HICS guidelines: including an EO and embedded health equity specialists within each section.

THE HICS EQUITY OFFICER AND THE HEALTH EQUITY RESPONSE

Defining an EO as a mandatory, core member of the command and general staff is a first step in mitigating inequities. The EO would directly report to the incident commander as a member of the command staff. The EO would have authority to command the resources needed to accurately identify threats to the well-being of marginalized groups and take steps to ensure that hospital activities and plans during crisis responses operate fairly and equitably to meet the needs of hospital employees, patients, and surrounding communities. The EO would advance an equity ethics in crisis management principle to ensure that the needs of the few and vulnerable are in balance with the needs of the many and powerful, such that decisions to distribute scarce resources (e.g., medications, funding for interpreters) are made to benefit marginalized populations, even if such resources are not required to respond to the crisis needs of majority populations.

Furthermore, medical technical specialists with health care equity expertise embedded within each HICS section would provide real-time insights for rapid cycle innovations to mitigate disproportionate impacts on vulnerable groups. Just as each member of the HICS team has a discrete role and responsibility, the EO and health equity specialists should be involved in all critical decisions and embed as core, trusted, essential members.

Figure 1 shows a proposed structure for the role of the EO and health equity specialists within the HICS infrastructure. Together with the liaison

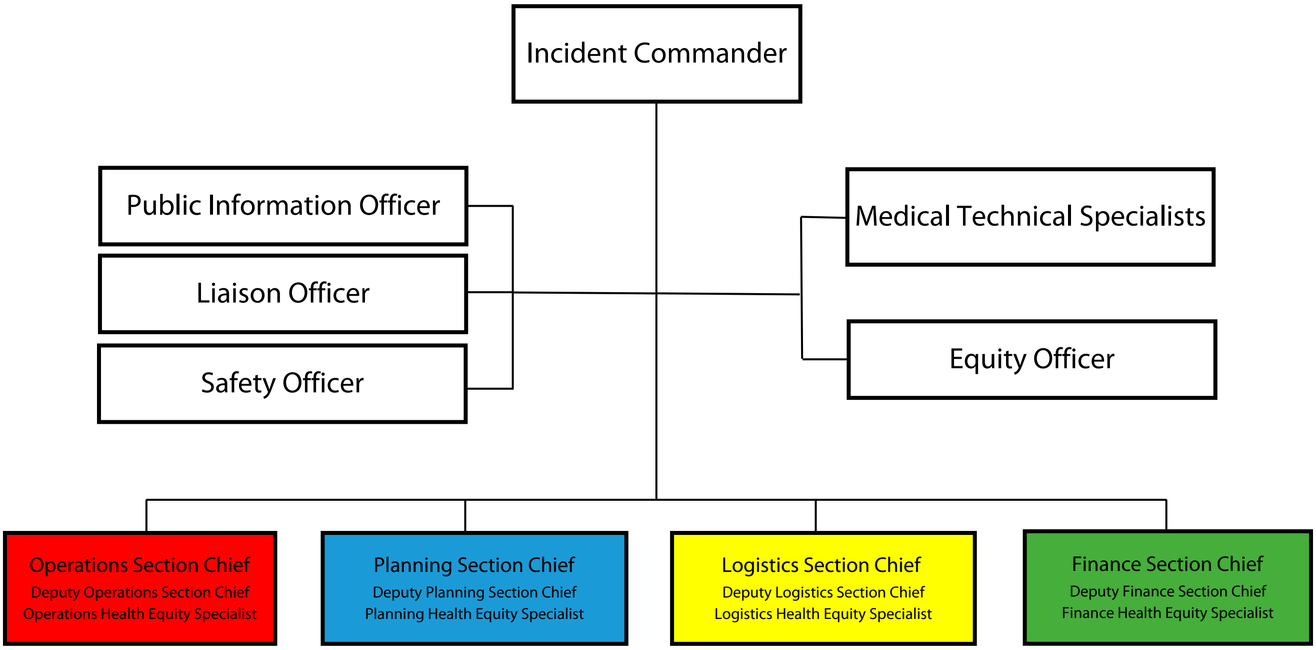

FIGURE 1— **Proposed Hospital Incident Command System Organizational Chart**

officer, the EO would coordinate with community-based, municipal, state, or other agencies to establish partnerships and coalitions for addressing underlying public health and social service barriers to crisis response. A successful response would ensure that the needs of marginalized populations are centrally integrated into problem definition, decision-making, and processes and outcomes of HICS activities (e.g., operations, planning, logistics, finance).

Essential work of the EO and health equity specialists would include the following, at minimum[17]:

1. Directing data collection for planning and management consistent with 2011 US Department of Health and Human Services guidance on assessing race, ethnicity, sex, sexual orientation and gender identity, and disability;
2. Ensuring use of culturally appropriate communication channels (digital and nondigital), appropriate use of languages and codes (including closed captioning and Braille), and attention to literacy levels (including infographics) for disseminating crisis information;
3. Planning for adequate access to essential medications and equipment (e.g., insulin, pain medications, dialysis machines, and ventilators) for use within the hospital and for distribution in community settings as appropriate;
4. Coordinating with and supporting trusted community agencies to provide social services;
5. Coordinating and working with local public health organizations; and
6. Ensuring equity in research participation.

Not only should EOs work within their organizations, but they should identify and advocate for similar leadership opportunities and roles at fellow public health agencies. Successful strategies used during HICS, such as developing metrics of equitable processes of care, should be tested and incorporated in standard hospital operations.[18] For example, our HICS experience has led to greater institutional use of hospital equity data monitoring as an institutional practice, and we have now applied this practice to monitoring equity in access to COVID-19 vaccination among our hospital staff employees.

CONCLUSIONS

Although the response to COVID-19 is still unfolding, the lessons of this pandemic underscore the experience of several prior crises in recent US history in which communities of color, populations of low socioeconomic status, and other groups suffer disparate impacts. Embedding an EO and health equity specialists within HICS is an important next step to address hospital-based contributions to institutional racism that has led to disproportionate illness and loss of life in marginalized communities during the COVID-19 pandemic. Work to implement equity as an essential element of HICS should be urgently shared now and continuously evaluated and refined through each phase of the pandemic. Deliberate, integrated changes in our crisis management structure are an essential step to mitigate future preventable deaths in our most vulnerable populations.

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Katrina to Corona: Surges Urge United States to Learn

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

As a nation, from time to time we face extraordinary events and challenges. A key current nemesis is the coronavirus disease 19 (COVID-19) pandemic. The COVID-19 pandemic, caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), presents monumental challenges on multiple fronts and on a global scale. Since the first report out of the Wuhan district in China in December 2019, the pandemic has resulted in nearly 75 million cases worldwide. The US Centers for Disease Control and Prevention had reported more than 16 million cases and more than 300 000 deaths domestically as of December 17, 2020, making the United States the most affected country.[1]

When catastrophic events occur, public institutions, especially government agencies, find ways to mitigate injury and loss to their citizens. Preparation is key and involves anticipating the elements of disaster events and creating policies and protocols that incentivize action and funding to lessen the burden of the crisis. COVID-19 tracking data highlight important emerging population-vulnerability issues and the evolving public health response. However, these issues and impacts are not new but were influential during previous catastrophic events.

One such event was Katrina, a high-category hurricane that made landfall along the Louisiana and Mississippi coasts on the morning of August 29, 2005. Katrina packed sustained winds of 120 miles per hour; its physical destruction was followed by unprecedented threats to life and health.[2,3] Both Hurricane Katrina and the COVID-19 pandemic exposed significant structural, social, and health deficiencies that have prompted significant changes to public health and policy responses. Although one event was a geoclimatic catastrophe and the other an infectious disease epidemic, they have health, socioeconomic, and structural features in common. Katrina and COVID-19 present shared lessons in preparing for and responding to public health disasters. Exploring policy, legislative, and emergency response and health care management of previous catastrophic events can prepare governments, the health care system, and citizenry to respond to future disasters.

DISPROPORTIONATE EFFECTS OF CATASTROPHIC DAMAGE

Although differing in reach across time and space, Hurricane Katrina and the COVID-19 pandemic wreaked economic, social, and health havoc on a massive scale. Katrina, one of the costliest hurricanes to hit the United States, caused an estimated $200 billion in damage, mostly concentrated in the Gulf Coast region.[4] Fortunately, the rest of the US economy was relatively stable and could support the region's recovery. Moreover, even excluding in-kind donations, the Department of State received $126 million from 36 countries and international organizations; the United States government had never before received such large amounts of disaster assistance.[5]

Unlike Katrina, the economic damage from COVID-19 is not limited in geographic scope or duration; its legacy will be far flung and long term. Total 2020 COVID-19-associated hospitalizations in the United States could cost $17 billion, and as of May 8, 2020, Congress had approved $2.4 trillion in stimulus funding, with more to come.[6] In fact, Achim Steiner, administrator of the United Nations Development Programme, anticipates a COVID-19-driven reduction in the Global Human Development Index—a measure of the world's education, health, and living standards—for the first time since the concept was introduced in 1990, a trajectory that is likely to be sustained.[7]

Hurricane Katrina and the COVID-19 pandemic vividly demonstrate the

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exceptional susceptibility of minority and disadvantaged groups to adverse outcomes from catastrophic events. Hurricane Katrina cut a broad swath across the Gulf Coast, but its health and socioeconomic effects were arguably worst in the New Orleans, Louisiana, area. Some of Louisiana's most vulnerable people (those who are impoverished, uninsured, chronically ill, and members of disadvantaged minority groups) are concentrated in the southeastern portion of the state. Katrina breached several levees protecting New Orleans, flooding the Orleans and adjoining St. Bernard and Jefferson parishes, and mostly affecting people who lacked transportation to escape the hurricane or navigate flooded terrain afterward. Populations of these parishes are predominantly Black, and affected individuals were also generally financially impoverished and often were members of single-parent (mostly women) households with children.[8]

Elderly and male individuals fared worse under Hurricane Katrina's wrath, as 49% of the 971 Louisiana decedents were at least 75 years old and 53% were men. However, the impact on Blacks was especially severe. Although Blacks constitute only 33% of Louisiana's population, 51% of decedents were Black and only 42% were White. This is partially explained by New Orleans parish adult mortality rates, with Blacks being 1.7 to 4.0 times more likely to die than Whites.[2] New Orleans' population also suffers disproportionately from poor health and poor access to care. A survey of Houston, Texas, shelters showed that 41% of 680 Katrina evacuees reported chronic health conditions.[9] Ninety-eight percent of these evacuees were from New Orleans, and 93% were Black. Also, 23% of Louisianans lacked health insurance, as compared with 54% of the Houston evacuees. These marginalized individuals were ill equipped to withstand the adverse health effects of societal disruption.

The COVID-19 pandemic threatens to rend the very fabric of global society for an indeterminate time, but not all populations or communities are equally affected. Although incomplete, data on race and ethnicity show that the pandemic has disproportionately infected, and led to greater mortality among, populations with health disparities such as Blacks, Hispanics, and other minority groups.[10,11] According to an analysis of supplementary data, most of the 10 647 decedents in 16 public health jurisdictions were 65 years or older and had underlying medical conditions; 34.9% of Hispanic and 29.5% of non-White decedents were younger than 65 years, as compared with only 13.2% of non-Hispanic White decedents.[12]

Sequist's comparison of the Navajo Nation and the small, densely populated town of Chelsea, Massachusetts, highlights ethnicity-linked COVID-19 pandemic disparities between these distinct communities of color and their broader populations. Fifty-three percent of COVID-19-related deaths occurred among the Navajo of New Mexico, despite this group representing only 11% of the broader population. In Chelsea, where two thirds of residents identify as Hispanic, more than 7000 cases among a population of 100 000 have been reported. Chelsea Hispanics have experienced the highest mortality rate in the nation, more than three times that of neighboring Boston.[13]

The reasons for disparities in COVID-19 pandemic outcomes among Blacks, Hispanics, and South Asians are not well established. Even among highly educated medical professionals, the mortality rate among minority group members has been extraordinary. Minority medical professionals, along with other minority workers, disproportionately serve front-facing industries, and they also support and are responsible for extended families and communities. Such communities are often burdened by high population density, which joins chronic disease, limited health literacy, and marginal financial and health insurance status as mortality-exacerbating dynamics.[14,15] As with Hurricane Katrina, difficulty in accessing care, deferred care of emergent conditions, and a deep-rooted mistrust of the public health and medical system are additional factors. In particular, highly complex combinations of comorbidities such as hypertension, diabetes mellitus, and chronic obstructive pulmonary disease are more frequent among marginalized groups than among Whites and are associated with worse outcomes.[13]

NONIMPLEMENTATION OF INFORMED DISASTER PREPARATIONS

The New Orleans basin and its sedimentary foundations and continuing subsidence are prime for flooding and have long been recognized as such. The US Geological Survey estimates that New Orleans, currently 3 meters below sea level and sinking at a rate of 1 centimeter per year, will descend an additional meter by 2100.[16] Hurricane Katrina's catastrophic flooding effects were anticipated. On November 2, 2005, Peter Nicholson, chair of the University of Hawaii's Department of Graduate Engineering, informed the US Senate Committee on Homeland Security and Governmental Affairs on Hurricane Katrina that his department had found dozens of preexisting areas of soil instability and actual breaches in the levee system that likely contributed to its failure. He recommended that Congress enact a national levee inspection and safety program modeled after the National Dam Safety Program.[17] Meanwhile, residents need to decide whether they can safely continue living in this area or whether they need to relocate, an especially difficult choice for marginalized individuals.

The US military and government leverage advanced simulated scenarios (gaming) to manage geography, population, resources, and technical and administrative expertise to achieve minimum-damage outcomes in combat and in disaster situations, such as weather events. For example, from May 24, 2004, through August 24, 2005, the Federal Emergency Management Agency conducted a multiagency emergency planning scenario for a hypothetical geoclimatic disaster, Hurricane Pam. Seven hurricane-specific and four general-disaster recommendations resulted.[18] Similarly, the US Naval War College's September 2019 urban outbreak pandemic exercise yielded 16 defensive recommendations to manage a COVID-19 pandemic–like situation.[19]

Dozens of additional modeling teams now offer support to policy and response directors by predicting COVID-19 trajectories through infectious disease and statistical modeling.[20] Notably, the Centers for Disease Control and Prevention and the Office of the Assistant Secretary for Preparedness and Response have developed five COVID-19 pandemic planning scenarios to evaluate the potential effects of various mitigation strategies and help inform public health planning.[1]

DISPARITIES REVEALED BY KATRINA AND COVID-19

Inadequacies in the three principal social determinants of health—physical environments, social environments, and (inadequate) health services and health literacy—result in health disparities that amplify morbidity and mortality in catastrophes.[21] According to Stephen M. Griffin of the Tulane University School of Law, Hurricane Katrina and the current COVID-19 catastrophe highlight policy disasters in the United States that can be traced back to federalism, "a fundamental aspect of American government, whereby the states are not merely regional representatives of the federal government, but are granted independent powers and responsibilities." He argues, instead, that the federal government should be the first responder and coordinator in a major crisis.[22]

In fact, an effective response strategy establishes basic protections from catastrophe that can neutralize disadvantageous socioeconomic and health disparities and protect marginalized groups from harm. According to both Griffin's recommendations and those stemming from the aforementioned scenario exercises, there is a need for, among other components, expert central planning to direct, coordinate, and support regional authorities.[18,19] Unfortunately, with Hurricane Katrina, discrepancies among national, regional, and local perspectives delayed reinforcement of the levee system as well as timely evacuation assistance to marginalized groups. Also, in part because of conflicting information from authorities, the marginalized population in the New Orleans basin largely did not anticipate—and lacked the resources and support to escape or withstand—the resulting flood.[23]

The situation has been the same with the COVID-19 pandemic. Disagreement among international authorities and among US federal executive and advisory personnel as to the existence and nature of the COVID-19 threat contributed to inadequate and erroneous information and to disparate and fluctuating US instructions to, and support of, regional authorities.[24]

The public, confused by conflicting messages, did not universally embrace or adopt even minimum protective measures. Much of the US health care system is now heavily stressed, necessitating guidance from the Centers for Disease Control and Prevention on interfacility patient and resource coordination and avoidance of a shift to crisis-care standards.[1] Tragically, with the COVID-19 pandemic as with Hurricane Katrina, the most vulnerable US citizens have again been the least protected and the most severely affected.

MORE HEALTH POLICIES NEEDED FOR MARGINALIZED GROUPS

Hurricane Katrina hit hardest in areas with high numbers of uninsured individuals that also ranked poorly on national health outcome measures. Medicaid is one avenue that improves outcome performance and enhances care access for low-income populations. However, federal and Gulf Coast state authorities initially limited Medicaid to elderly individuals and pregnant women. Some very-low-income parents and disabled individuals were also eligible, but others were not. Low-income individuals without children were not eligible. Fortunately, after Hurricane Katrina, the Centers for Medicare and Medicaid Services played a large role in increasing access to care, at least in Louisiana. In fiscal year 2006, upward Centers for Medicare and Medicaid Services adjustments moved Louisiana's federal medical assistance percentage calculation to 69.79%, meaning that Louisiana would have to cover only roughly 30% of Medicaid costs going forward.[24]

The COVID-19 pandemic has resulted in similar policy adjustments. The Families-First Coronavirus Response Act, as amended by the Coronavirus Aid, Relief, and Economic Security (CARES) Act, authorized a 6.2-percentage-point increase in federal medical assistance percentage calculations to help states respond to the pandemic.[25] The CARES Act also provides federal funding for states to cover COVID-19 testing for uninsured populations.[25] However, to encourage states to take full advantage of this support, the Centers for Medicare and Medicaid Services must emphasize that the percentage-point increase also applies to Medicaid disproportionate-share hospital expenditures. These Medicare and Medicaid payments improved care access for the most vulnerable in the aftermath of Hurricane Katrina and have improved access during the COVID-19 pandemic. Additional prevention today can further reduce the adverse impact of catastrophes on the most vulnerable—and on state health care budgets—tomorrow.

SUMMARY

Despite Katrina's high international profile, its global footprint was narrow and its duration predictably limited, so other parts of the United States and the international community could rally to the Gulf Coast's assistance. In contrast, the COVID-19 catastrophe is global in extent, with an indefinite and unpredictable duration and stunningly high mortality, and thus a Katrina-like rescue will not be coming. Tragically, both catastrophes disproportionately harmed and continue to harm vulnerable populations in social, historical, and political environments wherein health disparities are already prevalent, as in the United States.[26]

A nation is only as healthy as its sickest communities. These catastrophes affirm the importance of three basic tools in mitigating disaster harm among disadvantaged groups suffering socioeconomic health disparities. First, disadvantaged and minority populations should receive at least minimum insurance coverage to ensure regular preventive and prompt health engagement. Second, greater investment in health literacy and promotion, a key Healthy People 2020 goal, should be consistently pursued as a cost-efficient method to decrease health care costs and improve health.

Finally, we recommend a process to communicate pending, active, and completed disaster mitigation strategy exercises to top national decision-makers in real time to facilitate timely and consistent disparity-resolving policy planning and legislative action. Our federal agencies, academic institutions, and the private sector frequently engage in "what-if" scenarios and conduct postevent analyses to plot strong national structural, socioeconomic, and health solutions to disasters. Such preparation can yield broad societal benefits, including decreasing the health care system's crisis response burden, because it informs prompt, effective disaster protection, especially for the most vulnerable.[27]

CONCLUSION

True success in disaster management is evidenced by salutary outcomes among society's most vulnerable groups. Hurricane Katrina and the COVID-19 pandemic demonstrate the continuing need for effective planning and execution in protecting our most vulnerable citizens. Structural disadvantages make marginalized populations vulnerable to event-driven dislocation and morbidity and mortality. These effectively isolated populations may not receive the most factual and relevant information during a disaster. Our recommendations may represent a new way of thinking for authorities for whom the health disparity crisis has not traditionally appeared high on the radar.

Leveraging all available tools and skills to neutralize health disparities and enhance communication of simulation-derived disaster management strategies will help improve the fates of our most vulnerable citizens and of our entire nation. AJPH

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Shelter Characteristics, Infection Prevention Practices, and Universal Testing for SARS-CoV-2 at Homeless Shelters in 7 US Urban Areas

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

Objectives. To examine shelter characteristics and infection prevention practices in relation to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection point prevalence during universal testing at homeless shelters in the United States.

Methods. SARS-CoV-2 testing was offered to clients and staff at homeless shelters, irrespective of symptoms. Site assessments were conducted from March 30 to June 1, 2020, to collect information on shelter characteristics and infection prevention practices. We assessed the association between SARS-CoV-2 infection prevalence and shelter characteristics, including 20 infection prevention practices by using crude risk ratios (RRs) and exact unconditional 95% confidence intervals (CIs).

Results. Site assessments and SARS-CoV-2 testing results were reported for 63 homeless shelters in 7 US urban areas. Median infection prevalence was 2.9% (range = 0%–71.4%). Shelters implementing head-to-toe sleeping and excluding symptomatic staff from working were less likely to have high infection prevalence (RR = 0.5; 95% CI = 0.3, 0.8; and RR = 0.5; 95% CI = 0.4, 0.6; respectively); shelters with medical services available were less likely to have very high infection prevalence (RR = 0.5; 95% CI = 0.2, 1.0).

Conclusions. Sleeping arrangements and staffing policies are modifiable factors that might be associated with SARS-CoV-2 infection prevalence in homeless shelters. Shelters should follow recommended practices to reduce the risk of SARS-CoV-2 transmission. (*Am J Public Health*. 2021;111:854–859. https://doi.org/10.2105/AJPH.2021.306198)

Homeless shelters provide temporary and emergency housing for people experiencing homelessness. People experiencing homelessness disproportionately experience untreated chronic medical conditions, older age, and barriers to accessing medical care,[1] increasing the risk of severe disease from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19.[2] Furthermore, as shelters are often congregate settings where it can be challenging to adhere to Centers for Disease Control and Prevention (CDC) guidance to reduce SARS-CoV-2 transmission, such as handwashing, wearing face masks, or remaining at least 6 feet apart, exposure risk might also be increased.[3]

COVID-19 cases have been detected among clients and staff at US homeless shelters.[4–6] A previous study of shelters in 4 US cities identified varied SARS-CoV-2 infection prevalence using universal testing, defined as offering testing irrespective of symptoms.[5] This strategy can inform isolation efforts and infection prevalence estimations because it identifies more cases, including asymptomatic and presymptomatic cases, compared with symptom-based testing alone.[6]

Homeless shelters vary widely in access to resources, operational plans, regulations, size, staffing, and populations served, but the extent to which these traits affect SARS-CoV-2 infection prevalence is unknown. To support shelters during the COVID-19 pandemic, it is critical to identify shelter characteristics with potential to mitigate transmission among clients and staff. In this analysis, we examined shelter characteristics and infection prevention practices in relation to SARS-CoV-2 infection point prevalence at shelters where universal testing occurred.

METHODS

As part of the response to the COVID-19 pandemic, CDC requested collaboration from health and housing partners in 7 US urban areas where universal testing had been performed at shelters during April 1 to June 1, 2020. Participating agencies provided data from site assessments and universal testing.

Universal SARS-CoV-2 testing was conducted per local protocols by real-time reverse transcription–polymerase chain reaction, proactively or in response to a positive viral test at the shelter. Although universal testing was uncommon for the general population, all clients and staff were offered testing; participation was voluntary. If multiple testing events occurred at a shelter, only results of the first event were included. Prevalence was estimated by dividing the number of clients and staff positive for SARS-CoV-2 by the total tested.

Health or housing professionals conducted site assessments to collect information about shelter characteristics and infection prevention practices using a template adapted for local needs (Appendix A, available as a supplement to the online version of this article at https://www.ajph.org). Shared data elements included information about client sleeping arrangements, staffing practices and training, and infection prevention practices such as symptom screening and face mask use. County population density was calculated as inhabitants per square mile,[7] and COVID-19 incidence (cases per 100 000 per week)[8] was estimated as a 7-day average encompassing 3 days before to 3 days after testing.

Infection prevalence greater than 2.9% (the median) was defined as "high" and compared with prevalence of less than or equal to 2.9%; the subset greater than 10% was defined as "very high" and compared with prevalence of less than or equal to 10%. Other continuous variables were converted to binary variables based on the median. We calculated crude risk ratios (RRs) and exact unconditional 95% confidence intervals (CIs) to assess for associations between high or very high prevalence and shelter characteristics. We conducted analyses in SAS version 9.4 (SAS Institute, Cary, NC).

RESULTS

SARS-CoV-2 testing results and site assessments conducted March 30 through June 1, 2020, were reported for 63 shelters in urban areas in 7 states (California, Colorado, Georgia, Illinois, Nevada, Rhode Island, and Washington). Site assessments were conducted a median of 13 days after the testing event (range = 1 day before to 51 days after). Among 20 infection prevention practices included in this report, 19 (95%) were implemented by greater than 50% and 9 (45%) by greater than 80% of shelters (Table 1).

The average number of beds filled ranged from 8 to 320 (median = 74). The number of clients and staff members tested ranged from 7 to 364 (median = 63), and the number that tested positive for SARS-CoV-2 ranged from 0 to 165 (median = 2). Median prevalence by facility was 2.9% (range = 0%–71.4%). Twenty (31.7%) shelters had very high (> 10%) prevalence.

Shelters implementing head-to-toe sleeping (positioning beds in a row so that clients sleep with heads at alternating ends of the bed compared with their neighbors [i.e., each client's head lines up with their neighbors' toes, to maximize distance between clients' heads and minimize sharing air space while sleeping]) were less likely to experience high infection prevalence (35.1%; 13 of 37) compared with shelters that did not implement head-to-toe sleeping (73.7%; 14 of 19; RR = 0.5; 95% CI = 0.3, 0.8). Shelters that excluded symptomatic staff were also less likely to experience high prevalence (47.5%; 29 of 61) compared with shelters allowing symptomatic staff to continue working (100%; 2 of 2; RR = 0.5; 95% CI = 0.4, 0.6). Shelters with on-site medical services were less likely to have very high prevalence (20.6%; 7 of 34) compared with shelters lacking those services (44.8%; 13 of 29; RR = 0.5; 95% CI = 0.2, 1.0). In this analysis, additional characteristics (e.g., staff training, client and staff symptom screening and face mask use, and county COVID-19 incidence) were not associated with prevalence (Table 1).

DISCUSSION

These data show that universal testing at homeless shelters can identify high prevalence of SARS-CoV-2 infection, even in areas with low incidence of COVID-19, and shelters have adopted a range of infection prevention practices. Adopting head-to-toe sleeping arrangements and excluding symptomatic shelter staff from working were associated with lower risk of high SARS-CoV-2

TABLE 1— Association of High Point Prevalence During Universal SARS-CoV-2 Testing at Homeless Shelters, Selected County and Shelter Characteristics: 7 US Urban Areas, March 30–June 1, 2020

	Total Shelters, No. (%)[a] or Median (Range)	High SARS-CoV-2 Infection Prevalence,[b] No. (%) or Median (Range)	RR (95% CI)	Very High SARS-CoV-2 Infection Prevalence,[c] No. (%)	RR (95% CI)
Total	63	31 (49.2)		20 (31.7)	
County-level characteristics					
COVID-19 incidence (cases per 100 000)					
High, > 15 (Ref)	30 (47.6)	17 (60.7)		12 (42.9)	
Low, ≤ 15	33 (52.4)	14 (40.0)	0.7 (0.5, 1.2)	8 (22.9)	0.6 (0.3, 1.3)
Median	15.0 (2.9–32.8)				
Population density (inhabitants per square mile)					
High, > 3 923 (Ref)	31 (49.2)	18 (58.1)		13 (41.9)	
Low, ≤ 3 923	32 (50.8)	13 (40.6)	0.7 (0.4, 1.2)	7 (21.9)	0.5 (0.2, 1.1)
Median	3 923 (247–17 179)				
Client sleeping arrangements					
Percentage of beds filled					
≥ 74 (Ref)	31 (49.2)	14 (45.2)		8 (25.8)	
< 74	29 (29)	16 (55.2)	1.2 (0.7, 2.0)	12 (41.4)	1.6 (0.8, 3.4)
Median	76.9 (15.4–125)				
Beds or mats assigned to 1 person (instead of shared or communal use)					
No (Ref)	7 (11.1)	4 (57.1)		3 (42.9)	
Yes	53 (84.1)	26 (49.1)	0.9 (0.4, 1.7)	17 (32.1)	0.7 (0.3, 1.9)
Distance between beds in sleeping area ≥ 3 feet					
No (Ref)	10 (15.9)	6 (60.0)		4 (40.0)	
Yes	51 (81.0)	24 (47.1)	0.8 (0.4, 1.4)	15 (29.4)	0.7 (0.3, 1.8)
Separation screen or barrier between beds					
No (Ref)	50 (79.4)	25 (50.0)		15 (30.0)	
Yes	10 (15.9)	5 (50.0)	1.0 (0.5, 2.0)	4 (40.0)	1.3 (0.6, 3.2)
Clients sleeping head-to-toe					
No (Ref)	19 (30.2)	14 (73.7)		10 (52.6)	
Yes	37 (58.7)	13 (35.1)	0.5 (0.3, 0.8)	8 (21.6)	0.4 (0.2, 0.9)
Staff characteristics and training					
Staff work at other shelter locations					
No (Ref)	35 (55.6)	18 (51.4)		11 (31.4)	
Yes	23 (36.5)	12 (52.2)	1.0 (0.6, 1.7)	9 (39.1)	1.2 (0.6, 2.5)
Medical services routinely available at the facility					
No (Ref)	29 (46.0)	17 (58.6)		13 (44.8)	
Yes	34 (54.0)	14 (41.2)	0.7 (0.4, 1.2)	7 (20.6)	0.5 (0.2, 1.0)
All staff trained on hygiene measures and standard precautions					
No (Ref)	4 (6.3)	1 (25.0)		1 (25.0)	
Yes	58 (92.1)	29 (50.0)	2.0 (0.4, 11.1)	18 (31.0)	1.2 (0.2, 7.1)

Continued

TABLE 1— Continued

	Total Shelters, No. (%)[a] or Median (Range)	High SARS-CoV-2 Infection Prevalence,[b] No. (%) or Median (Range)	RR (95% CI)	Very High SARS-CoV-2 Infection Prevalence,[c] No. (%)	RR (95% CI)
All staff received training on how to correctly put on and take off personal protective equipment					
No (Ref)	14 (22.2)	6 (42.9)		5 (35.7)	
Yes	42 (66.7)	21 (50.0)	1.2 (0.6, 2.3)	14 (33.3)	0.9 (0.4, 2.1)
Staff routinely wear masks when interacting with clients					
No (Ref)	5 (7.9)	2 (40.0)		2 (40.0)	
Yes	54 (85.7)	27 (50.0)	1.3 (0.4, 3.8)	17 (31.5)	0.8 (0.3, 2.5)
All staff screened for symptoms					
No (Ref)	23 (36.5)	11 (47.8		8 (34.8)	
Yes	39 (61.9)	19 (48.7)	1.0 (0.6, 1.7)	11 (28.2)	0.8 (0.4, 1.7)
All staff have their temperature checked					
No (Ref)	25 (39.7)	12 (48.0)		9 (36.0)	
Yes	34 (54.0)	16 (47.1)	1.0 (0.6, 1.7)	10 (29.4)	0.8 (0.4, 1.7)
Staff excluded from working when symptomatic					
No (Ref)	2 (3.2)	2 (100)		1 (50.0)	
Yes	61 (96.8)	29 (47.5)	0.5 (0.4, 0.6)	19 (31.1)	0.6 (0.1, 2.6)
Other infection prevention practices					
Limited number of designated entry points					
No (Ref)	2 (3.2)	1 (50.0)		1 (50.0)	
Yes	61 (96.8)	30 (49.2)	1.0 (0.2, 4.0)	19 (31.1)	0.6 (0.1, 2.6)
Handwashing available at facility entry					
No (Ref)	22 (34.9)	11 (50.0)		6 (27.3)	
Yes	39 (61.9)	18 (46.2)	0.9 (0.5, 1.6)	12 (30.8)	1.1 (0.5, 2.6)
Points of entry monitored to ensure hand hygiene					
No (Ref)	14 (22.2)	6 (42.9)		4 (28.6)	
Yes	44 (69.8)	23 (52.3)	1.2 (0.6, 2.4)	15 (34.1)	1.2 (0.5, 3.0)
Clients routinely wear masks or cloth face coverings when not in their sleeping areas					
No (Ref)	11 (17.5)	5 (45.5)		3 (27.3)	
Yes	46 (73.0)	24 (52.2)	1.1 (0.6, 2.3)	16 (34.8)	1.3 (0.4, 3.6)
All clients screened for symptoms					
No (Ref)	7 (11.1)	4 (57.1)		2 (28.6)	
Yes	54 (85.7)	26 (48.1)	0.8 (0.4, 1.7)	17 (31.5)	1.1 (0.3, 3.8)
All clients have their temperature checked					
No (Ref)	19 (30.2)	9 (47.4)		6 (31.6)	
Yes	44 (69.8)	22 (50.0)	1.1 (0.6, 1.8)	14 (31.8)	1.0 (0.5, 2.2)
Designated area for suspected cases or symptomatic clients to isolate					
No (Ref)	20 (31.7)	12 (60.0)		9 (45.0)	
Yes	43 (68.3)	19 (44.2)	0.7 (0.5, 1.2)	11 (25.6)	0.6 (0.3, 1.1)

Continued

TABLE 1— Continued

	Total Shelters, No. (%)[a] or Median (Range)	High SARS-CoV-2 Infection Prevalence,[b] No. (%) or Median (Range)	RR (95% CI)	Very High SARS-CoV-2 Infection Prevalence,[c] No. (%)	RR (95% CI)
Symptomatic clients provided with a surgical mask					
No (Ref)	4 (6.3)	2 (50.0)		2 (50.0)	
Yes	55 (87.3)	28 (50.9)	1.0 (0.4, 2.8)	17 (30.9)	0.6 (0.2, 1.8)

Note. CI = confidence interval; RR = risk ratio; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2. For additional information about recommended prevention practices in homeless shelters, homeless service providers are encouraged to refer to the Centers for Disease Control and Prevention's Interim Guidance for Homeless Service Providers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)[9] and resources to support people experiencing homelessness: https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters.

[a] Numbers may not equal 100% because of missing or unknown responses.
[b] High SARS-CoV-2 infection prevalence is defined as point prevalence above the median (> 2.9%).
[c] Very high SARS-CoV-2 infection prevalence is defined as point prevalence > 10%.

infection prevalence. Positioning beds so clients sleep head-to-toe is recommended to reduce transmission of respiratory pathogens, including SARS-CoV-2.[9] Consistent with CDC recommendations for all persons, shelters should require staff who experience symptoms consistent with COVID-19 to isolate at home for at least 10 days since symptoms first appeared and until symptoms have improved, including at least 24 hours with no fever without taking fever-reducing medication.[10] Availability of on-site medical services was associated with lower risk of having very high prevalence of SARS-CoV-2 in clients and staff. Routine access to on-site medical services might enable shelters to quickly identify and isolate symptomatic clients or to identify and maintain appropriate infection prevention practices.

Although symptom and temperature screening were not associated with prevalence in this analysis, they remain fundamental measures to identify individuals with suspected COVID-19. Studies have shown that, given the potential for asymptomatic and presymptomatic transmission of SARS-CoV-2,[11] additional measures, including the use of face masks, can reduce the spread of SARS-CoV-2.[12] A combination of multiple infection prevention strategies is necessary to reduce transmission of SARS-CoV-2.

These findings are subject to several limitations. The high proportion of adopted infection control practices is a positive finding, but low variability in shelter practices and small sample size limit the ability to assess for confounding or detect statistically significant associations between prevention measures and prevalence. Timing of infection control measures and site assessments varied relative to testing events; associations between shelter practices and prevalence might not be correlated. Data were collected early in the pandemic as guidance regarding testing evolved, and prevalence was calculated for clients and staff together because some sites were unable to separate those results. Site assessments varied between locations and included self-reported data. Finally, results are not generalizable and are subject to biases, including selection (i.e., which areas and shelters offered and which individuals accepted SARS-CoV-2 testing), recall, and social desirability (i.e., tendency to respond favorably to site assessment questions).

PUBLIC HEALTH IMPLICATIONS

Congregate settings, such as homeless shelters, can pose risks for spread of communicable diseases such as COVID-19. However, continuing services for people experiencing homelessness is critical. Sleeping arrangements and staffing policies, such as excluding symptomatic staff and having medical services on site, are modifiable factors that might be associated with transmission of SARS-CoV-2 in shelters. Shelters should follow recommended practices[9] to reduce the risk of SARS-CoV-2 transmission, and further studies should evaluate environmental risks associated with transmission in congregate settings. AJPH

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CONFLICTS OF INTEREST

The authors report no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

This activity was determined by Centers for Disease Control and Prevention to be public health surveillance in accordance with 45 CFR Part 46.

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Public Policy Impact of the COVID-19 Pandemic on Blood Supply in the United States

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

The COVID-19 pandemic has precipitated an acute blood shortage for medical transfusions, exacerbating an already tenuous blood supply system in the United States, contributing to the public health crisis, and raising deeper questions regarding emergency preparedness planning for ensuring blood availability. However, these issues around blood availability during the pandemic are related primarily to the decline in supply caused by reduced donations during the pandemic rather than increased demand for transfusion of patients with COVID-19.

The challenges to ensure a safe blood supply during the pandemic will continue until a vaccine is developed, effective treatments are available, or the virus goes away. If this virus or a similar virus were capable of transmission through blood, it would have a catastrophic impact on the health care system, causing a future public health emergency that would jeopardize the national blood supply.

In this article, we identify the impact of the COVID-19 pandemic on blood supply adequacy, discuss the public health implications, propose recovery strategies, and present recommendations for preparing for the next disruption in blood supply driven by a public health emergency. (*Am J Public Health*. 2021;111:860–866. https://doi.org/10.2105/AJPH.2021.306157)

Blood donations are a pillar of modern medicine,[1,2] and an adequate supply of safe blood for transfusion is essential to protect the public's health. The US blood supply system has been seriously threatened by the COVID-19 pandemic, jeopardizing the ability to treat critically ill persons and emergency patients, with significant implications for the health care delivery system. The nation's blood supply was already tenuous before the COVID-19 pandemic,[3,4] and, since then, issues have been further compounded. Demand for blood has actually been declining since 2008 because of more conservative transfusion practices. This decline in demand caused blood centers to rapidly consolidate through mergers, resulting in reduced blood product availability,[5–10] leading to a loss of national surge capacity, leaving the highly complicated blood product supply chain struggling at the local, regional, and national levels.[11]

Blood is typically collected, processed, and stored at regional nonprofit blood centers and distributed to hospitals on a daily or weekly basis. Moreover, most blood products are perishable, with a short shelf life—42 days for red blood cells and 7 days for platelets—which precludes stockpiling a meaningful inventory for surge capacity or other emergencies. Safety for both the blood donor and recipient is the central concern in transfusion medicine and a key driver of blood availability. The pandemic has produced a heated debate regarding the safety of blood donations in endemic countries. While the lockdown reduces the amount of health care activity, unavoidable patient care continues. For example, it is estimated that there is a substantial backlog of new cancer patients across the nation[12]; as cancer programs look to restart operations, this backlog will grow.

IMPACT OF THE COVID-19 PANDEMIC ON BLOOD SUPPLY

The blood shortage caused by COVID-19 is an urgent public health issue that interferes with the functioning of the entire health care system. The US blood supply has fallen to critically low levels since the COVID-19 pandemic began, with only a 1 day inventory in some instances,[13] prompting the blood supply organizations and the surgeon general to issue an urgent call for blood donations.[14] However, these issues around blood availability during the pandemic are related primarily to the decline in supply caused by reduced donations during the pandemic rather than increased demand for transfusion of patients with COVID-19.[15] This decrease in blood donations is related to 2 main factors. First, the cancellation of blood drives—the Red Cross cancelled more than 30 000 planned blood drives between mid-March and June of 2020,[16] and upward of 500 000 potential units of blood went uncollected.[16] Second, it is possible that shelter-in-place recommendations and fear of infection has an impact on donor willingness to donate blood.

TABLE 1— Estimates of Eligible Blood Donors Before COVID-19 and as of December 2020: United States

Category	Amount
US population	328.2 million persons
Pre–COVID-19 estimates	
Adjustment for exclusion factors (328.2 × 0.626)	205.4 million persons eligible to donate
Actual number of blood donors	8 million donors
Percentage of actual eligible blood donors (8 million/205.4 million)	3.9
COVID-19 estimates	
Impact estimate (18 × 3.34)	60 million persons
Adjustment for exclusion factors (328.2–60 = 268.2 × 0.626)	167 million persons eligible to donate
Actual number of blood donors (167 × 0.039)	6.5 million donors
Percentage change in actual eligible blood donors ([6.5–8]/8)	19

The supply chain is most vulnerable at its first step: obtaining blood donations from healthy donors willing to volunteer their blood. Before the pandemic, our estimates indicate that approximately 37% of the US population was ineligible to donate blood because of 38 exclusion factors.[17] The number of confirmed COVID-19–positive infections as of late December 2020 is 18 million in the United States,[18] and it is estimated that the number of COVID-19 infections in many parts of the United States is more than 10 times higher than the reported rate.[19,20] Using a factor of 3.34 times confirmed infections, we conservatively estimate that as of December 2020 as many as 60 million persons in the United States have had a COVID-19 infection. In 2017, 8 million donors provided approximately 12.2 million units of transfused blood.[21] Table 1 shows that there are approximately 205 million eligible blood donors in the total US population of 328.4 million persons.[22] The 8 million blood donors represent 3.9% (8 million/205.4 million) of the population eligible to donate blood before the COVID-19 era. Based on the estimate that as many as 60 million persons in the nation could have had a COVID-19 infection, it is possible that the pool of eligible blood donors could decrease by 38.4 million persons if COVID-infected persons are deferred from blood donations, reducing the pool from 205.4 million eligible donors to 167 million eligible donors. This results in a 19% potential decrease in the pool of eligible blood donors (from 8 million to 6.5 million eligible blood donors).

This estimate only takes into account the potential exclusions for blood transfusion. To the extent that convalescent plasma treatment becomes an accepted practice, this would be a new demand on the blood system, and it is not included in the previous calculation. Turning convalescent plasma donors into return blood donors is evolving and could become a rapidly expanding area of collections. Studies show no evidence to support transfusion-transmitted COVID-19,[23] and there is no long-term deferral from blood donation following COVID-19 recovery.[24] While it is increasingly clear that a small portion of COVID-19 patients will have lingering problems that will prevent these patients from being blood donors,[25,26] this virus is part of the family of respiratory viruses that has been shown to not be transmitted by transfusion.[27] Preliminary studies indicate that neutralizing antibodies are stably produced for at least 5 to 7 months after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection,[28] and serum antibodies to SARS-CoV-2 are maintained in the majority of COVID-19 patients for at least 3 months after symptom onset.[29] However, it is not conclusively known how long the antibodies will persist nor which kinds of antibodies will be the most beneficial. Antibodies can be measured in a variety of ways, and, thus, it will be important to determine which of these antibody assays is most clinically relevant. If this virus or a similar virus were capable of transmission through blood, it would have a catastrophic impact on the health care system.

During the COVID-19 pandemic, blood donations have decreased, but blood transfusions have also decreased because of the closure of medical clinics and a reduction of hospital inpatient census by 20%.[30] A person with an active COVID-19 infection is ineligible to donate blood, although there is little evidence that blood transfusion will transmit the infection. However, the duration of the COVID-19 virus is quite variable—spanning from a few days to a few weeks or even months, and it seems likely that some persons will have long-term sequelae that eliminate them as blood donors. The impact of donor exclusion on the pool of eligible donators caused by COVID-19 may be substantial. COVID-19 could be classified as either a short-term (1–59 days) donor exclusion factor, a long-term (60–365 days) exclusion factor, or possibly a permanent exclusion factor.[4,17] Currently, the US Food and Drug Administration (FDA) suggests a 14-day deferral based on testing and symptoms with most blood collection centers not using a permanent deferral.[31]

The COVID-19 pandemic is precipitating innovative mechanisms for increasing the blood supply throughout the nation. For example, Facebook and the American Association of Blood Banks (AABB) announced a partnership to connect more people to their local blood banks.[14] However, such partnerships raise serious privacy concerns, which will require discussion and resolution. Several facets that are part of the pandemic will likely persist (see box on p. 863). The success of remote working will likely lead to its persistence to some extent, thus decreasing the number of large groups of potential blood donors. The public is likely to be more concerned by viral infections, and, thus, some social distancing will persist. There may be increased fear of receiving a transfusion-transmitted infection as well as the donor's misconception that they will become infected while donating blood from exposure to an infected person within the blood collection center.

These changes resulting from the pandemic will necessitate changes in the operation of blood supply organizations (see box on p. 864). The pandemic has altered work practices, perhaps permanently in some cases. This substantial transition toward remote work disrupts the traditional work setting with a number of residual impacts on traditional blood collection. For example, blood drives that used to take place at large gatherings of people such as places of employment will no longer be as relevant because of the large transition to virtual remote work. With these changing work practices, blood supply organizations will need to adapt and restructure their traditional modes of collecting blood. These and other not-yet-recognized effects will have an impact of how blood collection organizations will have to operate (see box on p. 864). These will likely necessitate change in the structure and operation of blood supply organizations and may lead to cost increases and further decrease ability to innovate.[32] A list describing potential factors that may change the operation of blood supply organizations related to the COVID-19 pandemic is shown in the box on p. 864.

EMERGENCY PREPAREDNESS

A blood emergency refers to an event that requires a larger amount of blood than usual or that temporarily restricts or eliminates the ability to collect blood.[33] Emergency response preparation for blood supply has not been as extensive as other preparedness activities,[34] and the COVID-19 pandemic highlights several deficiencies of the public health emergency preparedness system for blood. A recent study undertaken for the Department of Health and Human Services (HHS) explored the ways in which a global pandemic could disrupt the US blood supply,[35] a scenario that is now playing out in real time.

Blood and blood products are a critical element of public health emergency preparedness and an essential component of the Emergency Support Functions of the National Response Framework.[34] The Center for Preparedness and Response in the Centers for Disease Control and Prevention (CDC) coordinates public health preparedness,[36] while HHS monitors and coordinates the need for blood and blood products and related medical supplies in coordination with the AABB.[37] While Congress identified ensuring an adequate blood supply as an important strategic issue facing the US blood system, this concern has not received sufficient attention, and there has not been substantial progress toward this goal.[35] Although blood collection centers are among the few organizations allowed to stay open during closures of nonessential business during the pandemic, they have operated at a substantially reduced capacity, experiencing difficulty in reliably meeting blood requirements. Indeed, COVID-19 has significantly decreased the rate of blood donations around the world.[38]

Emergency preparedness for transfusion medicine is based on the assumption that demand will increase dramatically. For example, the AABB *Disaster Operations Handbook* identifies a pandemic as a high threat, related to an increase in the demand for blood, but does not identify the lack of blood supply as a substantial risk[33] as has occurred in the COVID-19 pandemic. As indicated previously, the COVID-19 pandemic blood shortage is related to

Potential Ongoing Factors From the COVID-19 Pandemic That Can Have an Impact on Blood Donations

1. Decreased donor willingness to donate
2. Continued emphasis on remote work
3. Decrease in large concentrations of workers
4. Concerns regarding the infection risk during travel to donation site
5. Social distancing
6. Fear of receiving blood transfusion
7. Fear of infection from donating blood

the inability to maintain supply rather than an increase in the need for blood or distribution difficulties.

The COVID-19 pandemic has raised a number of concerns regarding how to equitably allocate supplies that are needed to respond to the pandemic, such as vaccinations,[39] personal protective equipment,[40] and ventilators. There are similar concerns regarding how to set equitable allocation of blood to hospitals, how to determine first-tier transfusion recipients, and how to account for such factors, as health care disparities have not been discussed. A framework needs to be developed for equitable allocation of blood for transfusions. Public health practitioners and other partners need clear and accessible guidance regarding effective practices to respond to public emergencies,[41] which also applies to the blood supply for transfusion medicine. For example, a lottery system has been proposed to allocate scarce COVID-19 medications to promote fairness, and the National Academies released a preliminary framework for equitable allocation of COVID-19 vaccines on September 1, 2020.[42,43]

IMPLICATIONS

The blood supply system has been described as a public good, operating in an undefined partnership with government.[44] However, the blood supply system functions in the private sector with independent organizations, which compete with each other both for donors and for hospital distribution accounts.[3]

The COVID-19 pandemic has led to a serious shortage of blood in the United States, jeopardizing the ability of the health care system to treat patients, creating a public health emergency for the foreseeable future. Although some spot shortages caused procedures to be postponed—such as solid organ transplants—it does not appear that there were severe patient problems or fatalities attributable to the lack of blood.[45] These decreases in demand were met with greater decreases in supply of blood during the COVID-19 pandemic.[46] This blood shortage reflects longstanding challenges in the blood collection and distribution system, requiring both short-term and long-term solutions.[3,36]

In the short term, several actions can be taken to ensure voluntary blood donors provide a continuous and safe donation of blood components. This includes a timely appeal to donate blood when a shortage is foreseeable, careful planning of the donor schedule at blood collection centers to ensure compliance with social distancing measures and avoiding an excess number of donors at any given time, use of adequate personal protective equipment, and meticulous adherence to hygiene regulations. Travel by potential blood donors to make donations is the most feasible way to acquire the needed blood supply and should be considered essential by governments. These strategies have had a demonstrated effect. For example, following an initial 10% decrease in whole blood collection in Italy, the strict application of these measures resulted in a stable volume of blood donations, guaranteeing blood component self-sufficiency.[47] Avoiding shortages requires the ability to maintain supply-and-demand equilibrium by ensuring coordination among blood supply organizations, transfusion physicians, hospital systems, and government agencies. The governance for these strategies is unclear and needs resolution. For example, state requirements for personal protective equipment and distancing vary widely, while the CDC recommendations fluctuate. Although this is a short-term concern, we recommend a long-term national strategy with apolitical guidelines. Historically, the FDA sets donor requirements that are standardized on a national basis, and the AABB uses those same requirements.[31]

To provide a long-term foundation for improving preparedness in public health emergencies, we propose 3 recommendations. First, create national policies for capacity building. The absence of a national system for blood supply management has made it difficult to match supply and demand (see box on this page). Second, structural changes in the blood supply chain must be deployed, and blood supply organizations will need to change their operating structure to react efficaciously to COVID-19 (see box on this page). This includes integrating the community blood centers responsible for the collection and distribution of blood and blood

Potential Changes in Blood Supply Organizations' Operations Because of the COVID-19 Pandemic

1. **Fewer large blood drives may be offered because remote working decreases donor pool in central locations.**
2. **Shelter-in-place orders and donor fear of infection may decrease donor willingness to donate.**
3. **Addition of new donor exclusion criteria may lead to a decrease of eligible blood donors.**
4. **Fewer large blood drives may mean that more blood will be collected in fixed sites.**
5. **New kinds of sites, such as stadiums or convention centers, may be used to facilitate social distancing.**
6. **Blood supply organizations may emphasize increased effort to recruit donors who are friends and relatives of patients using blood.**
7. **The need for cleaning equipment and facilities between donors may result in reduced productivity.**
8. **Greater use of personal protective equipment for staff may increase costs and worker discomfort.**
9. **More scheduled donations may be required involving increased costs attributable to scheduling.**

products into the emergency management planning efforts with the addition of blood-related scenarios in the drill and exercise programs. This helps to ensure that blood centers are appropriately prioritized for emergency communications equipment and frequencies, transportation during disasters, restoration of utilities, and re-entry access into affected disaster areas. Third, crisis management leadership throughout the blood supply system is needed. This leadership begins with the Federal Emergency Management Agency working closely with community blood centers to ensure that blood and blood products are available when needed during emergencies. For example, the FDA issued 4 blood donor eligibility guidelines on April 2, 2020, to help alleviate blood shortages during the COVID-19 pandemic, including alternative procedures for blood and blood components collected during the COVID-19 public health emergency (these alternatives are only in effect until the end of the public health emergency).

One of the difficulties in the blood supply response has been the lack of a federal policy to coordinate the response to emergency shortages on a national basis. The US blood supply system involves a number of individual blood organizations that could be organized to function as a national emergency supply preparedness system. This national system for blood collection management could include an information technology infrastructure that connects all blood operators within the United States to more freely move needed blood products across blood collection organizations. The system could be overseen by a US government body that manages a universal blood supply organization with the independent nonprofit blood collection organizations functioning as collection and distribution hubs. This proposed integrated structure could be filled by government employees working directly within the blood centers or blood center employees that serve on integrated government-level committees. The box on p. 865 summarizes several recommendations to improve blood supply for future emergencies.

The recommendations for short-term and long-term recovery strategies will involve sustainable collaboration to continue after the epidemic is over, and blood supply organizations will need to adapt their operations to respond to these changes. The pandemic has altered work practices, perhaps permanently in some cases. This substantial transition toward remote work[48] disrupts the traditional work setting with a number of impacts on traditional blood collection. For example, blood drives that used to take place at large gatherings of people such as places of employment will no longer be as relevant because of the large transition to virtual remote work. With these changing work practices, blood supply organizations will need to adapt and restructure their traditional modes of collecting blood. To be more responsive to donor convenience, blood supply organizations understand the need to develop smaller, more mobile blood collection systems to supplement more traditional modes of collecting blood. For example, mobile blood units small enough to make house calls can enhance consumer convenience.

CONCLUSION

In this article we describe the US blood supply system, the impact of the pandemic upon blood supply, and implications for emergency preparedness. The COVID-19 pandemic exposes the gaps and vulnerabilities of the nation's blood supply system, contributing to public health emergency preparedness challenges. Dialogue between key policy and public health leaders, health care delivery systems, and physicians has been conspicuously absent. While there is a heightened need for rigor in emergency planning and response activities, this response has not been well coordinated or responsive to the needs of public health.

The blood transfusion supply chain has unique characteristics. Even before the onset of COVID-19, the transfusion medicine blood supply chain had structural challenges related to supply chain factors including sole source supply from human donors, limited

Recommendations to Improve Blood Supply in Preparation for Future Emergencies

1. **Create national policies for capacity building.**
2. **Establish national system for inventory management.**
3. **Change operating structure of blood supply organizations to improve ability to react to emergencies.**
4. **Make structural changes to improve supply chain.**
5. **Integrate blood supply organizations into emergency planning activities.**
6. **Include blood-related scenarios in emergency drill and exercise programs.**
7. **Ensure that blood suppliers have appropriate priority within emergency communications, transportation, and restoration of utilities.**
8. **Define structure for comprehensive unified crisis management related to blood supply.**
9. **Ensure that blood centers are considered essential services during emergencies.**
10. **Create national stockpile of key supplies, equipment, and reagents to support continued blood supply organization function during emergency.**

ability to create meaningful inventory because of the short shelf life of blood products, and economic pressures leading to industry consolidation. These structural challenges are mirrored across the globe, with 119 of the 195 nations of the world having an inadequate blood supply to meet health care needs.[49]

The COVID-19 pandemic introduces severe stressors into the supply chain, contributing to the public health emergency and threatening population health. However, this acute blood shortage reflects deeper issues for public health emergency preparedness as well as the structure of the blood collection system. There is no known end date for the COVID-19 pandemic and no guarantee that COVID-19 will be the last epidemic or pandemic,[50] underscoring the challenge to immediately identify strategies to improve long-term sustainability of the United States' blood supply. The short-term and long-term recommendations presented in this article can be used as a call to action to help ensure an adequate and safe blood supply. AJPH

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W. Riley led the writing of the article, contributed to the design of the study, and takes responsibility for the concepts expressed in the article. K. Love led the literature review, contributed to writing the article, and assisted with the article revision. J. McCullough originated the study concept, contributed to writing the article, and takes responsibility for the concepts expressed in the article.

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The authors report no conflicts of interest.

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COVID-19 Response Efforts of Washington State Public Health Laboratory: Lessons Learned

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See also the COVID-19/Public Health Preparedness and Response section, pp. 842–875.

Laboratory diagnostics play an essential role in pandemic preparedness. In January 2020, the first US case of COVID-19 was confirmed in Washington State. At the same time, the Washington State Public Health Laboratory (WA PHL) was in the process of building upon and initiating innovative preparedness activities to strengthen laboratory testing capabilities, operations, and logistics. The response efforts of WA PHL, in conjunction with the Centers for Disease Control and Prevention, to the COVID-19 outbreak in Washington are described herein—from the initial detection of severe acute respiratory syndrome coronavirus 2 through the subsequent 2 months.

Factors that contributed to an effective laboratory response are described, including preparing early to establish testing capacity, instituting dynamic workforce solutions, advancing information management systems, refining laboratory operations, and leveraging laboratory partnerships. We also report on the challenges faced, successful steps taken, and lessons learned by WA PHL to respond to COVID-19.

The actions taken by WA PHL to mount an effective public health response may be useful for US laboratories as they continue to respond to the COVID-19 pandemic and may help inform current and future laboratory pandemic preparedness activities. (*Am J Public Health*. 2021;111:867–875. https://doi.org/10.2105/AJPH.2021.306212)

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The first US case of COVID-19 was confirmed in Washington State and was announced on January 20, 2020, by the US Centers for Disease Control and Prevention (CDC) and the Washington State Department of Health (WA DOH).[1] By March 31, all 39 counties in Washington were reporting laboratory-confirmed cases (n = 5771) resulting in 290 deaths.[2] At the time, the largest number of confirmed cases (n = 2709) and infections resulting in death (n = 181) were reported from King County, Washington. As severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) continued to spread through Washington over the subsequent months, residents remained at risk for exposure, and the availability and capacity of COVID-19 laboratory testing remained paramount to an effective public health response to this pandemic. Diagnostic testing can confirm infection, guide patient care, improve understanding of the spread of SARS-CoV-2, and inform the implementation of evidence-based measures to slow transmission.

In response to reports of COVID-19, CDC established an Incident Management System on January 7, 2020; it activated the Emergency Operations Center in Atlanta, Georgia, on January 20 to provide continuing and enhanced support to the outbreak response. Multidisciplinary teams were deployed by CDC to support state health departments in epidemiological investigations, clinical management, public communications, and laboratory operations. On January 21, Washington State Public Health Laboratory (WA PHL) established an on-site Incident Management Team (IMT) to facilitate response activities and support laboratory logistics and operations. To effectively coordinate with CDC and public health partners, the Association of Public Health Laboratories also established its Incident Command System and activated its Emergency Operations Center on January 22.

CDC developed the 2019-novel coronavirus (2019-nCoV) real-time reverse transcriptase polymerase chain reaction (rRT-PCR) diagnostic panel to detect

SARS-CoV-2 from upper- and lower-respiratory specimens, and the US Food and Drug Administration (FDA) issued an Emergency Use Authorization for the test on February 4, 2020.[3] WA PHL began testing for SARS-CoV-2 using the CDC assay on February 28, 2020, and communicated with state and federal government leadership, such as the leadership of the Epidemiology and Laboratory Capacity for Infectious Diseases Cooperative Agreement, to secure funding and redirect work to support the response in Washington.

We report here on the pioneering response efforts of WA PHL, together with CDC, to the COVID-19 outbreak in Washington. A timeline of events and laboratory-confirmed cases during this response (through March 31, 2020) is summarized in Figure 1. Factors that contributed to an effective laboratory response included

1. preparing early to establish testing capacity,
2. instituting dynamic workforce solutions,
3. advancing information management systems,
4. refining laboratory operations, and
5. leveraging laboratory partnerships.

Progress, challenges, and lessons learned in each of these areas are discussed subsequently and summarized in the box on p. 869.

ESTABLISHING TESTING CAPABILITY AND EARLY PREPARATIONS

Encountering novel pathogens for which no diagnostic test or treatment exists presents a unique set of challenges to public health laboratories. In the case of COVID-19, CDC initially developed and distributed a test that included 3 primer–probe sets for the detection of viral genetic markers (N1 and N2 to detect 2 regions in the SARS-CoV-2 nucleocapsid [N] gene and N3 for the universal detection of SARS-like coronaviruses) as part of the 2019-nCoV rRT-PCR Diagnostic Panel.[3] To perform CDC's in vitro diagnostic assay under the Emergency Use Authorization and report COVID-19 results, laboratories were required to verify test performance. WA PHL received the CDC test and began the verification process on February 8, 2020; however, N3 reactivity did not match expected results, and this observation was reported back to CDC. After receiving an enforcement discretion from FDA, which gave CDC time to investigate the problem and modify the assay, CDC advised testing laboratories to exclude the N3 primer–probe set.[4] Subsequently, WA PHL verified the performance of the modified assay on February 27, 2020, and identified its first presumptive positive COVID-19 case 2 days later.

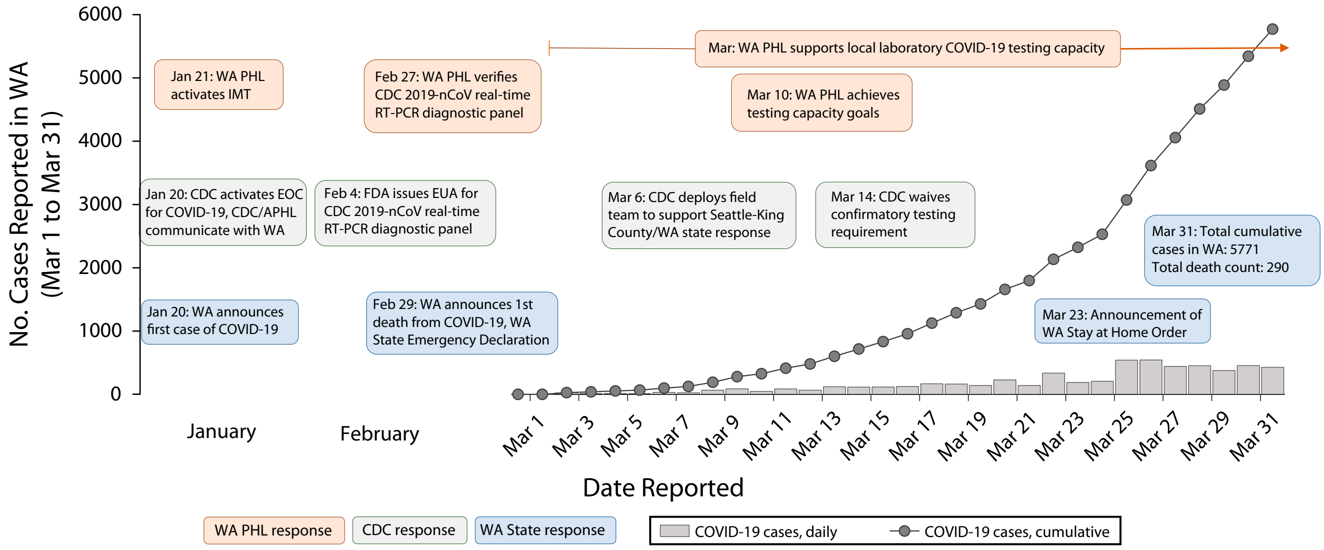

FIGURE 1— **A Timeline of Events and Laboratory-Confirmed COVID-19 Cases During the COVID-19 Response: Washington State; March 1–31, 2020**

Note. 2019-nCoV = 2019-novel coronavirus; APHL = Association of Public Health Laboratories; CDC = Centers for Disease Control and Prevention; EUA = Emergency Use Authorization; FDA = US Food and Drug Administration; IMT = Incident Management Team; PHL = Public Health Laboratory; RT-PCR = reverse transcriptase polymerase chain reaction; WA = Washington State. Daily cases (gray bars) and cumulative cases (gray line) are shown. Key events are displayed in text bubbles; WA PHL (orange), CDC (gray), and Washington (blue).

Source. Washington State Department of Health.[2]

Lessons Learned During the Washington State Public Health Laboratory Response to the COVID-19 Pandemic: Actions That Contributed to an Effective Laboratory Response

1. Initial response preparations and establishing testing capacity
    - Early and regular assessment of laboratory needs by management and rapid procurement of critical testing supplies, reagents, and equipment
    - Timely and clear communication among local, state, and federal public health entities regarding onboarding and verification of the diagnostic test
2. Management of a dynamic workforce
    - Establishment of laboratory-adapted Incident Management Team structure early and approval of continuity of operations plan later in the response to strategically manage staff and maintain productivity
    - Skilled personnel cross-trained and diverted to the response
    - Flexibility by management to meet staffing (hiring) and staff (work availability) needs to maintain laboratory operations
    - Laboratory and epidemiology staff working in proximity, facilitating real-time collaboration between groups
3. Advancing laboratory information management
    - Development of an internal dashboard tool to share critical, real-time, response-specific information with all involved staff
    - Development and implementation of an online, barcoded accessioning system to encourage standardization and interoperability of data management
    - Clear communication and messaging around specimen submission requirements for diagnostic testing to health care providers and submitters statewide
4. Refining laboratory operations and building testing capacity
    - Employing redundancy in equipment and identifying alternative sources for testing media and reagents in anticipation of supply shortages
    - Early establishment of clear criteria through standard operating procedures for accepting, rejecting, and redirecting specimens to ensure testing capacity goals were manageable
    - Waived testing approvals and prioritization processes to ensure continuity of testing and to resolve backlog
    - Refined laboratory operations to increase testing throughput and maximize use of resources
    - Staff dedicated to regularly updating inventory needs and 1 full-time operations staff member to maintain supplies (ideally a microbiologist)
5. Leveraging laboratory partnerships
    - Maximization of local testing capacities (decentralization), rather than relying on the state PHL testing capacity (centralization)
    - PHL aided local laboratories and hospitals to onboard diagnostic testing by providing test validation materials and technical and regulatory guidance
    - Engaging in reagent and supply sharing with local laboratory partners as a stopgap measure during times of supply shortages
    - Working with local and federal partners to ensure fundamental research and public health questions surrounding the response were addressed and public health and policy decision-making were informed by data

Note. PHL = Public Health Laboratory.

In early March 2020, Washington was 1 of 14 states to receive an Epidemiology and Laboratory Capacity grant for COVID-19 epidemiology and laboratory capacity functions. As the outbreak continued to expand in Washington and around the United States, additional COVID-19 testing capacity became available through commercial and academic laboratories. The University of Washington Medicine Clinical Virology Laboratory also began testing for SARS-CoV-2 on March 2, increasing test capacity across Washington.[5] To increase its own testing capacity, WA PHL preemptively ordered supplies and reagents to reach the upper limit of its surge-testing capacity and acquired additional testing equipment. The goal was to have a 10- to 14-day inventory of critical testing supplies and reagents, but high demand rapidly affected the national supply chain, including CDC's International Reagent Resource.[6]

WA PHL worked with CDC to streamline acquisition of critical supplies from federal partners, the International Reagent Resource, and an extended list of commercial vendors to mitigate supply chain difficulties. The challenges with verification of the initial CDC in vitro diagnostic assay at WA PHL resulted in lost time during its initial response efforts to implement testing.

RESTRUCTURING PUBLIC HEALTH LABORATORY STAFF

WA PHL rapidly reorganized its skilled workforce to increase COVID-19 testing efficiency by establishing a laboratory IMT structure. The IMT was arranged based on key components of COVID-19 testing operations: specimen accessioning, RNA extraction, PCR assay, data management, logistics, facilities, and applications (Figure 2). A liaison between epidemiology and laboratory operations was established to facilitate communication and optimize collaboration

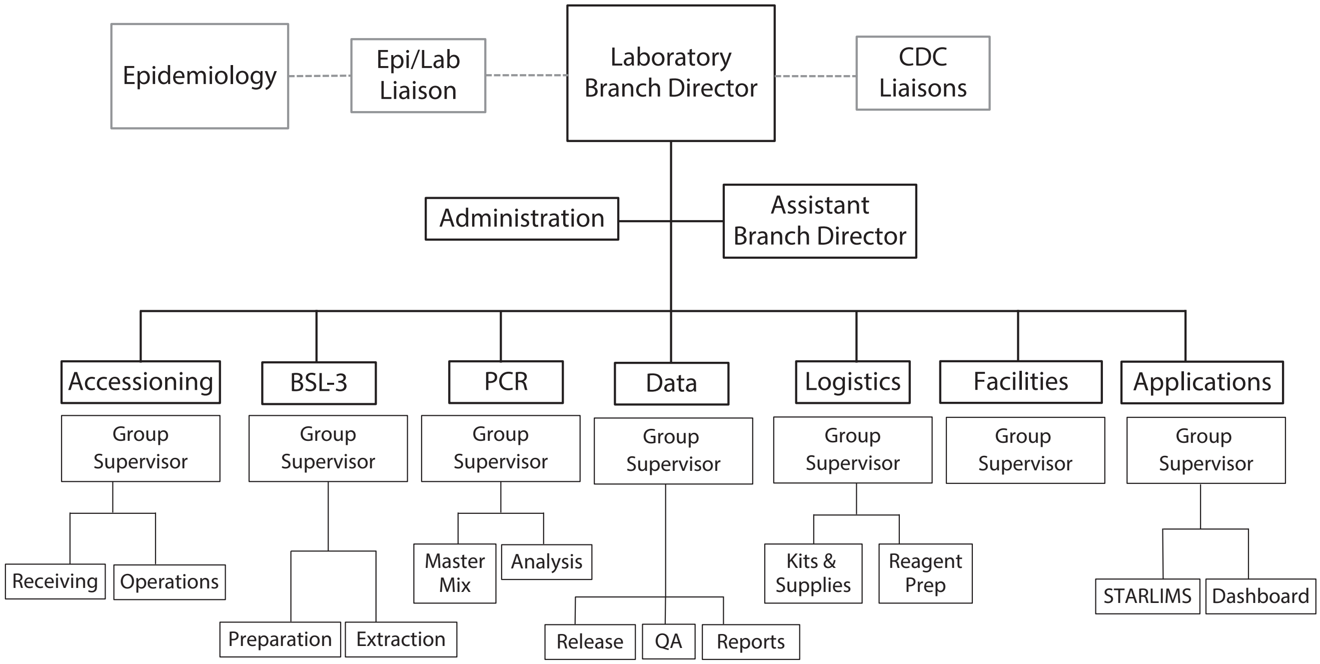

FIGURE 2— **Washington State Public Health Laboratory Adapted Incident Management Team Structure for the COVID-19 Response**

Note. BSL = biosafety level; CDC = Centers for Disease Control and Prevention; Epi/Lab = epidemiology/laboratory; PCR = polymerase chain reaction; QA = quality assurance.

between these groups. Furthermore, on March 8, 2 on-site CDC liaisons were added to the IMT structure at WA PHL to assist coordinated federal and state-level response efforts. Each group supervisor provided twice-daily updates on supply and reagent inventory, staffing needs, equipment, and operations to quickly identify and address issues related to the testing process. In addition, the King County Department of Community and Human Services approved initiation of WA PHL's COVID-19 continuity of operations plan,[7] which allowed it to halt or divert nonessential diagnostic, surveillance, and environmental testing, freeing staff with relevant expertise to be assigned to SARS-CoV-2 testing operations.

Maintaining continuity of testing relied on dynamic restructuring of the WA PHL workforce. Biodefense laboratory staff in the BioWatch program[8] were redirected to the COVID-19 response, and other staff members were reassigned to data-entry positions to help with accessioning when specimen receipt volumes intensified. Initially, emergency activation status allowed the laboratory to hire 6 additional nonpermanent staff, including 4 microbiologists, to help achieve surge-testing capacity goals. Federal assistance supported continued onboarding of additional staff members during 2020 to help relieve staff and prevent burnout. Existing trained personnel were diverted to the COVID-19 response, and staff working volunteer-based overtime hours allowed the laboratory to expand testing to 17 hours a day, 7 days per week. Following Seattle, Washington, school closures on March 12, work shifts were adapted to provide flexibility for staff who were parents to young children. A collaboration between WA PHL and University of Washington facilitated hiring of students from the School of Public Health to assist in epidemiology and accessioning roles. WA PHL epidemiologists and laboratory scientists worked in the same physical location, and this facilitated close and timely collaboration between these 2 groups. Overall, early establishment of an IMT structure enabled WA PHL to efficiently coordinate and maintain laboratory testing operations while providing the flexibility to adapt workforce needs to meet challenges faced during the outbreak.

ADVANCING INFORMATION MANAGEMENT SYSTEMS

COVID-19 specimens were received in larger numbers than WA PHL had previously managed, straining existing laboratory information management systems. The applications group, working in information technology, developed and operationalized an internal digital dashboard early in the response.

It provides a visual summary of the current status and trends of COVID-19 testing information to monitor progress and impact in real time. The dashboard is used to share information throughout WA PHL including in-house specimen inventory in queue for testing, specimen status in the testing workflow, and specimen test results (positive, negative, inconclusive). The dashboard facilitated improved laboratory–epidemiology communication and allowed the laboratory to quickly adapt its specimen prioritization strategy as needed.

During normal operations, WA PHL manually accessioned specimens submitted to the laboratory; however, high demand for COVID-19 testing resulted in a bottleneck when specimen information was entered into the Laboratory Information Management System. To mitigate the bottleneck, WA PHL established a partnership with Microsoft to develop and implement an online, custom-built, barcoded electronic test-ordering system to streamline its workflow. The system allowed submitters to fill out test requisition forms online before submitting specimens to the laboratory for testing, and required fields ensured that submitters provided essential information. When printed, the form generated a Quick Response code capturing all the information entered by the submitting facility. Upon receipt at the laboratory, the Quick Response code was scanned and information was autotranscribed into the Laboratory Information Management System. This reduced errors in manually transcribed submission forms and allowed for accessioning of specimens in seconds rather than minutes. When the electronic test ordering system went live at WA PHL on April 10, 2020, 25 health care facilities across the state began using the online portal to complete and submit test requisition forms electronically.

Another challenge occurred when specimens lacking essential, associated information were submitted for testing, which required additional, time-consuming case-finding efforts. As specific patient information pertaining to symptoms and previous travel was initially required to inform testing priorities (e.g., approval of person under investigation by epidemiology staff), personnel were required to contact specimen submitters for this information to proceed with testing. The WA DOH and PHL worked with local jurisdictions across Washington to create messaging around specimen submission requirements for COVID-19 testing to health care providers and submitters statewide. A quality assurance team under the data group in the IMT structure was established to provide educational outreach to submitters regarding appropriate labeling of specimens and requisition forms. Clear communication to specimen submitters and innovation to improve existing information management systems were central to WA PHL's ability to accommodate the unprecedented specimen processing demands during the outbreak.

REFINING OPERATIONS AND BUILDING TESTING CAPACITY

Enhancing testing capacity for timely diagnosis of COVID-19 was essential to the response efforts in Washington. Redundancy in approved COVID-19 testing platforms was employed to ensure continuity of testing in anticipation of supply and reagent shortages. To comply with quality management systems employed by WA PHL, standard operating procedures, risk assessments, and plans to verify test performance were compiled before delivery of new equipment. WA PHL maximized their testing workflow by developing a COVID-19–specific specimen processing standard operating procedure that established accept, reject, and redirect criteria; specified instructions for testing COVID-19 specimens in the order of receipt; and waived epidemiology-based testing approvals to test specimens meeting person-under-investigation criteria to ensure continuity of testing and to resolve backlogs. Initially, to increase throughput of testing, the sample layout on each rRT-PCR plate was reoriented when using alternative extraction platforms. This ensured the maximum number of samples were tested on each plate per run. In subsequent months, additional high-throughput real-time PCR instruments and fully automated sample-to-result systems were purchased.

A major hurdle in maximizing testing capacity was the shortage of testing supplies, including swabs, transport media, and RNA extraction reagents. Two CDC liaisons were stationed at WA PHL to directly communicate laboratory needs related to supply shortages and provide guidance on amendments under the Emergency Use Authorization. Because of the scarcity of supplies, CDC wrote and shared a standard operating procedure for in-house preparation of viral transport media and provided swabs and media to mitigate shortages. WA PHL utilized Laboratory Response Network partners, such as the nearby Madigan Army Medical Center, for stopgap reagent sharing to mitigate impact of supply shortages. The FDA also released alternative recommendations including a list of example products and different distributors for testing supplies that were otherwise limited in availability.[9]

WA PHL was able to achieve its surge capacity goal of testing 400 specimens per day by March 10 (Figure 1). By the end of 2020, the laboratory could perform 1500 tests per day, 7 days per week. WA PHL and University of Washington Medicine Clinical Virology Laboratory provided CDC with suggestions for improving testing throughput, including verification of a test using a single viral target and development of a multiplex PCR assay. Refining laboratory operations and implementing redundancy in testing processes provided flexibility when kits and reagents were limited. In retrospect, WA PHL realized that having a dedicated microbiologist for procurement of testing supplies with an understanding of the COVID-19 testing process would be helpful to identify multiple vendors and acquire analogous supplies to those recommended by the FDA that could be limited in availability in a rapid-response situation.

LEVERAGING LABORATORY PARTNERSHIPS

Many of the US public health laboratory systems and networks in place today were created in the wake of past public health emergency events (e.g., anthrax attacks [2001], Hurricane Katrina [2005], the threat of pandemic influenza [2017–2018]). The sentinel clinical laboratory network in Washington, part of the Laboratory Response Network, facilitates partnerships with local, state, and federal laboratories to recognize and respond to emerging public health threats. The Clinical Laboratory Advisory Council, which serves as an advisory group to the Washington DOH, was also established more than 25 years ago with the vision to develop public–private partnership among the laboratory community. WA PHL's response to COVID-19 has further highlighted how partnerships within public health laboratory systems and beyond enhanced the collective laboratory response in Washington.

Anticipating a high demand for COVID-19 testing, WA PHL management prioritized building capacity by establishing testing partners in the state. As a state PHL with a longstanding history of spearheading laboratory network initiatives[10] and maintaining a robust laboratory quality assurance program,[11] WA PHL was and continues to be a resource for academic, clinical, and commercial laboratories requesting technical and regulatory guidance, reagents, and resources for COVID-19 testing. By March 31, WA PHL in partnership with the DOH's State Laboratory Quality Assurance Program had assisted 15 local laboratories and hospitals to establish COVID-19 testing by providing test validation materials. The WA PHL also provided technical guidance on validation requirements and regulatory guidance in compliance with regulations set forth by the Centers for Medicare and Medicaid Services through the Clinical Laboratory Improvement Amendments and FDA Emergency Use Authorization regulatory requirements. Communication between the state laboratory and local testing sites occurred via the WA DOH Laboratory Quality Assurance channel, where WA PHL acted as the resource for all local testing inquiries. The Association of Public Health Laboratories also supported the response by providing member laboratories assistance with quality testing, reporting, technical matters, and communications. Collective testing capacity of local and national laboratories contributed to the considerable number of COVID-19 tests completed in Washington during the outbreak (Figure 3).[2]

In addition to testing and support, WA PHL worked with local and federal partners to ensure that fundamental research and public health questions around SARS-CoV-2 testing and COVID-19 were addressed and public health and policy decision-making were informed by data. For example, WA PHL collaborated with the Fred Hutchinson Cancer Research Center to provide de-identified aliquots of SARS-CoV-2–positive specimens to inform genomic epidemiology and improve

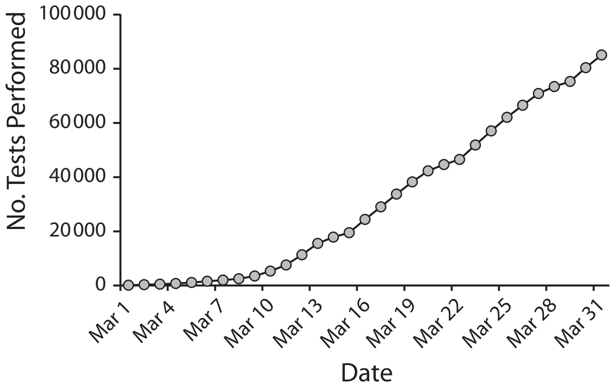

FIGURE 3— Cumulative COVID-19 Tests Performed by Local, State, and National Laboratories Supporting Washington Testing Capacity: March 1–31, 2020)

Note. As of March 31, 2020, 15 local medical laboratories, comprising 3 nonprofit, 6 hospital, and 6 commercial laboratories, were supported by the Washington State Public Health Laboratory to onboard COVID-19 testing.

understanding of the evolution of the virus as the pandemic progressed.[12] WA PHL also worked with the Seattle and King County DOH and the CDC to demonstrate asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term skilled nursing facility in King County.[13,14]

CONCLUSIONS

The current COVID-19 pandemic marks the third emergence of a novel coronavirus in the 21st century, following severe acute respiratory syndrome (SARS) in 2002 and Middle East respiratory syndrome (MERS) in 2012,[15] and highlights the continual global public health threat posed by respiratory viruses. It has been reported that the confirmed cases of COVID-19 in the United States do not accurately reflect the total burden of the pandemic.[16] It is probable that SARS-CoV-2 infection in the population of Washington during this time outnumbered the laboratory-confirmed cases reported herein, as testing was limited and guidance for meeting person-under-investigation and testing criteria was more heavily focused on symptomatic individuals. Insufficient testing, such as undiagnosed asymptomatic infections, as well as imperfect test accuracy, have been shown to contribute to this difference.[16] Thus, health care, social, and economic impacts of the COVID-19 pandemic have resulted in unprecedented challenges to our public health systems in responding to and controlling the outbreak.

In the United States, state and local public health departments and laboratories are central to the effective management of major health crises. This work describes challenges faced, successful steps taken, and lessons learned by WA PHL to respond to COVID-19 (see box on p. 869). Here, we reported WA PHL response efforts from initial detection of SARS-CoV-2 in the United States on January 20, 2020, through the subsequent 2 months of the outbreak in Washington, to inform other US laboratories mounting their own responses to COVID-19, as well as future laboratory pandemic preparedness activities. To conclude, we summarize the gaps and needs informed by the operational-level experience of WA PHL in response to the COVID-19 outbreak in Washington and offer possible approaches to advance the systems underlying and supporting the public health laboratory's core functions.[17]

The COVID-19 response in Washington required timely communication and standardized information sharing among laboratories, health care practitioners, and public health officials at local, state, and federal levels. The time required initially to verify the rRT-PCR diagnostic assay stalled efforts early in the response and resulted in testing delays. Aspects of information management and reporting systems requiring manual inputs placed a burden on public health staff and data managers to input, share, and analyze critical information and data specific to the COVID-19 outbreak. In addition, interoperability to achieve integrated data management among clinical, private, and public health partners was required. Improved information exchange among these partners and clear messaging for specimen submitters could greatly reduce time spent on retrospectively rectifying submitter information discrepancies, which was unsustainable for WA DOH staff during the COVID-19 outbreak.

WA PHL implemented short-term changes to their Laboratory Information Management System and public health information management systems to adapt to the outbreak. The laboratory partnered with Microsoft to develop standardized test requisition forms with barcode accessioning to reduce accessioning time and error. WA PHL also developed an internal digital dashboard for timely communication of critical information to all laboratory staff involved in the response. CDC staff stationed onsite at WA PHL improved interagency communication within the context of the outbreak; however, it also highlighted the need for long-term, sustainable solutions for improving communication between state and federal public health partners. Implementation of modern, standardized, and integrated laboratory information management systems and broader health information systems could mitigate a future need for short-term, stop-gap solutions like those described previously.

Shortages in essential reagents, supplies, and personal protective equipment to perform COVID-19 testing continues to be one of the greatest challenges to laboratory response during this pandemic. Federally managed public information sources, such as supply availability, may reduce time spent on inquiries. This could be accomplished via an online dashboard offering a list of vendors for all approved supplies and alternatives, as well as real-time updates of their availability during an outbreak response event. This approach could be expanded to communicate standardized federal (CDC and FDA) guidance documents, funding sources available to support laboratory and workforce infrastructure, and other key information, providing timely notifications to partners when updates are made during a response.

Lessons learned by WA PHL highlight elements it found to be critical to an effective public health response such as (1) timely, consistent communication between public health partners at local, state, and federal levels; (2) modern, standardized, and integrated health information management systems; and (3) adequate resources to effectively begin diagnostic testing and build surge capacity. Federal oversight of critical supplies and the ability for states to request and obtain supplies managed by the Strategic National Stockpile[18] may be helpful during shortages. Adapting and streamlining laboratory testing is not only vital during response surge testing but it also builds process efficiency during nonoutbreak responses as well as preparedness for future public health emergencies.

Early and ongoing COVID-19 response efforts by WA PHL paved the way for other US laboratories to mount similar responses. Moreover, creation of a comprehensive response framework relies on building and maintaining strong partnerships. WA PHL acted as a key central partner to many public, private, and commercial laboratories in Washington, providing support and guidance for onboarding testing and strengthening local testing capacity. Actions taken by WA PHL during the COVID-19 pandemic may be useful toward developing a national system of public health surveillance and response. Lessons learned will be valuable as we work together as a nation to continue responding to this pandemic. AJPH

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Note. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. Use of trade names is for identification only and does not imply endorsement by the Centers for Disease Control and Prevention.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

This study did not involve any experiment or survey that requires human participation; therefore, it is exempted from institutional review board approval.

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Sinophobic Stigma Going Viral: Addressing the Social Impact of COVID-19 in a Globalized World

Anahí Viladrich, PhD

This article critically examines the recent literature on stigma that addresses the overspread association among the COVID-19 pandemic and racial and ethnic groups (i.e., mainland Chinese and East Asian populations) assumed to be the source of the virus.

The analysis begins by reviewing the way in which infectious diseases have historically been associated with developing countries and their citizens, which, in turn, are supposed to become prime vectors of contagion. The latter extends to the current labeling of COVID-19 as the “Chinese virus,” that—along with a number of other terms—has fueled race-based stigma against Asian groups in the United States and overseas. This review further discusses the limitations of current COVID-19 antistigma initiatives that mostly focus on individual-based education campaigns as opposed to multisectorial programs informed by human rights and intersectional perspectives.

Finally, the article ends with a call to the international public health community toward addressing the most recent outbreak of stigma, one that has revealed the enormous impact of words in amplifying racial bias against particular minority populations in the developed world. (*Am J Public Health*. 2021;111:876–880. https://doi.org/10.2105/AJPH.2021.306201)

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> There is a common enemy on this planet itself where we need to fight in unison. Let’s really underline that. Stigma is the most dangerous enemy. For me, it’s more than the virus itself.[1]
>
> *—Tedros A. Ghebreyesus, PhD, World Health Organization Director General (WHO press conference, March 2, 2020)*

In December 2019, a new type of coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in Wuhan, China. In a matter of weeks, it quickly spread across the Asian region and, soon after, to the rest of the world.

The suspected origin of SARS-CoV-2 (the agent leading to the disease known as COVID-19) in Wuhan’s “wet markets” immediately cemented the worldwide association between the virus and China, because these markets—known for the sale of game animals—are popularly deemed as ideal breeding grounds for infectious diseases.[2] Stigma thereafter became an entrenched feature of the COVID-19 pandemic, one that revealed the power of semantics in framing particular groups as alleged vectors of contagion. With time, the outbreak led to a wave of worry and fear that fueled a worldwide spread of discriminatory public discourses against East Asians (particularly Chinese citizens) and eventually Asian immigrants and Asian Americans in the United States.[3] As will be discussed in this article, President Donald Trump and his administration played a crucial role in inflaming xenophobia and racist stigma, which have largely affected Asian American groups along with other racial/ethnic minorities in the United States and around the world.

Stigmas, universally rooted in social structures and power hierarchies, are framed within a symbolic universe of words that negatively associate specific groups with characteristics that are morally and socially condemned. Beginning with Goffman, stigma is usually defined by discrediting attributes that reflect a discrepancy between spoiled and devalued features on the one hand,

and the ideal or socially expected stereotype on the other.[4] Even though the object of stigma may change, particularly during a pandemic, its effects through pervasive discrimination and rejection tend to persist even after the disease has been controlled and the quarantine lifted.[3]

The association between foreignness and disease carriers has been a constant in the social imagination of the West, with COVID-19 being no exception.[5,6] While the bulk of studies on COVID-19 stigma have addressed its psychosocial drivers and effects, this study examines the public production of social labels that help create, solidify, and disseminate stigmatizing conditions. This research piece also proposes a critical view on the conceptualization of stigma by reflecting on the ideological scaffolding that supports its impact on particular populations, mostly Asian groups globally and in the United States particularly.

FROM LABELS TO STIGMA

Stigma, as a specific function of labeling phenomena, has historically been associated with infectious diseases that presumably originated in, and were transmitted by, particular populations and regions.[7] For example, the H1N1 global influenza infection of 1918, the deadliest pandemic in history up to now—which killed roughly 40 million people—was widely known as the Spanish flu.[8] Despite the fact that the outbreak might have had originated in France, Germany, or even the United States, it was never linked to any of these developed countries.[5] More recently, HIV, which led to a worldwide outbreak in the 1980s, was initially known as the gay-related immune deficiency. Soon afterward, it became known as the "4-Hs," an acronym that brought together 4 groups that were stigmatized as HIV carriers at the time: hemophiliacs, heroin users, homosexuals, and Haitians.[9,10]

About a decade ago, a newer strain of the H1N1 virus was first identified in Mexico and therefore became known as the "Mexican swine flu." As pointed out by the World Health Organization (WHO), even though that strain of influenza may have come from other regions (i.e., Asia and even the United States) it was never called the "American flu."[11] In a similar vein, populations from developing nations have been systematically labeled as disease vectors as in the case of the Ebola epidemic that took place from 2014 to 2016. Although this virus mostly affected a limited number of groups and regions from the West African countries of Guinea, Liberia, and Sierra Leone, it became public associated with all African populations—a phenomenon that fueled widespread anti-African racism, both in the United States and Europe.[12,13]

As noted in these examples, rapidly spreading (and deadly) communicable diseases tend to be associated with people of color and racial minorities. Bearing the brunt of disease-based stigma, these populations are consistently framed as "viral vectors" by White supremacist discourse and practices. To avoid and deter such spurious connections, the WHO eventually reached a landmark decision that mandated the use of neutral terms when naming emerging pathogens and their related conditions.[14] In February 2020, the WHO announced a new strain of coronavirus disease that was then named COVID-19, a term that explicitly circumvented references to any specific country or target population. Despite the WHO's admonition against COVID-19 stigma, influential politicians from Brazil, Italy, the United Kingdom, and the United States (among other nations) soon took the lead in digging up old stigmatizing scripts by repeatedly and publicly linking the new virus to Chinese and East Asian groups, an issue to which we now turn.[15]

THE WORLDWIDE BRANDING OF THE CHINESE VIRUS

During the past decade, the world experienced 2 infectious diseases caused by coronavirus: severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), both of which originated in China. Time and again, the association of the outbreaks with East Asian populations led to their being the object of racial discrimination and hate crimes.[16,17] This phenomenon has grown to unprecedented proportions with the late emergence of a third infectious condition caused by coronavirus: COVID-19.[2,18] In recent months, terms such as "Wuhan virus" and "Chinese virus pandemonium" quickly grew to include diverse Asian groups, from agricultural workers to students, all of whom became the consistent target of derogatory language in worldwide social media platforms.[19] In the United States, the pervasive xenophobic tenets of the Trump administration soon propelled the racist stigmatization of ethnic and racial minorities, both at home and abroad. Global anxiety about the virus's modes and rates of contagion found a scapegoat in travelers from East Asian countries that were negatively portrayed in the Western media everywhere, from Denmark to Australia.[6,20] Hashtags such as "#chinesedon'tcometojapan" trended on Twitter with Chinese tourists being called "dirty" and "insensitive."[20,21]

In countries with large immigration flows from East Asia, Sinophobia—or hate-based stigma against Asian populations—has extended to anyone having Asian features regardless of culture, language, or geographical origin. Meanwhile, fear of the unknown, particularly with respect to the source and trajectory of the infection, has fueled the xenophobic imagination of much of the world. Earlier in 2020, discrimination against Mandarin-speaking Chinese in Hong Kong reflected the rejection of individuals suspected of coming from mainland China.[22] Taiwanese citizens have also been discriminated against by those living in Hong Kong, and, in turn, Hong Kong citizens have been pilloried by Chinese mainlanders.[3]

First impressions matter, and naming a disease after a national group is a big step toward stigmatizing it.[23] Even more important, negative labeling has concrete consequences in people's lives, and, in the case of COVID-19, this can be seen in the correlation between hate speech and racially motivated crime.[21] Ever since COVID-19 became a worldwide pandemic, individuals of Asian descent have been at the receiving end of slurs and physical violence: everything from direct verbal harassment and racist threats to beatings and murder.[2,19] Hate speech and assaults against Asian communities have also been reported in several Latin American countries such as Brazil and Argentina.[19]

In the United States, negative labels featuring immigrants have been connected to rising levels of COVID-19 stigma and growing numbers of hate crimes against minorities, particularly among Asian populations. For instance, a survey on US attitudes toward minority groups during the COVID-19 pandemic found that 40% of participants were positively motivated to act in a discriminatory manner against "Asian-looking" individuals.[24] Main predictors of these negative attitudes were knowing little about the virus, feeling unsafe around Asians, and trusting President Trump's personal beliefs and statements about the virus over scientific data.

STIGMAS FROM ABOVE

Much of the recent COVID-19–related Sinophobic discourse has been fueled by nativist narratives against the "other" in both the developed and developing worlds.[25] As in the past, racist stigma is being powered by a rhetoric aimed at eliciting emotional reactions against immigrants, along with the blaming of foreign countries and their citizens for infectious conditions.[26] In doing so, governing parties and politicians hope to increase their political success by promising draconian measures aimed at keeping foreign intruders out, while misleading the public about the effective measures to control the pandemic.

In the United States, the Trump administration took the lead in coining and publicly utilizing expressions that negatively labeled the Chinese and Asian diaspora. This was in tune with a long history of state-sanctioned racial bias against Asian communities, from the Chinese Exclusion Act of 1882 to Japanese American wartime incarceration and, more recently, the immigration bans. President Trump's use of expressions such as "Kung Flu" and the "Chinese plague" for COVID-19, along with his choice of terms labeling unauthorized Latin American immigrants as "bad hombres," "drug smugglers," and "rapists" who allegedly bring "tremendous infectious disease" to the country, contributed to reinforcing racist stigma. Furthermore, President Trump's suspicion that the virus was the intentional outcome of experiments carried out by Chinese laboratories was quickly added to the long list of unfounded conspiracy theories on the issue.[27]

The literature on COVID-19 stigma generally agrees on the effectiveness of terms such as the "Chinese plague" in assigning blame for the disease to a concrete racial group that, in turn, provides the justification for discrimination and COVID-19 stigma.[28,29] As dehumanization is an important predictor of intergroup discrimination and conflict, labeling COVID-19 the "Chinese virus" has become an effective tool to instill both explicit and implicit prejudices against Asians. Recent research also shows that the current anti-Chinese sentiment in the United States is deeply entrenched within a colonial legacy that has always been suspicious of trade with the Asian diaspora.[30] Asian markets, particularly in China, are both feared and vilified and, therefore, scapegoated for many of the woes faced by the United States and European nations.

MOVING BEYOND STIGMA MITIGATION INITIATIVES

Never before has humankind traveled so much and been able to shorten the physical distance between nations so quickly—a double-edged sword that also involves the rapid spread of formerly unknown infectious diseases. The COVID-19 pandemic has reminded us that discriminatory labels—not just travelers—make the world "a global village," to use McLuhan and Powers's celebrated term.[31] The fact that racist stigma against Asian groups and other populations has expanded exponentially across wide swaths begs the question of the enduring power of revamped forms of racism in a globalized world. Almost 12 months into the COVID-19 outbreak, it seems that Sinophobia has also gone viral.

In response, the WHO, along with other international, nongovernment, and professional organizations, has called for multilevel action platforms toward coordinating stigma mitigation strategies.[1,32] Most of these have focused on what is termed here as "discourse framing" and "message channeling" initiatives. On the one hand, discourse framing addresses the proximal determinants of stigma by producing, circulating, and vetting accurate data (i.e., facts vs myths) as well as combating misinformation and biased language on social media—what has been called an "infodemic."[33] On the other hand, message channeling programs emphasize the participation of public figures, social influencers, community leaders, and recovered patients for the purpose of modeling and disseminating messages deemed appropriate for their respective constituencies.

Meanwhile, there has been a marked absence of any coordinated efforts to track stigma facilitators (e.g., through hate-prevention campaigns, media monitoring) and effects. Scholars and public health professionals have noted that addressing stigma as a structural problem cannot be solely resolved through information strategies and language patrolling.[18] To be effective, antistigma initiatives must include a legal commitment to enhance the policing of hate speech and crimes.[19] This includes action-based platforms aimed at investigating and penalizing hate violence against target populations along with implementing concrete measures to address these crimes.[34] Rather than targeting 1 social category (i.e., race or nationality) to combat stigma, intersectional approaches highlight the impact of structural factors (e.g., class, gender, immigration, job and housing security) in compounding the effect of COVID-19 among disenfranchised populations.[9] For example, the subjective impact of stigma among Asian domestic violence victims, Chinese undocumented immigrants, or the homeless Asian population is further strengthened by gender inequities, job and housing insecurity, and lack of social support systems.[35]

A consensual commitment to overcoming stigma should therefore be informed by intersectional approaches that embrace the right to health care and social justice as critical goals.[19,36] Today, more than ever before, coalition building requires all of us—from scholars and activists to public health officials and policymakers—to embrace the moral imperative of fighting the roots of health and social inequality, which COVID-19 has only made more visible.[37,38] Political mobilization and grassroots activism on the local level could, therefore, shed light on ways to counteract the pandemic of prejudice and fear that affect us all globally.

As I finish revising this article, the twilight of the Trump administration is being overshadowed by the remnants of his xenophobic legacy, which has not only undermined the ostensibly equal-rights and nondiscriminatory US legal system but has also contributed to support a racist governmental superstructure. Without drastically enforcing antidiscrimination laws for all federal employees—including top-ranked politicians—inclusive language and educational booklets against stigmatization will merely remain "lip service." While hoping for and dreaming of a brighter and socially just future for all, we must call on international organizations such as the WHO, along with the US justice system, to hold leaders accountable for what they do and say. Unless the rule of the law applies to everyone, regardless of individual status, financial power, or government position, the overt and covert tentacles of racism and xenophobia will continue to cause irreparable damage and will ultimately devour the democratic principles so cherished throughout the Western world. AJPH

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The author has no conflicts of interest to declare.

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Institutional review board approval was not needed as this study did not include human participants.

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The Effect of Coal-Fired Power Plant Closures on Emergency Department Visits for Asthma-Related Conditions Among 0- to 4-Year-Old Children in Chicago, 2009–2017

Sarah Komisarow, PhD, and Emily L. Pakhtigian, PhD

See also Shendell, p. 770, and Galea and Vaughan, p. 787.

Objectives. To investigate the effects of coal-fired power plant closures on zip code–level rates of emergency department visits for asthma-related conditions among 0- to 4-year-old children in Chicago, Illinois.

Methods. We used data on wind, population, $PM_{2.5}$ (particulates measuring ≤ 2.5 μm in diameter), and zip code–level rates of emergency department visits for asthma-related conditions among 0- to 4-year-old children between 2009 and 2017 in Chicago. The difference-in-differences research design compared rates of emergency department visits in zip codes near 3 coal-fired power plants before and after their closures to rates in zip codes farther away during the same time period.

Results. We found that emergency department visits for asthma-related conditions among 0- to 4-year-old children decreased by 12% in zip codes near the 3 coal-fired power plants following their closures relative to rates in zip codes farther away during the same period. The crude and age-specific rates of emergency department visits decreased by 2.41 visits per ten thousand inhabitants and 35.63 visits per ten thousand children aged 0 to 4 years, respectively.

Conclusions. Our findings demonstrate that closing coal-fired power plants can lead to improvements in the respiratory health of young children. (*Am J Public Health*. 2021;111:881–889. https://doi.org/10.2105/AJPH.2021.306155)

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Exposure to ambient air pollution, especially among young children, is a serious public health concern. Given their ongoing physical development, smaller sizes, higher breathing rates, and activity patterns, children face higher ambient air pollution exposure and are more susceptible to its negative effects than adults.[1] Increased exposure and heightened vulnerability can result in both short- and long-term health consequences, particularly in lung development and respiratory health.[2]

Research has explored the linkages between exposure to ambient air pollution during early childhood (and in utero) and the development of asthma, asthma exacerbations, and asthma-related hospitalizations. Despite a growing body of evidence that suggests a positive association between exposure to air pollution and asthma-related outcomes, the roles of specific pollutants and sources of air pollution in asthma causation are not yet established.[3,4] Examinations of the relationship between children's exposure to air pollution from sources such as traffic, power plants, and hazardous waste sites and asthma-related outcomes, for example, have produced mixed evidence.[5–8] Findings differ by age group, context, source of air pollution, and health outcome; results are often sensitive to the operationalization of air pollution exposure, study design, and controls.

Coal-fired power plants represent an important, yet understudied, source of air pollution exposure. Despite declines in coal consumption[9] and closures of coal-fired power plants in the United States over the past decade,[10] young children's exposure to air pollution from coal-fired power plants remains high. Figure 1 shows the locations of operational coal-fired power plants and population estimates of 0- to 4-year-old children in the United States in 2016. We estimate that in 2016, nearly 1.36 million 0- to 4-year-old children—approximately 7% of all children in that age range—lived in a zip code located within 10 kilometers of an operational coal-fired power plant.

To the best of our knowledge, no research study has examined the effects of changes in exposure to ambient air pollutants emitted from operational coal-fired power plants on young children's respiratory health using a quasi-experimental research design. To address this gap in the literature, we studied the effects of 3 large, coal-fired power plant closures in (or near) Chicago, Illinois, in 2012. These closures produced significant changes in young children's exposure to ambient air pollutants emitted from operational coal-fired power plants, providing a unique opportunity to investigate the potential impact of these exposure reductions on children's health outcomes. Specifically, we analyzed rates of emergency department visits for asthma-related conditions among 0- to 4-year-old children in Chicago using annual data on emergency department visits for all zip codes in Chicago between 2009 and 2017. We employed a difference-in-differences research design that compared rates of emergency department visits in zip codes near the coal-fired power plants with those farther away, before and after the 3 plant closures.

METHODS

Between March and August 2012, 3 coal-fired power plants in or near Chicago closed unexpectedly. Figure 2 locates the 3 plants: the Crawford and Fisk

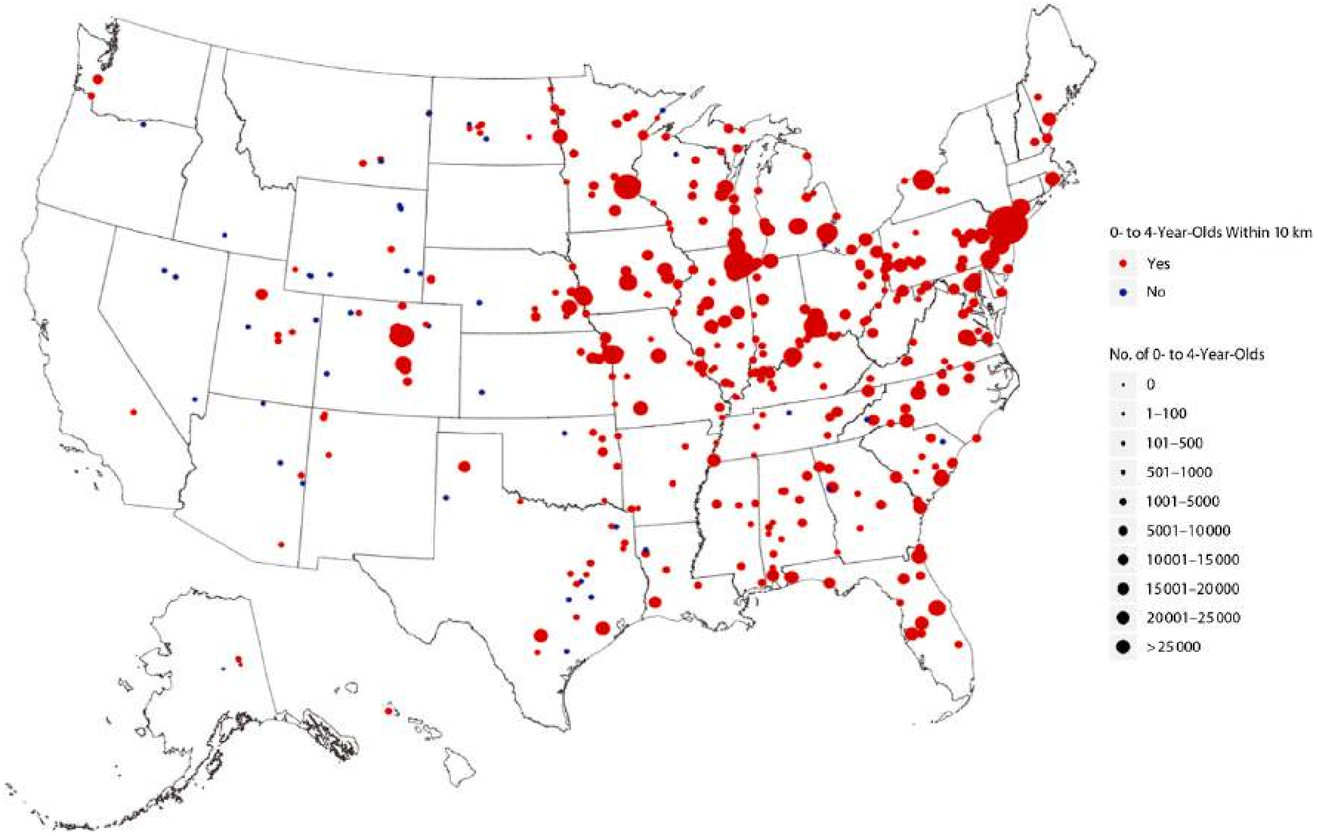

FIGURE 1— Operational Coal-Fired Power Plants and Population of Children Aged 0 to 4 Years: United States, 2016

Note. This figure depicts the locations of operational coal-fired power plants in the United States in 2016. The size of each dot represents the number of 0- to 4-year-old children living in a zip code whose centroid is within 10 km of the plant. Power plants depicted in red have 0- to 4-year-old children living in a zip code whose centroid is within 10 km of their operation; power plants depicted in blue do not.

Source. Coal-fired power plant locations and operational statuses were obtained from US Energy Information Administration Form EIA-860. Population estimates of 0- to 4-year-old children at the zip code level were obtained from Table DP05 of the American Community Survey Demographic and Housing Estimates (5-Year) of the US Census Bureau.

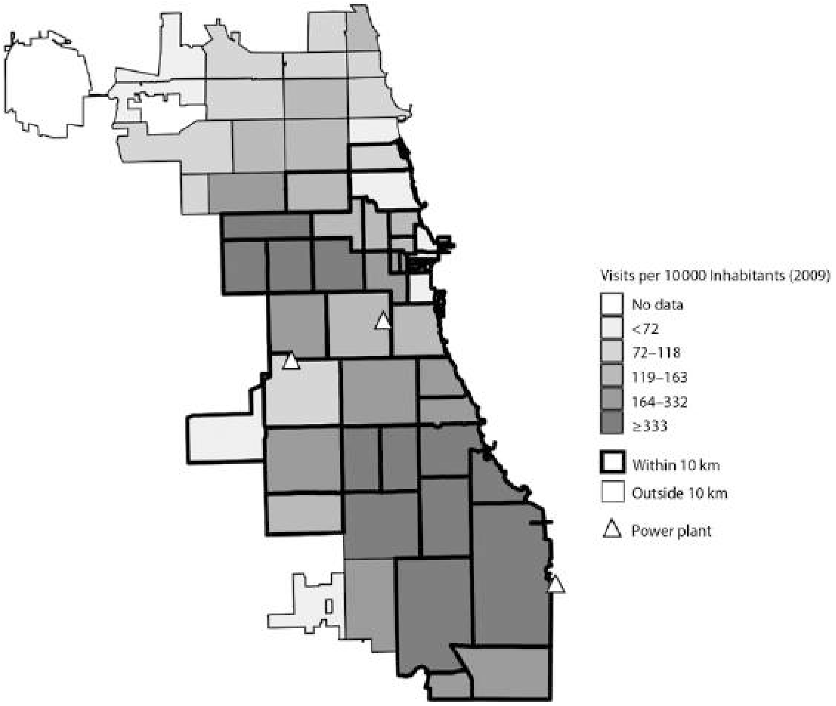

FIGURE 2— Rates of Emergency Department Visits for Asthma-Related Conditions Among 0- to 4-Year-Old Children by Zip Code and Locations of Operational Coal-Fired Power Plants: Chicago, IL, 2009

Note. This figure depicts the crude rate (visits per 10 000 inhabitants) of emergency department visits for asthma-related conditions among 0- to 4-year-old children in Chicago by zip code in 2009. Zip codes outlined in bold have centroids located within 10 km of an operational coal-fired power plant, whereas zip codes outlined in nonbold have centroids located more than 10 km from a plant.
Source. Coal-fired power plant locations and operational statuses were obtained from US Energy Information Administration Form EIA-860. Emergency department visit data were obtained from the Chicago Health Atlas. Total population estimates were obtained from Table DP05 of the American Community Survey Demographic and Housing Estimates (5-Year) of the US Census Bureau.

Street Generating Stations within Chicago's city limits, and the adjacent State Line Generating Station in Hammond, Indiana. Prior to their closures, the 3 plants were among the largest coal-fired power plants in the United States and some of the largest emitters of ambient air pollutants in the Chicago area.[11] State Line was closed in March 2012, and Fisk Street and Crawford were closed in August 2012. All 3 closures were unexpected and in advance of previously announced closure timelines.[12,13] Preceding their closures, the plants operated at consistent levels (Figure A, available as a supplement to the online version of this article at http://www.ajph.org). Furthermore, the closures resulted in significant reductions in emissions of sulfur dioxide and nitrogen oxides (online Figures B and C).[14] Around the time of the closures, the 3 plants employed fewer than 300 workers in total,[15,16] which made the impact of their closures on unemployment in Chicago minimal. We do not know of any other coal-fired power plant closures or openings in Chicago during this time.

Data

We obtained annual zip code–level data on emergency department visits for asthma-related conditions among 0- to 4-year-old children in Chicago between 2009 and 2017 from the Chicago Health Atlas, an open-access data portal provided by City Tech Collaborative and the Chicago Department of Public Health.[17] These zip code–level data were generated from patient-level hospital discharge data collected by the Illinois Department of Public Health. No emergency department visit data were available for the year 2015 because of the transition from the Ninth to Tenth Revision of the *International Classification of Diseases*, which occurred in the fourth quarter of 2015.[18] This transition revised the set of diagnoses included as "asthma-related conditions" and therefore affected our 2016 and 2017 data. In online Table A, we report a complete listing of the diagnoses included before and after the transition. We return to this change in coding in our analysis and results.

We obtained annual zip code population estimates from the 2011–2017 American Community Survey (5-year estimates for 5-digit Zip Code Tabulation Areas) and the 2010 Decennial Census. Zip code population estimates were unavailable for 2009, so we produced our own using linear interpolation between the 2000 and 2010 Decennial Censuses.[19] From the same sources, we obtained zip code estimates of total population, population by gender, and population in age groups: 0 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 years or older.

We obtained wind data from the Global Historical Climatology Network at the National Centers for Environmental Information. Using daily readings of the fastest 2-minute wind direction, we constructed a zip code–specific measure of wind intensity. This measure counted the total number of days each year on which the zip code's centroid was in the wind path (by octant) of the nearest coal-fired plant in our study. For a visual representation of this approach, see online Figure D.

We obtained daily average estimates of ground-level concentrations of $PM_{2.5}$ (particulates measuring ≤ 2.5 µm in diameter) at the census tract level from the Fused Air Quality Surfaces Using Downscaling Tool of the Environmental Protection Agency. We used these data to produce annual $PM_{2.5}$ concentration estimates at the zip code level by aggregating and averaging the daily Downscaler concentration estimates separately by zip code (or zip code group) and year.

Using counts of emergency room visits and population estimates, we constructed our main outcomes of interest: the natural logarithm of annual emergency department visits, the crude rate, and the age-specific rate. We defined the crude rate as the number of emergency room visits for asthma-related conditions among 0- to 4-year-old children per 10 000 residents in the zip code; we defined the age-specific rate as the number of visits among 0- to 4-year-old children in the zip code per 10 000 residents in that age range. Descriptive statistics for population, wind intensity (number of days), estimated $PM_{2.5}$ concentrations, and emergency department visits at baseline (2009) are reported in online Table B.

Sample

Our sample included 48 unique zip codes (or zip code groups) across 8 years (n = 384). We calculated the latitude and longitude coordinates of each zip code's centroid using a Shapefile of zip code boundaries for Chicago obtained from the City of Chicago Data Portal and the Stata package shp2data (Stata version 14.2; StataCorp LP, College Station, TX).[20] We assigned each zip code to treatment or control status based on the linear distance between the zip code's centroid and the nearest of the 3 coal-fired power plants, using the average latitude and longitude for zip code groups. We assigned zip codes with centroids within 10 kilometers of at least 1 coal-fired power plant to treatment (hereafter, "near" zip codes); we assigned those with centroids more than 10 kilometers away from all 3 plants to control (hereafter, "far" zip codes). Figure 2 depicts these treatment and control classifications (boldface vs regular zip code boundaries), the 3 plant locations (hollow triangles), and the baseline (2009) crude rate of emergency department visits for asthma-related conditions among 0- to 4-year-old children (gray shading).

Analysis

To identify the effects of coal-fired power plant closures on emergency department visits for asthma-related conditions among 0- to 4-year-old children, we implemented a difference-in-differences design, comparing asthma-related emergency department visits in "near" versus "far" zip codes in the years leading up to and following the closures in 2012. We considered 3 dependent variables: the natural logarithm of the annual number of visits, the crude rate of visits, and the age-specific rate of visits.

We estimated the following multiple regression specification:

$$Y_{zt} = \alpha + \beta \times (Near \times Post)_{zt} + \gamma_z + \phi_t + X_{zt} \cdot \theta + \varepsilon_{zt} \qquad (1)$$

Y_{zt} is 1 of 3 measures of emergency department visits for zip code z in year t. $(Near \times Post)_{zt}$ is a binary variable equal to 1 for "near" zip codes in years $t = 2013,\ldots,2017$ and zero otherwise. We included zip code fixed effects, γ_z, to control for time-invariant zip code characteristics and year fixed effects, ϕ_t, to control for factors common to all zip codes in specific years (e.g., citywide economic conditions). X_{zt} is a vector of time-varying zip code–level controls, including wind intensity, total population, and population age and gender distributions. ε_{zt} is an error term that is assumed to be uncorrelated with other determinants of the outcome; robust standard errors were clustered at the zip code level.[21]

The estimate of β from Equation 1 identifies the influence of coal-fired power plant closures on emergency department visits under the assumption that observables and unobservables were trending similarly in near and far zip codes prior to the coal-fired power plant closures in 2012. To probe this assumption and examine dynamic effects following the closures, we complemented our main analyses with an enriched difference-in-differences specification that allowed the treatment effect to vary flexibly across years (relative to the reference year of 2011). Estimated effects for the years preceding the closures (2009 and 2010) provided visual evidence to support the trend assumption. Estimated effects for the years following the closures (2012 through 2017) illustrated dynamic effects over time. Online Figure E provides additional evidence of parallel pretrends.

RESULTS

Table 1 presents estimates of the effect of coal-fired power plant closures on emergency department visits for asthma-related conditions among 0- to 4-year-old children. We found statistically significant decreases in the natural logarithm, crude rate, and age-specific rate of emergency department visits for 0- to 4-year-old children living in near versus far zip codes following the closures. Emergency department visits for asthma-related conditions among 0- to 4-year-old children decreased by 13 log points or 12.1% (95% confidence interval [CI] = −0.24, −0.02; Table 1). The crude rate decreased by 2.41 visits per ten thousand inhabitants in the zip code (95% CI = −3.67, −1.15). Relative to the pretreated mean of 13.97 visits per ten thousand inhabitants, this represents a 17% decline. The age-specific rate decreased by 35.63 visits per ten thousand children aged 0 to 4 years in the zip code (95% CI = −53.87, −17.39). Relative to the pretreated mean of 198.35 visits per ten thousand children in this age range, this represents an 18% decline. Our estimated effects and associated 95% confidence intervals were very similar when we estimated Equation 1 without any time-varying covariates for population or wind intensity, without a time-varying covariate for wind intensity, without population weights, and with the addition of linear trends at the zip code level (Table 1).

Figure 3 presents results from the enriched difference-in-differences specification and illustrates 2 important findings. First, we found no evidence of pretrends in the years preceding the plant closures. Relative to 2011, the estimated effects for 2009 and 2010 were small in magnitude and statistically insignificant, and we could not reject the null hypothesis that these 2 coefficients are jointly zero (*P* = .81). Second, we observed an increasingly negative pattern of estimated effects for the years 2012 and later, which suggests that the effects of coal-fired power plant closures increase over time. The coefficient estimate on 2012, although negative, was not statistically significant. This finding was not unexpected, as the plant closures occurred in March (State Line) and August (Fisk Street and Crawford) of 2012. After this year of partial operations, we found a clear pattern of negative effects relative to the years before the closures.

To ensure that our results were not driven by changes in the coding of "asthma-related conditions" between the Ninth and Tenth Revisions of the *International Classification of Diseases*, we reestimated Equation 1 using 2 alternative samples: first, we ended our analytic window in 2014 (prior to the change in coding); second, we adjusted data from 2016 and 2017 using a published comparability ratio for asthma of 0.89.[22] The results from these samples, presented in online Table C, were very similar to our main results.

To probe the sensitivity of our results to our definition of near zip codes—those with a centroid located within 10 kilometers of the nearest coal-fired power plant—we reestimated Equation 1 for 1-kilometer increments ranging from 6 to 14 kilometers. Although our estimates for 6-, 7-, and 8-kilometer radii are smaller and less precise—likely through the combination of control group contamination and a small number of treated zip codes—varying the treatment radius between 9 and 14 kilometers did little to the estimated treatment effect (online Figure F).

Finally, we investigated the possibility that our results were driven by highly influential zip codes using a "leave-one-out" procedure. We reestimated Equation 1 on 48 separate samples, each of which was constructed by dropping 1 zip code (or zip code group) from the sample at a time. We found that our estimates were largely unchanged by this leave-one-out procedure and thus concluded that our results were not driven by any single zip code (online Figure G).

To explore the role of reduced $PM_{2.5}$ exposure as a possible mechanism underlying our main results, we estimated a modified version of Equation 1 by replacing the regressor $(Near\ X\ Post)_{zt}$ on the right-hand side with an estimate of annual, zip code–level $PM_{2.5}$ concentrations (PM_{zt}) from aggregated and averaged Downscaler estimates. Our regression results indicate that a 1-unit ($\mu g/m^3$) increase in average annual $PM_{2.5}$ concentrations was associated with an 11-log-point or 11.6% increase (95% CI = −0.08, 0.29) in emergency department visits for asthma-related conditions among 0- to 4-year-old children (Table 1). Similar estimates for the crude and age-specific rates indicate that 1-unit increases in average $PM_{2.5}$ concentrations were associated with increases of 2.49 visits per ten thousand inhabitants (95% CI = 0.03, 4.96) and 41.47 visits per ten thousand children aged 0 to 4 years (95% CI = 7.21, 75.73), respectively (Table 1).

To interpret the magnitudes of these estimated associations, we used daily data on $PM_{2.5}$ concentrations from 12 outdoor air quality monitors in Cook County, Illinois (the county containing Chicago). We divided these monitors into 2 groups corresponding to our treatment and control zip codes: "near" monitors located within 10 kilometers of any of the 3 power plants (8 monitors) and "far" monitors located more than 10 kilometers from all 3 power plants (4 monitors). We averaged all available daily $PM_{2.5}$ data from these monitors, separately by "near" and "far," for the years prior to and following the 3 closures (2009–2011 and 2013–2017; 2012 omitted). On the basis of these averages,

TABLE 1— Difference-in-Differences Estimates of the Effect of Coal-Fired Power Plant Closures on Emergency Department Visits for Asthma-Related Conditions Among 0- to 4-Year-Old Children: Chicago, IL, 2009–2017

	Natural Log of Visits, b (95% CI)	Crude Rate, b (95% CI)	Age-Specific Rate, b (95% CI)
Near × Post[a]	−0.14 (−0.27, −0.01)	−2.58 (−4.17, −0.99)	−39.07 (−62.92, −15.22)
Near × Post[b]	−0.13 (−0.24, −0.02)	−2.37 (−3.56, −1.14)	−34.94 (−52.41, −17.46)
Near × Post[c]	−0.12 (−0.23, −0.02)	−2.52 (−3.72, −1.32)	−37.04 (−54.92, −19.16)
Near × Post[d]	−0.15 (−0.30, −0.01)	−1.74 (−3.36, −0.11)	−25.56 (−49.82, −1.30)
Near × Post[d]	−0.13 (−0.24, −0.02)	−2.41 (−3.67, −1.15)	−35.63 (−53.87, −17.39)
$PM_{2.5}$[e]	0.11 (−0.08, 0.29)	2.49 (0.03, 4.96)	41.47 (7.21, 75.73)
Observations, No.	384	384	384

Note. CI = confidence interval; $PM_{2.5}$ = particulates measuring ≤ 2.5 μm in diameter. Near × Post is a binary variable equal to 1 for "near" zip codes (zip codes whose centroids are within 10 km of at least 1 of the 3 coal-fired power plants) in years t = 2013,…, 2017, and zero otherwise. Sample includes zip code–level data from Chicago between 2009 and 2017 (excluding 2015). Outcome data from 2015 are missing because of transition from the *International Classification of Diseases, Ninth Revision* to the *International Classification of Diseases, 10th Revision*.[18] Each coefficient estimate comes from a separate regression that includes year fixed effects and zip code fixed effects.

Source. Emergency department visit data were obtained from the Chicago Health Atlas. Population data were obtained from the American Community Survey and Decennial Censuses of the US Census Bureau. Data on wind direction were obtained from the National Oceanic and Atmospheric Administration. Data on $PM_{2.5}$ were obtained from the Fused Air Quality Surfaces Using Downscaling Tool of the Environmental Protection Agency.

[a] Coefficient estimates in this row were obtained using zip code–level population weights.

[b] Coefficient estimates in this row were obtained using zip code–level population weights and by adding the following time-varying covariates: total population, share female, and shares in the age ranges 0–4, 5–9, 10–14, 15–19, 20–24, 25–34, 35–44, 45–54, and 55–64 years.

[c] Coefficient estimates in this row were obtained by adding the following time-varying covariates: total population, share female, and shares in the age ranges 0–4, 5–9, 10–14, 15–19, 20–24, 25–34, 35–44, 45–54, and 55–64 years.

[d] Coefficient estimates in this row were obtained using zip code–level population weights, by adding zip code–level linear trends, and by adding the following time-varying covariates: total population, share female, and shares in the age ranges 0–4, 5–9, 10–14, 15–19, 20–24, 25–34, 35–44, 45–54, and 55–64 years.

[e] Coefficient estimates in this row were obtained using zip code–level population weights and by adding the following time-varying covariates: wind intensity (i.e., the total number of days per year that the zip code's centroid was in the wind path of the nearest coal-fired power plant), total population, share female, and shares in the age ranges 0–4, 5–9, 10–14, 15–19, 20–24, 25–34, 35–44, 45–54, and 55–64 years.

we estimated that average annual $PM_{2.5}$ decreased by 2.43 $\mu g/m^3$ in near zip codes and 2.09 $\mu g/m^3$ in far zip codes following the power plant closures. Taken together, these average declines suggest a difference-in-differences estimate of −0.34 $\mu g/m^3$ (declines before and after the power plant closures in near vs far zip codes). We repeated the same calculation using Downscaler concentration estimates and obtained a difference-in-differences estimate of −0.21 $\mu g/m^3$ (average annual $PM_{2.5}$ decreased by 1.82 $\mu g/m^3$ in near zip codes and 1.61 $\mu g/m^3$ in far zip codes following the power plant closures).

Scaling our effects from row 6 of Table 1 by these reductions in average annual $PM_{2.5}$ concentrations (0.34 and 0.21 $\mu g/m^3$), we estimated that declines in $PM_{2.5}$ (or other primary pollutants with comparable spatial patterns) could account for between 18% and 40% of the reductions in emergency department visits reported in Table 1. This is consistent with previous work suggesting that exposure to other pollutants from coal-fired power plants can also produce negative impacts on children's health and that annual concentrations do not capture variation in air pollution exposure that might have negative health consequences beyond average exposures.[23]

DISCUSSION

The results of this study demonstrate that zip codes in close proximity to the 3 coal-fired power plants experienced reductions in emergency department visits for asthma-related conditions among 0- to 4-year-old children after their 2012 closures. Across our 3 measures of emergency department visits, this reduction ranged from 12% to 18% in relative terms.

Previous analysis of the same 3 coal-fired power plant closures revealed declines in ambient $PM_{2.5}$ concentrations in areas surrounding the plants after the closures,[24] which are confirmed by our Downscaler and outdoor

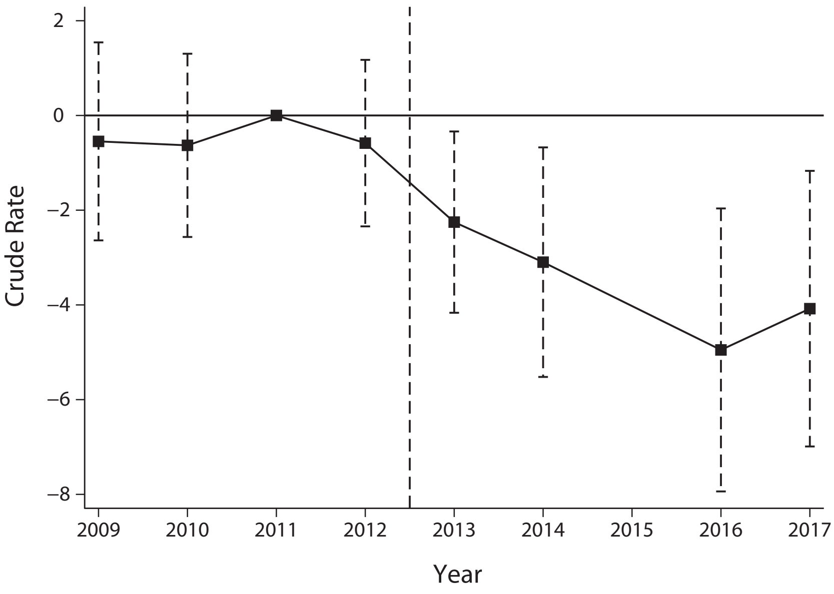

FIGURE 3— **Enriched Difference-in-Differences Estimates of the Effect of Coal-Fired Power Plant Closures on Emergency Department Visits for Asthma-Related Conditions Among 0- to 4-Year-Old Children: Chicago, IL, 2009–2017**

Note. Estimates (and associated 95% confidence intervals) represent effects of coal-fired power plant closures on the crude rate of zip code–level emergency department visits for asthma-related conditions among 0- to 4-year-old children between 2009 and 2017 (excluding 2015). The sample includes zip code–level data from Chicago between 2009 and 2017 (excluding 2015). Outcome data from 2015 are missing because of transition from the *International Classification of Diseases, Ninth Revision* to the *International Classification of Diseases, 10th Revision*.[18] Coefficient estimates were obtained using zip code–level population weights, by adding year fixed effects and zip code fixed effects, and by adding the following time-varying covariates: wind intensity (i.e., the total number of days per year that the zip code's centroid was in the wind path of the nearest coal-fired power plant), total population, share female, and shares in the age ranges 0 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 to 64 years.
Source. Emergency department visit data were obtained from the Chicago Health Atlas. Population data were obtained from the American Community Survey and Decennial Censuses of the US Census Bureau. Data on wind direction were obtained from the National Oceanic and Atmospheric Administration.

air quality monitor estimates. Our correlational evidence on this mechanism is consistent with other previous research, which found positive associations between exposure to ambient air pollution—including $PM_{2.5}$—and pediatric emergency room visits.[25, 26]

The second major finding is that reductions in emergency department visits for asthma-related conditions among 0- to 4-year-old children were neither short-lived nor constant. Previous work suggests 2 possible, but not mutually exclusive, explanations for these results. First, for individual children, the effect of reduced exposure to ambient air pollution from coal-fired power plants could accumulate over time and decrease the need for emergency care for asthma-related conditions.[27] Although our data are cross-sectional and do not allow us to test this hypothesis directly, the pattern of effects is consistent with this explanation. Second, as has been demonstrated in other studies,[28] exposure to air pollution—or lack thereof—at critical periods in a child's development may have lasting health implications. Exposure in utero and during the first year of life are 2 such critical times.[29, 30] The pattern observed could thus result from a reduction in air pollution exposure at critical moments for the youngest cohorts of children who appeared in our cross-sectional data toward the end of our sample period. These children were potentially never exposed to ambient air pollution from coal-fired power plants because they were born after 2012. The pattern of increasing effects over time could therefore be explained by children with fewer (or no) years of exposure to ambient air pollution from coal-fired power plants becoming a larger share of our sample over time.

Limitations

Coal-fired power plants are known emitters of many pollutants, including $PM_{2.5}$, sulfur dioxide, and nitrogen oxides, among others.[31] Our study considered reductions in exposure to ambient air pollution from coal-fired power plants holistically and also explored the role of ambient $PM_{2.5}$ exposure as a potential mechanism. We did not examine, however, how distance between a residential area and a coal-fired power plant affected emergency department visits among 0- to 4-year-old children, and we believe that this, along with more in-depth analysis of other pollutants, is a particularly fruitful area for future research.

A second limitation arises from our use of emergency department visits for asthma-related conditions as our outcome of interest. Because emergency departments are not the only places where patients may obtain treatment for asthma-related conditions (e.g., urgent care, primary care offices), our data might not have captured less extreme or less urgent incidents of respiratory distress in children. As a result, our analysis cannot reveal how coal-fired power plant closures affect less severe respiratory health outcomes or treatment outside of emergency departments. Moreover, if parents or caregivers chose health care providers other than emergency departments as a child's respiratory health improved, our estimates could overstate the effects of coal-fired power plant closures. In this case, our estimates would provide insight into reductions in more severe asthma-related incidents but would not be generalizable to less serious conditions.

Finally, our use of zip code–level data precludes analysis of avoidance behavior in the years preceding the power plant closures and prevents us from investigating heterogeneous treatment effects based on zip code demographics. Ideally, we would use individual-level panel data to investigate avoidance behavior, which has been shown to be important in other contexts.[32] We would also obtain a richer set of time-varying covariates at the zip code level to investigate potential heterogeneity in health improvements following the plant closures.

Public Health Implications

Although the number of operational coal-fired power plants in the United States has declined over the past decade, many parts of the country still rely on coal-fired power plants for electricity generation.[33] These plants often operate in close proximity to populated areas, posing the potential for negative impacts on the health and well-being of young children who live nearby.

The results from this study highlight a previously underexplored benefit of broader changes in energy generation within the United States. As large numbers of coal-fired power plants are decommissioned, retired, or otherwise closed, children's respiratory health might improve. Young children, especially low-income and minority children living near operational power plants, are particularly susceptible and vulnerable to the consequences of exposure to air pollution. Thus, public health may have much to gain from coal-fired power plant closures.

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CONTRIBUTORS

S. Komisarow obtained, cleaned, and analyzed data; wrote the article; edited and revised the article; and responded to reviewer and editor comments. E. L. Pakhtigian obtained data for generating maps and related descriptive statistics, wrote the article, edited and revised the article, and responded to reviewer and editor comments.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

No institutional review board protocol approval was obtained because all data in this study were obtained from public use, secondary sources.

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The North Karelia Project (1972–1997) and the Origins of the Community Approach to Cardiovascular Disease Prevention

Mikko Jauho, PhD

See also Blackburn, p. 782, and Semler, p. 785.

Community-based risk factor modification is today an established approach to chronic disease control and public health practice. This article analyzes the shaping of the North Karelia Project (NKP), an early and influential formulation of the community approach that focused on coronary heart disease prevention in Finland. Instead of targeting only high-risk individuals, NKP aimed to change the culture of the local community. On the basis of archival material and interviews, I first trace the multiple origins of the notion of community in NKP, which combined "internal" factors (local risk factor distribution, the role given to the social environment in chronic disease prevention) and "external" influences (regional origin of the initiative, World Health Organization and national policy concepts of community control and primary health care). Second, I describe the shape of the community intervention in NKP. The project foregrounded social relationships as a way to educate the public and influence norms guiding individual behaviors while subordinating environmental changes of a more structural nature. (*Am J Public Health*. 2021;111:890–895. https://doi.org/10.2105/AJPH.2020.306016)

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Coronary heart disease (CHD) emerged as a major public health problem in post–World War II industrialized countries.[1] After two decades of research on the causes of the epidemic, many experts considered the key risk factors for CHD (smoking, hypertension, elevated cholesterol, physical inactivity) sufficiently established and began to explore possibilities to move toward mass prevention in the late 1960s.[2] Fueling these activities was growing public attention, which created political pressure to tackle the problem.

From the late 1940s onward, World Health Organization (WHO) statistics identified Finland as one of the leading countries in CHD mortality, especially among middle-aged men. The "high premature mortality among a population which earned its living largely from heavy forest and farm work, who might have been expected to enjoy the benefits of a physically active, healthy outdoor life,"[3] contradicted the then current belief that CHD struck predominantly wealthy urban sedentary men. Finland became involved in the Seven Countries Study, a large international comparative investigation coordinated by Ancel Keys in Minnesota that tested the cholesterol theory in CHD causation. North Karelia was one of the study areas and had the highest mortality not only in Finland but among all participating countries.

Preliminary information on the 10-year results of the Seven Countries Study published in late 1969 once again highlighted the poor CHD situation in North Karelia.[4] In early 1971, key members of the local establishment signed a petition demanding that the national authorities "urgently undertake efficient action to plan and implement a programme which would organize and finance general health information to the public, necessary basic research, and individual health education to reduce this greatest public health problem" of North Karelia.[5]

Although the petition surely reflected local sentiments, preparations for the North Karelia Project (NKP) had already started behind the scenes in 1970, involving the National Board of Health, the Office of the North Karelia County Physician, the Finnish Heart Association, North Karelia Central Hospital, and the Martha Organization (a popular association for home economics). The initiator was Martti J. Karvonen, leader of the national arm of the Seven Countries Study and the key personality in Finland's cardiovascular research field from the 1950s onward.

The result was one of the first community prevention projects that tested concerted methods to reduce cardiovascular problems in a specific area among the entire population instead of only high-risk groups. NKP was located in a socially and economically disadvantaged area of northeastern Finland with a population of 190 000 that suffered exceptionally high CHD morbidity and mortality. Its main objective was to lower CHD incidence by modifying the levels of three key risk factors: smoking, hypertension, and elevated cholesterol.

To facilitate lifestyle change, the project focused on the culture of the local community, introducing changes in the physical and social environment. A massive information and education campaign mobilized various stakeholder groups, civil society actors, and the local populace. In addition, NKP developed methods of early detection, treatment, and rehabilitation of cardiovascular patients in the community. In a population-wide intervention trial design, a neighboring county (Kuopio) with almost equally high CHD mortality served as control, receiving no interventions.

NKP started in 1972. Project evaluation after the initial five-year period showed an overall reduction in risk factors but no effect on CHD mortality relative to the control area.[6] Determining the project's impact is complicated by the evaluation design, which relied on cross-sectional surveys for risk factor data along with official morbidity and mortality registers. The great public interest in the project and its principles, as well as a simultaneous secular decline in CHD mortality throughout the country, further complicates impact assessment.[7] Nevertheless, NKP was deemed a success and continued, with aspects of the project adopted in national public health policies.[8] A greatly expanded and modified NKP was officially terminated only in 1997.

NKP is regarded an important pilot project both nationally and internationally. Together with the Stanford Three Community Study, led by John Farquhar, NKP was among "the first real community intervention programmes [to] use education or environmental change to promote and facilitate lifestyle and behaviour changes needed to address a particular problem," such as CHD.[9] NKP provided a key example when the National Heart, Lung, and Blood Institute in the United States adopted community trials in its research agenda in the early 1980s.[10] Principles formulated by NKP and other similar intervention trials have been applied in subsequent WHO community projects in developing countries.[11]

Despite the later impact, the community focus initially departed from established expert opinion and WHO guidelines. Although the majority of experts argued for multifactorial mass field trials to provide conclusive proof of the efficacy of modifying the key CHD risk factors, "an active minority among the international [cardiovascular disease] prevention community...were prepared to bypass the complex mass trials [and] move directly into study designs for evaluation of hygienic, safe medical strategies and health promotion in the population."[12] Karvonen and Farquhar were present at the influential Makarska Conference on Mass Trials in the Prevention of Coronary Heart Disease in Yugoslavia in 1968, where they together with Henry Blackburn advocated this minority position.[13] After the conference, both Karvonen and Farquhar took steps to establish a community study in their respective home countries.

This article sheds light on the Finnish developments. Why did NKP adopt the novel community approach, and how did project plans and practices formulate that approach? The first section of the article presents the multiple origins of the community approach and the term's polyvalent nature in NKP. The second section describes NKP's specific understanding of community as manifested in the project's plans and activities. The focus is on the preparation and first phase of the project (i.e., 1970–1977).

WHY A COMMUNITY APPROACH?

A number of influences contributed to NKP adopting a community approach and shaped its particular structure.

One motivation for targeting the entire community was the contemporary understanding of risk factors, wherein there was "no natural limit between a normal and an abnormal risk factor level." Any rise in any risk level thus increased the population risk and rate of coronary events. The effect of the different risk factors was considered "synergistic, not additive"; that is, the estimated disease risk was higher than the sum of the separate risk factors. However, because the number of people with pathologically high risk factor levels was considerably smaller than the number of people with moderate (but important) risk factor–level elevations, the bulk of the disease occurred within the latter group. A large proportion of the population needed to be affected to substantially reduce the disease burden. Because the average level of all risk factors was high in North Karelia, it was important to extend the intervention to all inhabitants of the area.[14]

Another influence was the interest in social medicine in Finland in the 1960s.[15] Biomedicine was criticized for a narrow focus on pathological processes in individual bodies and a technological emphasis on treatment. Instead, social medicine promoted prevention and working on the structural causes of ill health. Chronic degenerative conditions such as CHD were thought to result from the interplay of many influences, including the environment and individual behavior; consequently, their prevention and treatment should address the whole community, including both social structure and health services.[16]

These ideas had salience among the project developers. Kai Sievers, a professor at the Department of Public Health at the University of Turku assigned with planning NKP, had connections to the Social Insurance Institution in Finland, a key hub of social medicine in the country. His assistant, Matti Rimpelä, and Pekka Puska, the assigned leader of NKP, were both medical students interested in social sciences. Puska even obtained a degree in social policy.[17]

The fruitful links between WHO programs and national policy developments were an additional factor shaping the community approach. National planners sought contact at an early stage with WHO, which provided essential advice. Present at NKP's planning conference in 1971 were, among many national stakeholders, key WHO officials Zdenek Fejfar, Zbynek Pisa, and Peter Rhomberg, as well as two international experts, Jerry Morris and Henry Blackburn.[18] Moreover, the head of WHO Europe, Leo Kaprio, was a Finn, which assured good relations with WHO.

Within WHO, CHD was addressed in the European Program of Cardiovascular Disease Control, established in 1968.[19] Community concepts figured into WHO Europe activities in two ways. First, community-focused preventive trials emerged as a research approach. In the 1960s, the official WHO line was still a cautious one: "no major alterations in living habits can be recommended until preventive trials have been carried out."[20] At this stage, single-factor trials dominated.[21]

Entering the 1970s, one can detect a growing sense of urgency.[22] The research focus shifted to multifactorial preventive trials, which promised faster results and corresponded better with real-life situations than single-factor trials, as patients typically had several elevated risk factors simultaneously.[23] Community trials were a further modification. Unlike randomized controlled multifactorial trials, which typically (but not always) focused on high-risk individuals, they targeted entire populations. Community trials were added to the arsenal of available research approaches in WHO documents in the early 1970s, with NKP as the pilot study.[24]

More influential on NKP was the second WHO context for community concepts, the notion of "community control" that emerged in WHO documents in the late 1960s. It referred to the ensemble of measures to control a specific (chronic) health problem. For example, in WHO's hypertension control project, community control of hypertension was envisioned as an integrated program that covered all aspects from prevention, detection and diagnosis, treatment and rehabilitation, and follow-up to education, training, and research.[25] In practice, much of this comprehensive community work took place in the primary health services.[26]

The notion of community control resonates with health policy developments in Finland, which culminated in the comprehensive health insurance scheme of 1962 and the Primary Health Care Act of 1972. The reforms purported to conclude a decades-long debate focusing on affordability and availability of services. They were guided by a belief that better benefits and more outpatient services would lead to higher service use and earlier treatment and consequently to less severe illnesses and better health, especially for disadvantaged population groups and areas.[27] The Primary Health Care Act introduced universal primary health care, replacing the previous system of municipal officers of health with community health centers.

NKP employed this new service structure but also aimed to develop it further for public health practice at the community level. This reliance on primary health care, as well as the inclusion of secondary prevention and evaluation through research, testifies to NKP's proximity to the principles of community control as formulated by WHO.[28]

Finally, the framing of the CHD problem was a crucial element. According to Puska's retrospective assessment, "the historical background of the Project dictated a community approach."[29] Although high CHD mortality in Finland was not restricted to North Karelia, the 1971 petition framed it as a regional problem for which the local population was seeking help. Hence, it was plausible to direct project activities to the county as a whole.

"Community" thus had multiple references in the discussions surrounding NKP. First, it defined a comprehensive approach that designated an entire population at risk and in need of sociomedical intervention. Second, it signified ambition to extensively target the social environment in addition to individual bodies to prevent illness. Third, it highlighted the need to shift medical activities from hospitals to outpatient services and public health work. Finally, it created a metonymic relationship with the administratively defined geographical area where the political impulse for the project had originated. The path-breaking community approach of NKP emerged as an amalgamation of these influences.[30]

COMMUNITY APPROACH IN PRACTICE

NKP aimed at a community-based rather than community-placed intervention.[31] The former involves members of the affected community in the development and implementation of programs, whereas the latter is more expert led, although it can involve measures to garner community support for activities. NKP researchers originated themselves as facilitators stimulating and organizing activities that were then realized by community members. Health service personnel were a key group, especially public health nurses, who carried out many of the practical tasks such as testing, registration, and education. Journalists were another important group. NKP maintained good relationships with various media representatives, who acted as mouthpieces to its message, ensuring good visibility in local media outlets. Later, NKP also involved "lay leaders" who acted as focal points for the project in their home communities, disseminating information and organizing activities on its behalf.[32]

However, NKP researchers defined community structure in a hierarchical manner. They first involved key actor groups in the project, which could then reach laypeople via their channels of influence. Accompanying this top-down approach was a massive education campaign that disseminated information on project principles through all possible channels to every member of the local community. Participation was thus distributed according to position in the community; laypeople mostly executed the changes in health behavior stipulated by experts and influencers.

One of the early project plans, formulated by Rimpelä of the University of Turku, explicates the rationale for this approach.[33] According to the plan, three elements regulate individual risk factor levels: genotype, living conditions, and social relationships. The first element is immutable, but the other two can be influenced. Mediating between these elements and risk factor levels (and thus CHD) are aspects of health behavior, including smoking, exercising, eating habits, "psychological stress," and treatment compliance. These aspects of health behavior were the immediate targets of intervention.

In terms of influencing social relationships, Rimpelä presented a model involving a phased mobilization of actors, beginning with NKP researchers. After identifying and personally adopting mechanisms of risk factor reduction, the researchers educated a first tier of key actors: physicians. They similarly embraced the principles in their work and personal behavior and then began to spread the information to a second tier of key actors, including other health personnel, media representatives, teachers, leaders of public organizations, and administrative officials. Finally, these groups passed on the gospel in their channels to men and women on the street. In this model, schools, public organizations, health services, media, and advertising affected individuals' social relationships, changing the information they received and the norms guiding their health behavior.[34]

Altering living conditions focused on "[i]ntroducing environmental changes that would result in behavioural changes."[35] A campaign to prohibit smoking in public facilities and vehicles addressed smoking habits. Dietary change was endorsed by introducing novel types of low-fat milk products and sausages in cooperation with local dairies and a local food company, promoting vegetable growing and use, and raising shopkeepers' awareness of nutrition campaigns and recommended foods.

These measures, however, left the social determinants of health unaffected and paled in scope to the information and education activities aimed at both various key groups and the public.[36] According to the early project plan, "structural changes in society…cannot be an immediate objective of preventive action."[37] The project affected social relationships directly (through the aforementioned mobilization of different actors), whereas its grasp of living conditions was more indirect: changing them was defined as a task of social policy and therefore within the remit of the public administration (i.e., one of the actors to be mobilized).

Thus, the privileged approach in NKP was to educate the public about risk factor modification and to change the normative structure in the community through mass media campaigns and influencer recruitment to facilitate behavior change.[38] By comparison, changing living conditions to support healthy lifestyles played a relatively minor role. Community hence became defined as a system of information flows and relationships of persuasion that affect the cognitive and normative basis of individual health behaviors, whereas the social and material conditions of existence were mostly excluded from intervention.[39]

Moreover, despite NKP's retrospective public image highlighting primary prevention and a broad community focus, significant portions of its activities were targeted at a specific high-risk group (middle-aged men), of a biomedical nature, and firmly situated within the health services.[40] This reflected WHO principles of community control and the stated goal of health service development.

CONCLUSION

The community focus in NKP arose from a combination of "internal" factors pertaining to CHD as a public health problem (population risk factor distribution in North Karelia, broad multifactorial concept of chronic disease causation) and "external" influences (the regional origins of the initiative, WHO and national health policy concepts of community control and primary health care). Together they shaped the project into a comprehensive preventive effort that targeted multiple risk factors, defined the entire population of North Karelia at (high) risk, covered the entire area, and strongly relied on the primary health services, which introduced a distinct biomedical aspect.

Regarding the shape of the community intervention, the project foregrounded social relationships as a way to educate the public and influence the norms guiding individual behavior. By comparison, changes in living conditions, especially of a more structural nature, were subordinated. Judging by letters sent to the project office, this approach received criticism from some locals, who connected the CHD epidemic to the effects of ongoing structural changes in Finnish society on local communities. These voices advocated measures against closing farms, unemployment, and migration from the countryside caused by industrialization and urbanization.[41]

Such measures were, however, beyond the scope of NKP, which foregrounded individual aspects of lifestyle, quitting smoking, and consuming less (saturated) fat as well as treating hypertension. Despite the project's intentions and public image, its community commitment was rather narrow. It privileged in a rather hierarchical way community leaders and made no clear effort to address social determinants of health. Community was conceptualized as a supportive structure to facilitate individualized behavioral modification centered on the three key risk factors. AJPH

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CONFLICTS OF INTEREST

The author declares no conflicts of interest.

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9. World Health Organization, "Community-Based Programmes," https://www.who.int/chp/about/integrated_cd/index2.html (last accessed June 18, 2020). The Stanford project, led by John Farquhar, was contemporaneous and parallel in approach to NKP, but the two studies came into contact only after their initiation. Interview with Matti Rimpelä, May 16, 2018; "John W. Farquhar," Stanford Oral Histories Series, https://exhibits.stanford.edu/oral-history/catalog/zb736mw3032 (last accessed February 4, 2020). Farquhar lamented that "as far as the world is concerned, the North Karelia study is often the only thing they remember," although NKP employed "methods by which one can do health communication at the community level following the psychological principles of behavior change that had been developed at Stanford."
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36. See the reported information activities in World Health Organization, *Community Control,* 129–133.
37. Rimpelä, “Luonnos yleissuunnitelmaksi,” 11. The statement addresses causes of stress but also applies to other risk factors.
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Use of Acupuncture by 1970s Revolutionaries of Color: The South Bronx “Toolkit Care” Concept

Eana Meng, MPhil

See also Reverby, p. 760.

Failed by mainstream medical institutions, 1970s revolutionaries of color sought to take health care into their own hands. A lesser-known phenomenon was their use of acupuncture. In 1970, an alliance of Black, Latinx, and White members at Lincoln Detox, a drug treatment program in the South Bronx area of New York City, learned of acupuncture as an alternative to methadone. In Oakland, California, Tolbert Small, MD, used acupuncture for pain management following his exposure to the practice as part of a 1972 Black Panther Party delegation to China. Unaware of one another then, the Lincoln team and Small were similarly driven to “serve the people, body and soul.” They enacted “toolkit care,”—self-assembled, essential community care—in response to dire situations such as the intensifying drug crisis. These stories challenge the traditional American history of acupuncture and contribute innovations to and far beyond the addiction field by presenting a holistic model of prevention and care. They advance a nuanced definition of integrative medicine as one that combines medical and social practices, and their legacies are currently carried out by thousands of health care practitioners globally. (*Am J Public Health*. 2021;111:896–906. https://doi.org/10.2105/AJPH.2020.306080)

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At an opioid recovery center in New Hampshire, 10 people sat in the lounge, each with five needles sticking out of both ears. They were all White and identified as making low income.[1] This was the distinctive ear acupuncture treatment of the National Acupuncture Detoxification Association (NADA), used for substance use, anxiety, posttraumatic stress disorder, and more.[2] I asked if they believed in acupuncture, which they were receiving for free. They unanimously agreed—it made a difference. One man elaborated, “We don’t know what medicine is anymore. Whatever works, works.”[3]

According to a 2012 National Institutes of Health report on the use of complementary and alternative medicines (CAM), 33.2% of the adult US population, especially non-Hispanic Whites with higher incomes, had tried CAM practices in the 12 months prior.[4] With biomedicine as a cause of the opioid epidemic, it is unsurprising that patients would look elsewhere, yet the crisis is likely shifting the CAM user demographic. Furthermore, in stark contrast to the 2012 report, the NADA protocol traces back to 1970s activists of color—to those connected with the Black Panther Party (BPP) or the Young Lords, two revolutionary groups advocating for the self-determination of poor and oppressed communities, the former consisting largely of Black activists and the latter of Latinx radicals.[5] The revolutionaries sought to provide for the holistic needs of marginalized populations, such as health care access. This history includes the use of acupuncture.

In New York City, the BPP, Young Lords, and other revolutionaries founded Lincoln Detox, a drug treatment program, at Lincoln Hospital in the South Bronx. In 1970, Mutulu Shakur, an informal affiliate of the BPP, was introduced to acupuncture and suggested it to Lincoln as an alternative to methadone.[6] Lincoln eventually became the site for the development of the NADA protocol, now used globally. Yet, this was not the only instance in which 1970s revolutionaries used acupuncture.[7] In California, Tolbert Small served as the BPP’s medical director between 1970 and 1974. He visited China as part of a BPP delegation in 1972 and witnessed acupuncture for the first time.[8] Fascinated, Small incorporated the practice into his medical toolkit upon returning home. He has since treated thousands with acupuncture for pain management, often in lieu of prescribing drugs.

These two stories have received sparse attention but offer significant contributions to the history and policy of public health.[9] They challenge the traditional narrative of the arrival of acupuncture in the United States perpetuated by American Chinese medical schools and biomedical institutions, by preceding or running in parallel with *New York Times* reporter James Reston's 1971 article on his acupuncture treatment in China.[10] Furthermore, they argue for a nuanced definition of integrative medicine as one that combines medical and social practices.

Acupuncture in the hands of the revolutionaries carried sociopolitical meanings and motivations. They employed "toolkit care" as their logic of survival.[11] Based on the notions of health care for the people by the people, their approaches embodied and defined toolkit care—the endeavor for community self-efficiency and self-empowerment through self-assembled, mobile means.[12] It merged the concepts of do-it-yourself and first aid, connoting a care that responded to emergencies, including dire health care needs. In particular, the revolutionaries' use of acupuncture as part of their toolkit explicitly addressed the intensifying crisis and criminalization of drug use in communities of color. With addiction seen largely outside the purview of medicine and public health during the War on Drugs (legacies of which have lasted well into the 21st century), these revolutionaries took health care into their own hands, using acupuncture as prevention and care for addiction.

Their toolkit care was born not necessarily out of desperation but rather a desire to reclaim authority and the right to heal. This practical care was built of essential skills the revolutionaries metaphorically and physically carried as they worked to meet the communities' local needs and "serve the people, body and soul."[13] Acupuncture fit the revolutionaries' toolkits; it was economical, accessible, responded to the drug crisis, and was understood as part of Maoist ideology, which significantly influenced the revolutionaries, especially in health care delivery.[14]

Expanding upon sociologist Alondra Nelson's analysis of the BPP's health activism, the employment of integrative medicine demonstrated the Black and broader revolutionary movement's commitment to laying claim to the right to health equality.[15] As *AJPH* Editor-in-Chief Alfredo Morabia has noted, dominant narratives of the BPP's violent state confrontations have obfuscated the party's broader community service legacies.[16] These histories of Small and Lincoln fill in a fuller picture of not only the BPP, but also the 1970s revolutionaries of color and offer a detailed lineage of their influence on the wider American and global population from then to now.

THE 1972 CHINA LESSON

In August 1963, Mao Zedong, chairman of the Chinese government, issued a global call to support the Black struggle against oppression by the US government. Disseminated by the Chinese Communist Party's *The People's Daily*, Mao's statement solidified many revolutionary groups' commitment, such as the BPP's, toward Maoist ideology. Founded in 1966, the BPP funded much of their arms purchases by selling the "Little Red Book," a collection of Mao's writings. BPP founders Huey Newton and Bobby Seale lifted the party's signature term, "serving the people," directly from the red book.[17] Maoist ideology provided them guidance on the means for societal transformation; in particular, the barefoot doctor movement was a key influence.

Laypersons with basic Western and Chinese medical training, barefoot doctors carried "medical kits," including acupuncture, into rural communities lacking medical care, resembling the health care deserts in many American communities of color.[18] This movement informed the BPP's health care praxis and toolkit care. With a 10-point platform, including the demand for "completely free health care for all black and oppressed people," the BPP established a national network of People's Free Medical Centers, which spanned 13 major cities, from Los Angeles to New York City.[19] At the George Jackson Medical Clinic, the headquarters' clinic in Oakland, California, physicians and laypersons worked as "24-hour revolutionaries" to provide medical care.[20]

Tolbert Small was the director of the George Jackson Medical Clinic during its height in 1970 through 1974. Born in Coldwater, Mississippi in 1942, Small and his family moved to Detroit, Michigan when he was a few months old. While attending the University of Detroit, he cofounded the student chapter of the National Association for the Advancement of Colored People. Seeking to alleviate the health care needs of his community, Small graduated from the Wayne State School of Medicine in 1968 on a Sloan Foundation medical scholarship.[21] His residency in internal medicine brought him to Oakland, where he approached the BPP in 1970. Although he did not join, believing he would be more effective as a nonmember, he provided medical services pro bono and served as the BPP's physician. He visited jails and prisons, treating prominent BPP

FIGURE 1— Tolbert Small, Back Right, and David Levinson, Third From Left, With Barefoot Doctors in Yenan, China, March 22, 1972

Source. Tolbert and Anola Small Papers, the archives of the Small family, which are in the early stages of being organized by the family and the author. Printed with permission.

activists and affiliates such as George Jackson and Angela Davis. Small also codirected the national BPP Sickle Cell Anemia Project, which promoted education and screening among Black communities.[22] This work pressured Richard Nixon's administration to fund research to eradicate sickle cell anemia.[23]

In March 1972, Small traveled to China with a BPP delegation organized by Newton, who visited China in November 1971 and asked if he could send a group the following spring.[24] Granted permission by the Chinese Communist Party, Newton selected 20 participants, including BPP members, other activists, social workers, health professionals, teachers, and children. According to the BPP newspaper, the group "had come from their different walks of life to work and live together under the tutelage of the Black Panther Party."[25] Small was the only physician. The delegates visited factories, schools, and medical facilities over the course of seven weeks. David Levinson, then 19 years old and a White BPP member, recalled meeting "many revolutionary people ... and there was much about that vision, much about that commitment, and heartfelt desire that we connected to." The delegates believed they were witnessing their ideologies actualized "on a mass, grand scale."[26]

At urban hospitals and rural clinics, the group was introduced to acupuncture. At hospitals, they watched acupuncture anesthesia used for surgeries such as a thyroidectomy. In the countryside, they met barefoot doctors who carried aspirin alongside "one silver needle and a bunch of herbs" (*yigen yinzhen, yiba caoyao*) in their medical toolkit.[27] In Small's audio recordings of the trip, the tour guides emphasized "the seamlessness of integration" of Chinese with Western medicine, referring to the national "East–West Medicine Integration" (*zhongxiyi jiehe*) policies. The guides suggested the delegates "integrat[e] traditional Black medicine with modern medicine to serve people better."[28] This encouraged the revolutionaries' self-assembled toolkit care, as "these were the tools and techniques that were available and easily disseminated without having to rely on Western technology or ideas of medicine."[29]

Intrigued, delegates bought acupuncture needles and tried needling themselves. "The Chinese came to us and diplomatically said that they were enthused by our interest but warned that it could be dangerous if we didn't know what we were doing," Levinson recounts.[30] The officials then organized acupuncture lectures, led by a certain "Dr Wu" in Shanghai. "It was spectacular," Small recalled, "I had to learn more . . . I was inspired by how one million barefoot doctors brought medicine into the communities."[31] Upon returning home, Small taught himself acupuncture by trying points on himself, referring to an English-translated Chinese medical text.[32]

Small was interested in biomedical understandings of acupuncture, although he was not opposed to "other ways of explaining." Small recalled, "the meridian system is one way of explaining acupuncture, but I wanted to explain it in familiar terms." He subscribed to translated Chinese medical journals and published two articles in the *American Journal of Acupuncture* in 1974: "The Neurophysiological Basis for Acupuncture" and "Acupuncture Anesthesia: A Review." He specifically paid attention to acupuncture's pain relief potential and described the practice as a mechanism of stimulating endorphin release and blocking pain transmission. Later, he presented a talk entitled "Traditions of Healing Acupuncture" to hospitals and community centers. "I had this business card that I got in Mexico

FIGURE 2— Tolbert Small Treating a Patient With Acupuncture for Back Pain in the Upstairs Room of the Harriet Tubman Medical Office in Oakland, CA

Note. This room was dedicated to acupuncture, 1993.
Source. Tolbert and Anola Small Papers, the archives of the Small family, which are in the early stages of being organized by the family and the author. Printed with permission.

that said, 'Tolbert Small, Research Acupuncturist,'" Small recounted. He instructed the card's maker to include "research acupuncturist" because practicing acupuncture was illegal in California in 1972; nonetheless, he did house calls for free. Embodying the spirit of toolkit care, he described, "I had a bag with a needle pouch and electroacupuncture machines everywhere I went."[33]

In 1980, Small and his wife Anola established the Harriet Tubman Medical Office, which operated until 2016. The upstairs room was dedicated to acupuncture, and Small largely resorted to the practice for pain management to prevent unnecessary drug use. "I try to avoid prescribing painkillers," he explained.[34] He has introduced thousands to acupuncture, including writer-activist Daphne Muse, who was treated for pain in the early 1970s.[35] Small also taught patients points to needle themselves or apply pressure on themselves for pain relief.[36] He performed acupuncture on his wife for her childbirths and on himself for his colonoscopy. To this day, he continues using acupuncture alongside his general practice.

The China trip exposed the delegation to an alternative form of therapeutic treatment and health care delivery. The lesson of community service and the integration of medical practices reinforced the revolutionaries' toolkit care, and Small continues to see medicine as part and parcel of a broader commitment to societal transformation. He believes "there isn't a Western or Eastern medicine, just one medicine—what helps the people." Dedicated to "serving the people," Small, at age 78 years, is "not ready to retire yet!"[37]

ACUPUNCTURE AS POLITICS

The history of Lincoln Detox, an acupuncture clinic in Lincoln Hospital in the South Bronx, is rooted in radical politics. Known by the community as the "butcher shop" for the extreme mistreatment of patients and its dilapidated conditions, Lincoln Hospital was the only medical facility in the area by the 1970s.[38] The Young Lords, BPP, and revolutionary health workers staged several takeovers at the hospital in 1970, demanding community self-efficiency with health care services.[39] In November, they began a drug treatment program, later called Lincoln Detox, in the nurses' residence to tackle the ravaging drug epidemic.[40] The space functioned as a community gathering place, offering methadone treatments alongside political education courses.[41]

Posters distributed by the team featured skulls to represent oppressive forces, such as Eli Lilly, a prominent pharmaceutical company that manufactured and distributed methadone.[42] Although methadone maintenance was the predominant detoxification treatment, community members viewed it as another method of sociopolitical regulation from the "white doctors, in white coats, in white hospitals."[43] The Lincoln Detox team believed the community was under attack by "chemical warfare" and "genocide," whereby the American government was a "dope pusher," creating a "methadone plague" and neglecting dire health care needs.[44] Defense was to "organize," "educate the people," and employ acupuncture.[45]

The Lincoln team was an alliance of Black, Latinx, and White revolutionaries with varying sociopolitical backgrounds, united by a spirit of "collaboration and solidarity."[46] Prominent members included Walter Bosque and Vicente "Panama" Alba, both Young Lords activists.[47] White doctors, such as Richard Taft, were also significant team members.[48] Mutulu Shakur introduced the idea of using acupuncture to Lincoln.[49] Formally part of the Republic of New Afrika, an organization that advocated for the liberation of several Southern states to the Black community, Shakur described himself as "a crucial liaison" to the BPP as he shared similar principles.[50]

In 1970, when car accidents left Shakur's sons paralyzed, Shakur's friend and fellow activist Yuri Kochiyama recommended acupuncture, a practice that was then known primarily within Asian American communities. His sons recovered, and Shakur described acupuncture as "a miracle," fascinated that it was "non-chemical." He noted that practitioners "didn't wear traditional white coats," which were associated with the poor treatment of minority communities.[51] The team subsequently learned about acupuncture's potential to treat withdrawal symptoms.[52]

The Lincoln team purchased affordable needles and learned from Chinatown practitioners, "picking up books, finding points in the ear, and trying on patients willing to give it a go."[53] Although toolkit care did not entail complicated technologies, it nonetheless required a learning process, as evidenced by the revolutionaries' scrappy but dedicated endeavor to find what fit. In 1976, Shakur, Bosque, and others trained and received doctorates at the Montreal Institute of Traditional Chinese Medicine, run by practitioners Oscar and Mario Wexu, who helped set up Lincoln's acupuncture program in the early 1970s.[54]

Open to all, the acupuncture program treated more than 10 000 people within its first years, and treatment was paired with training in acupuncture and politics.[55] The Lincoln team sought to develop "a barefoot doctor acupuncture cadre," empowering communities to build their own toolkits. They visited China in 1977 with Mario Wexu and aimed to actualize Mao's barefoot movement at home.[56] They traveled around the United States teaching communities "the fundamentals of acupuncture . . . [and] how [the practice] was used in the revolutionary context in China."[57] Bosque described, "We used to say, 'Each one, teach one.' We started teaching each other."[58]

The political significance of acupuncture was also embedded in the Chinese medical theory of the body's innate abilities. The team taught that acupuncture was "a form of self-help therapy . . . the patient's own rebalanced energy flow provides most of the health-giving relief."[59] As dominant sociopolitical forces rendered minority patients powerless, the concept that their very bodies were agents of health was significant, even subversive. This self-healing, importantly, also scaled to the community level, where "patients who were healed became practitioners who helped," creating a self-sufficient, empowered collective.[60] Acupuncture was not only a therapeutic but also a radical intervention of resistance and empowerment; disempowered communities were reclaiming the right to heal, which itself was healing.

Although these revolutionaries sought to "challenge Western occidental medicine by Eastern medicine" and criticized the medical establishment for its "patriotic" rejection of acupuncture, they did not dismiss biomedicine altogether. The Lincoln team advocated for scientific research on acupuncture "to give it legitimacy."[61] Western doctors, including Taft, "use[d] their licensing to benefit the people's needs" by facilitating the state authorization of the program as a medical facility.[62] The team used recognized research protocols, such as those of the National Institutes of Health, to measure acupuncture's efficacy. This included a 20-bed inpatient unit where general detoxification methods were compared with methadone and acupuncture. "This was the most efficacious way to determine research results with statistics, case studies and findings," Shakur recalled.[63]

In using biomedical tools for strategic means, the revolutionaries symbolized what Nelson described as not a blanket rejection of biomedical practices and scientific research but instead a "more rigorous engagement with them anchored in a conception of healthfulness that included freedom from medical discrimination and entitlement to social rights."[64] The employment of both biomedical methods and acupuncture signaled a crucial message: the "alternative" status of acupuncture read not as secondary, nor a last resort, but instead as preferred. Although certain biomedical interventions were available, especially methadone, the revolutionaries chose to rely on acupuncture. A drug-free and empowering practice with Maoist affiliations, acupuncture was a better fit for the revolutionaries' toolkit, evidenced by the thousands of returning patients.[65] However, important questions of the program's longer-term efficacy remain, which call for more analyses.[66]

In November 1978, Mayor Edward Koch shut down Lincoln on allegations of fraud and the use of "questionable treatment methods."[67] This ended a years-long battle between government officials and the Lincoln team, beginning with the revolutionaries' hospital

FIGURE 3— Unidentified Lincoln Detox Member Treating a Patient Using Ear Acupuncture

Note. Photo is a still from Mia Donovan's EyeSteelFilm documentary, *Dope is Death*, 1973.
Source. Carlos Ortiz, courtesy of the Center for Puerto Rican Studies at Hunter College. Printed with permission.

takeovers. Alba described the constant "political struggle . . .to maintain funding, keep the program alive, against the local police as well as hospital police who continuously tried to make their way into the program (Lincoln Detox was a sanctuary where addicts could go and not be afraid of police)." With city and state bodies frequently threatening to cut funding, the team often protested. "Even though we forced the government for years to underwrite our work, eventually they had the power and took it out," Alba stated.[68] For Koch, "hospitals are for sick people, not for thugs," and he was concerned with the revolutionaries' direct actions and Lincoln's network of radicals.[69] Shakur emphasized that "acupuncture in the hands of the revolutionary-minded, particularly addressing addiction, was an intervention that the government was not willing to accept at the time."[70] More than 70 supporters gathered at Lincoln, holding signs that read "Reopen Detox, no methadone maintenance."[71]

Shakur subsequently established the Black Acupuncture Advisory Association of North America (BAANA) in 1978, which trained hundreds of revolutionary-minded acupuncturists.[72] Some members were linked to robberies, which they characterized as "expropriations"—the return of money from the rich to the poor from whom they had taken it.[73] In 1982, Shakur, several BAANA members, and others were federally indicted under the Racketeer Influenced and Corrupt Organization Act.[74] The charges included their involvement in a Brinks armored car robbery in 1981, which led to the death of two policemen and one guard.[75] Situated in the larger context of the 1960s and 1970s American underground movements in response to systematic suppression by local and federal law enforcement, the Black underground movement is particularly poorly documented, and this history is muddy on factual and moral dimensions.[76] Complexity and multiplicity of truths pervade the history of Lincoln and BAANA, as public health and history strike a balance between celebrating the innovative use of acupuncture for addiction and community self-empowerment, on the one hand, and condemning the endangerment and taking of lives on the other.[77]

TOOLKIT CARE TODAY

Other Lincoln members founded a nearby successor program, called Lincoln Recovery. Known as "Phase Two," this program did not offer political education but attracted socially oriented practitioners to train in ear acupuncture, many of whom worked on HIV/AIDS and addiction.[78] However, many considered the original "program"—of acupuncture and politics—as having ended in November 1978.[79] In 1985, Michael Smith, a White psychiatrist and director of Lincoln Recovery, formalized NADA and the five-point ear acupuncture protocol. Low-cost and efficient, the protocol is widely accessible for people of all backgrounds to receive or be trained in. From nurses to prison officers, the protocol was also used for first responders after the 9/11 World Trade Center attacks and Hurricane Katrina.[80] As one practitioner declared: "It's first aid!"[81] Now a global organization, NADA has chapters from Great Britain to Japan, with an estimated 25 000 members.[82]

Lincoln also influenced the founding of other organizations. These include People of Community Acupuncture in the United States and Substance Misuse Acupuncture Register and Training (SMART UK) in England, where thousands of practitioners (either trained at Lincoln or trained by someone who was) employ toolkit care, working with marginalized populations at a sliding-scale rate or for free in group treatments.[83]

Although some practitioners are directly inspired by the Lincoln team, recognition and awareness of the early history have not always been at the forefront of these modern organizations, including NADA itself, a fact that is now changing under calls by community members.[84]

Small's influence extends beyond his direct patient care since the 1970s. In Oakland, Freedom Community Clinic, whose founder was inspired by Small, has offered integrative medicine services since July 2019 to more than 2300 residents. Recently, the clinic organized pop-up "healing clinics" for Black, Indigenous, and people of color (BIPOC) patients in response to the COVID-19 pandemic and the killing of George Floyd. At these clinics, acupuncture was offered alongside primary care checkups. BIPOC practitioners employed toolkit care similar to that used by the 1970s revolutionaries and provided alternative healing options. Their message resonated, and hundreds of BIPOC patients attended.[85] Altogether, tens of thousands of practitioners, influenced by Small or the Lincoln team, practice integrative medicine, where medicine goes together with the social praxis of "serving the people, body and soul."

Small and Lincoln members have never met.[86] The varying degrees of sociopolitical motivation of its adherents attest to the multiplicity encompassed by the Black and broader revolutionary movement. The Lincoln team's toolkit was far more politically oriented, evidenced by the political education emphasis. Yet the simultaneous and parallel nature of their acupuncture uptake powerfully underscores similar messages that provide guidance for today's public health issues. With the current opioid epidemic resembling the conditions of the 1970s drug crisis, the revolutionaries' use of acupuncture offers a holistic image of prevention and care—acupuncture for pain management on the one hand and its pairing with social empowerment for addiction management on the other. Importantly, thousands of patients attest to its benefits.[87] These stories contrast with the current understanding of CAM practices, as mostly used by White patients.[88] The contributions and innovations to the addiction field and beyond by these revolutionaries have not been properly recognized by public health; political and conceptual occlusions from incomplete historical understandings of the Black and broader revolutionary movement and the dismissal of addiction interventions as only relevant to addiction have kept these histories from getting the attention and critical engagement they deserve.

Although medical practices with sociopolitical involvement are not new, they are seldom taught in public health, medical, and other health science schools.[89] But the lessons of their successes—and failures—in holistic health care delivery are widely applicable.[90] We must understand the facilities of (in)justice and conditions that made Lincoln possible—and then not. We must also evaluate the agency of the Lincoln team and how they were made into and made themselves targets of the state, which led to the cessation of a pioneering public health program. We ask, what features of Lincoln could be successful today? We may also wonder, was Small's intentional peripherality what allowed him to sustain his practice?

What is clear is that the revolutionaries' integration of medical with social practices broadens our conceptualization of health care. What sustained the reception of acupuncture was its ability to satisfy particular needs, which were not always medical but were nonetheless constituent of health. These lesser-known histories not only suggest the importance of considering medical needs together with social needs, but they also highlight their interplay, encouraging us to address the multiple axes that constitute the healing process. They impress on us the indispensability of attending to local needs and provide a practical vision of a modern barefoot doctor and grassroots implementation of toolkit care. Above all, these important histories should move us to pay attention to the creative and complex ways in which oppressed communities define, envision, and seek health as they lay claim to a fundamental human right.

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CONFLICTS OF INTEREST

The author has no conflicts of interest to declare.

ENDNOTES

1. In continuation with previous articles in this Journal—such as the ones I reference below—I will be standardizing the capitalization of the first letter of racial groups.
2. "About," National Acupuncture Detoxification Association, available at https://acudetox.com (accessed October 15, 2020). By "treatment," I indicate the broader definition of illness and disease management, which encompasses both care and cure. Addiction is notoriously difficult to cure, as there is little consensus on the definition of "cure" itself.
3. "Conversation in Group Setting at Hope for New Hampshire," interview by author, October 23, 2018.
4. Tainya C. Clarke, Lindsey I. Black, Barbara J. Stussman, Patricia M. Barnes, and Richard L. Nahin, "Trends in the Use of Complementary Health Approaches Among Adults: United States, 2002–2012," *National Health Statistics Reports* 79 (February 10, 2015): 1–16. Of this population, the largest group of CAM users in 2012 were non-Hispanic White adults (37.9%) and those that were not poor (38.4%). "Not poor" is defined as persons who have incomes 200% of the poverty threshold or greater.
5. For excellent overviews of the BPP, see Joshua Bloom and Waldo E. Martin, *Black Against Empire: The History and Politics of the Black Panther Party* (Berkeley, CA: University of California Press, 2016); Donna Jean Murch, *Living for the City Migration: Education and the Rise of the Black Panther Party in Oakland, California* (Chapel Hill, NKC: University of North Carolina Press, 2010). For the Young Lords, see Johanna Fernández, *The Young Lords: A Radical History* (Chapel Hill, NC: University of North Carolina Press, 2020). Note that although the use of "Latinx" is anachronistic for this time period, I follow Fernández's use of the term. See Fernández, *The Young Lords,* 5.
6. Refer to footnote 39 for references about the Lincoln events. For specific coverage of Shakur's work at Lincoln, see Susan Reverby, *Co-Conspirator for Justice: The Revolutionary Life of Dr. Alan Berkman* (Chapel Hill, NC: University of North Carolina Press, 2020); *Dope Is Death*, documentary directed by Mia Donovan (Montreal, Canada: EyeSteel Film, 2020); Mia Donovan, *Dope Is Death,* podcast audio, August 31, 2020, available at https://dopeisdeath.com (accessed October 20, 2020).
7. Based on conversations with Small, I take his definition of "revolutionary," which represents "people that wanted to change society for the better." This does not necessarily refer to someone with the agenda of overthrowing governments. Small considers himself to be a revolutionary, despite not formally being part of a radical party.
8. Small has been mentioned for his health care work with the BPP at the party's free clinic in Oakland and the national sickle cell anemia project. Lacking, however, is an analysis of his use of acupuncture. The most coverage on Small's work is thus far with Alondra Nelson, "The Longue Durée of Black Lives Matter," *American Journal of Public Health* 106, no 10 (2016): 1734–1737, https://doi.org/10.2105/ajph.2016.303422; Alondra Nelson, *Body and Soul: The Black Panther Party and the Fight Against Medical Discrimination* (Minneapolis, MN: University of Minnesota Press, 2011), 71, 97, 181–182. See also Lewis Cole, ed., *Columbia University Black Panther Project: Interview of Dr. Tolbert Small by Lewis Cole* (Alexandria, VA: Alexander Street Press, 2005); E. Schiller, *Community Health Activism of The Black Panther Party* (BA Honors Thesis, University of Michigan, 2008); Stephen Shames and Bobby Seale, "Healthcare," in *Power to the People: The World of the Black Panthers* (New York: Abrams, 2016), 102–107. For Small's personal Web site, see "Home," Dr. Tolbert Small, The People's Doctor, July 27, 2020, available at http://the-peoples-doctor.com (accessed October 20, 2020).
9. They also make significant contributions to the fields of Chinese medicine and African American studies, in which they have also received little attention, especially the work of Small in comparison to the Lincoln events.
10. For examples of reputable American Chinese medicine schools, see "Chinese Medicine," American College of Traditional Chinese Medicine, available at https://www.actcm.edu/chinese-medicine (accessed November 2, 2020); M. Harris, "The Birth of Acupuncture: History of Acupuncture," Pacific College, October 24, 2019, available at https://www.pacificcollege.edu/news/blog/2019/01/25/the-birth-of-acupuncture-history-of-acupuncture (accessed November 2, 2020). For examples of biomedical institutions, see "Traditional Chinese Medicine," Mount Sinai Health System, available at https://www.mountsinai.org/health-library/treatment/traditional-chinese-medicine (accessed November 2, 2020). See also William L. Prensky, "Reston Helped Open a Door to Acupuncture," *The New York Times*, December 14, 1995, available at *h*ttp://search.proquest.com.ezp-prod1.hul.harvard.edu/docview/109511141?accountid=11311 (accessed November 2, 2020). For Reston's original article, see James Reston, "Now, About My Operation in Peking," *The New York Times*, July 26, 1971, *available at http*://graphics8.nytimes.com/packages/pdf/health/1971acupuncture.pdf (accessed November 2, 2020).
11. Based on conversations and observations, I contend that "toolkit care" is a viable description of the ethos of the Lincoln team, Small, and modern practitioners of (ear) acupuncture with sociopolitical motivations. Small describes bringing a bag of needles and electroacupuncture machines with him as he did house calls. Modern practitioners, just like the Lincoln team, carry needles as they move around the country. The ease of transportability of acupuncture lends itself well to toolkit care, a notion that can be extrapolated and broadly applied. See the explicit use of "clinical toolkit" by ear acupuncturists, "Trauma Prevention and Recovery Protocols/Clinical Toolkit," Acupuncturists Without Borders, August 7, 2020, available at https://acuwithoutborders.org/rsh-module-2 (accessed October 20, 2020).
12. NADA trainers have written explicitly about the notion of "healthcare for the people by the people" and service, especially in the face of difficult, stigmatized conditions such as addiction or mental health, or in response to emergencies. They term this the "spirit of NADA." See Claudia Voyles, Kenneth Carter, and Laura Cooley, "Back to the Future: The National Acupuncture Detoxification Association (NADA) Protocol Persists as an Agent of Social Justice and Community Healing by the People and for the People," *Open Access Journal of Complementary & Alternative Medicine* 2, no. 4 (2020): 191–193, https://doi.org/10.32474/OAJCAM.2020.02.000143.
13. "Serving the people, body and soul" was a famous BPP aphorism, borrowed from Mao Zedong's writings. See Mary T. Bassett, "No Justice, No Health: The Black Panther Party's Fight for Health in Boston and Beyond," *Journal of African American Studies* 23, no. 4 (2019): 352–363, https://doi.org/10.1007/s12111-019-09450-w;Nelson, *Body and Soul*, 1.
14. The influence of Mao Zedong and Maoism on the BPP can be found in many writings by Panther members. See Elaine Brown, *A Taste of Power: A Black Woman's Story* (New York, NY: Anchor Books, 1994), 295–304; Huey P. Newton, *Revolutionary Suicide* (London, UK: Penguin Books, 2009), 322–326, 348–353; Bobby Seale, *Seize the Time: The Story of the Black Panther Party and Huey P. Newton* (Baltimore, MD: Black Classic Press, 1991), 79–85; David Hilliard and Lewis Cole, *This Side of Glory: The Autobiography of David Hilliard and the Story of the Black Panther Party* (Chicago, IL: Lawrence Hill Books, 1993), 118–121. For a few excellent secondary literature sources, see Bloom and Martin, *Black Against Empire*, 1–3, 66, 69, 311, 349–350; M. D. Johnson, "From Peace to the Panthers: PRC Engagement With African-American Transnational Networks, 1949–1979," *Past & Present* 218, no. suppl 8 (January 2013): 233–257, https://doi.org/10.1093/pastj/gts042; Robin D. G. Kelley and Betsy Esch, "Black Like Mao," in *Afro Asia* (Durham, NC: Duke University Press, 2008), 97–154, https://doi.org/10.1215/9780822381174-008; Julia Lovell, *Maoism: A Global History* (London, UK: The Bodley Head, 2019), 292–293; Murch, *Living for the City*, 6, 132, 142; Nelson, *Body and Soul*, 69.
15. Nelson, *Body and Soul*, xi.
16. Morabia Alfredo, "Unveiling the Black Panther Party Legacy to Public Health," *American Journal of Public Health* 106, no. 10 (2016): 1732c1733, https://doi.org/10.2105/AJPH.2016.303405
17. Lovell, *Maoism*, 293; Nelson, *Body and Soul*, 70.
18. Xiaoping Fang, *Barefoot Doctors and Western Medicine in China* (Rochester, NY: University of Rochester Press, 2015), 19, Ch. 3, 4. See also Xun Zhou, *The People's Health: Health Intervention and Delivery in Mao's China, 1949–1983* (Montreal, Canada: McGill-Queen's University Press, 2020).
19. While the original 10-point platform in 1966 did not explicitly include the demand for health care (it was incorporated in the 1972 revision, replacing the demand for the exemption of Black men from military service), BPP members and affiliates were enacting community health care work early on. The first People's Free Medical Clinics were established in 1968 in Kansas City and Chicago. See Mary T. Bassett, "Beyond Berets: The Black Panthers as Health Activists," *American Journal of Public Health* 106, no. 10 (2016): 1741–1743, https://doi.org/10.2105/ajph.2016.303412; Nelson, *Body and Soul*, 92.
20. "Conversation with Dr. David Levinson," interview by author, February 8, 2019.
21. College and School News,*Crisis*. 71, no. 1 (1964): 55, available at https://books.google.com/books?id=7FsEAAAAMBAJ&pg=PA55 (accessed October 20, 2020).

22. Tolbert Small, “Black Genocide: Sickle Cell Anemia,” *The Black Panther Intercommunal News Service,* April 10, 1971, 10–11, available at https://www.marxists.org/history/usa/pubs/black-panther/06%20no%2011%201-20%20apr%2010%201971.pdf (accessed October 20, 2020); “Lecture From Dr. Tolbert Small On Sickle Cell Anemia And David Hilliard On Black Panther Movement,” available at https://search.alexanderstreet.com/view/work/bibliographic_entity%7Cvideo_work%7C3156547 (accessed October 30, 2020). See also Nelson, *Body and Soul*, 97, 122.

23. See Nelson, *Body and Soul*, 146; Morabia, “Unveiling the Black Panther Party Legacy to Public Health.”

24. Newton and fellow Panthers Elaine Brown and Robert Bay visited China together in September 1971 for 10 days. In his memoir, Newton writes of the “strange yet exhilarating experience” to travel to China and witness “the revolutionary process,” and concludes his chapter on China by quoting Mao’s statement, “If you know the theory and methods of revolution, you must take part in revolution. All genuine knowledge originates in direct experience.” See Newton, *Revolutionary Suicide,* 348–353. While he does not mention asking the Chinese Communist Party about sending the 1972 BPP delegation, Small and Levinson recall Newton making the request. Thus far, no documents exist to corroborate the exact origins of who initiated the idea for the delegation, but given what Newton writes about the importance of “direct experience” and high praise of his time in China, it seems likely he would make such a request. See also Brown, *A Taste of Power,* 296–304.

25. “Progressive Americans, Led by Panthers, Return from China,” *The Black Panther Intercommunal News Service*, April 22, 1972, 8th edition, sec. 5, available at https://www.marxists.org/history/usa/pubs/black-panther/08%20no%205%201-20%20apr%2022%201972.pdf (accessed October 20, 2020). A few other newspapers reported on the trip; for example see “Bay Black Panthers Enroute to R. China,” *San Francisco Examiner*, March 6, 1972, 1, 12; “Black Panther Party Members on Way to China,” *Los Angeles Times*, March 6, 1972, 2; “Panthers, Others Off to Red China,” *Sun Reporter*, March 11, 1972, 2.

26. “Conversation with Dr. David Levinson.” Levinson was part of the Intercommunal Survival Communities to Combat Fascism (ISCCF), the BPP’s multiracial network working to promote the party’s survival programs. He was also a member of the Lumpen, the BPP’s R&B band. His parents, Cec and Saul Levinson, founded the Huey Newton Defense Committee as well as the Berkeley chapter of the National Committees to Combat Fascism (later renamed ISCCF). See Peter Gilstrap, “Power to the People: Inside the Black Panthers’ R&B Band, the Lumpen,” KCRW, June 18, 2020, available at https://www.kcrw.com/culture/shows/lost-notes/black-panther-band-lumpen-lost-notes (accessed October 20, 2020); Y. Litvin, “The Black Panther Party’s Multiracial Anti-Fascism,” *ROAR* Magazine (Foundation for Autonomous Media, August 27, 2020), available at https://roarmag.org/essays/black-panther-multiracial-antifascism (accessed October 20, 2020);Schiller, *Community Health Activism*.

27. Fang, *Barefoot Doctors and Western Medicine in China*, 2, 67.

28. “Lecture in Workers, Peasants, Soldiers Hospital in Peking,” March 27, 1972, Beijing, China, 1:08:51, Tolbert and Anola Small Papers.

29. “Conversation with Dr. David Levinson.”

30. Levinson returned home and volunteered at an acupuncture conference organized by Frederick Kao, a preeminent practitioner in New York who founded *The American Journal of Chinese Medicine.* See Bruce Lambert, “Frederick Kao, 73, Educator Who Led Acupuncture Effort,” *New York Times*, July 31, 1992, available at https://www.nytimes.com/1992/07/31/nyregion/frederick-kao-73-educator-who-led-acupuncture-effort.html (accessed October 20, 2020). Later, Levinson moved to New York City and worked for Kao in a research program investigating the use of acupuncture for hearing loss. In 1981, Levison received a medical degree at the University of California, San Francisco, and became an emergency physician. He has worked with revolutionaries around the world, including in El Salvador and Chiapas. Most recently, he volunteered at an Oakland integrative medicine clinic for undocumented immigrants, where a primary care office sits adjacent to an herbal dispensary.

31. “Conversation with Dr. Tolbert Small,” interview by author, February 9, 2019. Similar to Small, a number of other American physicians (visiting China as part of medical delegations) were inspired by the barefoot doctors’ movement. See, for example, Victor W. Sidel, “The Barefoot Doctors of the Peoples Republic of China,” *New England Journal of Medicine* 286, no. 24 (1972): 1292–1300, https://doi.org/10.1056/nejm197206152862404; “Wald Lectures on Chinese Medicine,” *Harvard Crimson*, March 24, 1972, available at https://www.thecrimson.com/article/1972/3/24/wald-lectures-on-chinese-medicine-pthis (accessed November 2, 2020).

32. The book Small used to teach himself acupuncture was an English translation of *zhongguo zhenjiuxue gaiyao,* a Chinese medicine book by the Editorial Committee for Acupuncture and Moxibustion of the People’s Health Publishing House. The translation was done by Lee Hsu on the commission of David Bacon, an activist, photojournalist, and former volunteer at the George Jackson Clinic while Small was the medical director. The Chinese text was acquired from China Books in San Francisco. Lee Hsu’s translation, entitled *Basic Acupuncture Techniques*—which includes an introduction written by Small—was never published due to lack of funding. Small retains a copy of the manuscript. Eventually, an English version of the same Chinese text was released in 1980 by the Foreign Languages Press; see *Essentials of Chinese Acupuncture*, 1st ed. (Beijing, China: Foreign Languages Press, 1980).

33. “Conversation with Dr. Tolbert Small,” interview by author, October 30, 2020.

34. “Conversation with Dr. Tolbert Small,” interview by author, August 25, 2019.

35. Daphne Muse, personal communication with author, August 13, 2020.

36. “Conversation with Dr. Tolbert Small,” October 30, 2020.

37. “Conversation with Dr. Tolbert Small,” interview by author, August 26, 2019.

38. Meléndez Miguel, “‘The Butcher Shop’: Lincoln Hospital,” in *We Took the Streets: Fighting for Latino Rights With the Young Lords* (New Brunswick, NJ: Rutgers University Press, 2005), 162–178; Merlin Chowkwanyun, “The New Left and Public Health the Health Policy Advisory Center, Community Organizing, and the Big Business of Health, 1967–1975,” *American Journal of Public Health* 101, no. 2 (2011): 238–249, https://doi.org/10.2105/ajph.2009.189985. Note that amongst a series of medical neglect and discrimination cases, there was the infamous case of Carmen Rodriguez, a young woman who was believed to be “butchered in the hospital,” and bled to death on a gurney. See Jennifer Nelson, *More Than Medicine: A History of the Feminist Women’s Health Movement* (New York, NY: New York University Press, 2015), 52–54.

39. Vicente “Panama” Alba, “Lincoln Detox Center: The People’s Drug Program,” interview by Molly Porzig, *The Abolitionist*, March 15, 2013, available at https://abolitionistpaper.wordpress.com/2013/03/15/lincoln-detox-center-the-peoples-drug-program (accessed January 7, 2019); Chowkwanyun, “The New Left and Public Health.” The history of the Lincoln events is much more expansive than what I have laid out here; see Chowkwanyun, Fernández, and Reverby (previously cited works) and others for a more complete account. See also Alondra Nelson, “‘Genuine Struggle and Care’: An Interview With Cleo Silvers,” *American Journal of Public Health* 106, no. 10 (2016): 1744–1748, https://doi.org/10.2105/ajph.2016.303407

40. Reverby, *Co-Conspirator for Justice*, 91; Martin Tolchin, “South Bronx: A Jungle Stalked by Fear, Seized by Rage,” January 15, 1973, available at https://www.nytimes.com/1973/01/15/archives/south-bronx-a-jungle-stalked-by-fear-seized-by-rage-the-south-bronx.html; (accessed October 20, 2020); see also Fernández, *The Young Lords*, 303.

41. “2018 Interview about Acupuncture & The Opioid Crisis,” interview by Steven Michael Hinshaw, Mutulu Shakur, December 9, 2017, available at http://mutulushakur.com/site/2018/11/acupuncture-interview (accessed January 3, 2019).

42. Due to copyright issues, this poster, printed in 1975, cannot yet be published. However, the poster can be viewed in Donovan’s documentary, *Dope Is Death*.

43. As described by historian Samuel Roberts, who is currently working on a project on the political history of heroin addiction treatment, in an interview; see Olga Khazan, “How Racism Gave Rise to Acupuncture for Addiction Treatment,” *The Atlantic*, August 3, 2018, available at https://www.theatlantic.com/health/archive/2018/08/acupuncture-heroin-addiction/566393 (accessed December 10, 2018). For a history of how methadone maintenance became standardized in New York City, see Samuel Roberts, “‘Rehabilitation’ as Boundary Object: Medicalization, Local Activism, and Narcotics Addiction Policy in New York City, 1951–62,” *The Social History of Alcohol and Drugs* 26, no. 2 (2012): 147–169, https://doi.org/10.1086/shad26020147.

44. Shakur, interview by Hinshaw; Radical Roots of Acupuncture, *Dope Is Death*, podcast audio, August 31, 2020, available at https://dopeisdeath.simplecast.com/episodes/two (accessed September 1, 2020).

45. The words “organize,” “educate the people,” and “acupuncture heals,” along with the imagery of a needling hand, can be seen in the 1975 poster, which can be viewed in Donovan’s *Dope Is Death.* See also “Acupuncture Used to Treat Addiction,” *Press & Sun-Bulletin*, June 5, 1976, p. 3-A.

46. Alba, interview by Porzig.

47. Ibid; Sessi Kuwabara Blanchard, “How the Young Lords Took Lincoln Hospital, Left a Health Activism Legacy,” Filter (The Influencer Foundation Inc, November 9, 2018), available at https://filtermag.org/how-the-young-lords-took-lincoln-hospital-and-left-a-health-activism-legacy (accessed October 20, 2020).

48. "In Memory of Richard Taft," *White Lightning*, 1974, available at http://www.freedomarchives.org/Documents/Finder/DOC58_scans/58.White.Lightening.RichardTaft.pdf (accessed November 2, 2020). The extent of Taft's contribution to the program is unclear. While some literature suggests that he was interested in Chinese medicine (perhaps even having gone to China himself) and recommended acupuncture to the Lincoln cohort, original members of the team, such as Bosque, recall Shakur mentioning the practice first. Later practitioners state that Taft's name was often strategically used as a way to legitimize the practice.
49. Blanchard, "How the Young Lords Took Lincoln Hospital"; Shakur, interview by Hinshaw.
50. Edward Onaci, *Free the Land: The Republic of New Afrika and the Pursuit of a Black Nation-State* (Chapel Hill, NC: University of North Carolina Press, 2020).
51. Shakur, interview by Hinshaw.
52. Various team members report Shakur initially reading about research conducted in Hong Kong for the use of acupuncture for withdrawal symptoms or about a doctor in Bangkok using the practice as an analgesic. The order is unclear, but it is clear that both articles influenced the team. For the *New York Times* article, see "Hong Kong Doctors Use Acupuncture to Relieve Addicts' Withdrawal Symptoms," *New York Times*, April 5, 1973, available at https://www.nytimes.com/1973/04/05/archives/hong-kong-doctors-use-acupuncture-to-relieve-addicts-withdrawal.html (accessed November 2, 2020). For the original research, see H. L. Wen and S. Y. C. Cheung, "Treatment of Drug Addiction by Acupuncture and Electrical Stimulation," *Asian Journal of Medicine* 9, no. 138 (April 1973): 138–141. The article about the Bangkok doctor is yet to be located.
53. Shakur, interview by Hinshaw.
54. Haki Shakur, personal communication with author, May 30, 2020; "Conversation With Mario Wexu," interview by author, September 10, 2020.
55. "In Memory of Richard Taft"; Voyles, Carter, and Cooley, "Back to the Future"; "Conversation With Mario Wexu"; *Dope Is Death*, directed by Mia Donovan. Various documents, accounts, and people state conflicting start dates for the acupuncture program. This is likely due to different definitions of the origin—when the team reached out to Chinatown practitioners, when they started experimenting with needles on each other, when they started treating patients, or when the program was standardized and scaled. The contested years are 1972, 1973 and 1974.
56. "Conversation With Mario Wexu."
57. "The Use of Acupuncture by Revolutionaries: An Interview With Brother Tyehimba," August 31, 2014, available at http://mutulushakur.com/site/1992/10/interview-on-acupuncture (accessed October 20, 2020).
58. Blanchard, "How the Young Lords Took Lincoln Hospital." "Each one, teach one" was a common phrase employed by the BPP. See, for example, "Political Education—Oakland, CA," It's About Time, available at http://www.itsabouttimebpp.com/Our_Stories/Chapter4/Political_Education.html (accessed October 20, 2020).
59. Shakur, interview by Hinshaw.
60. *July Membership Café,* National Auricular Detoxification Association, July 15, 2020, available at https://acudetox.com/july-membership-cafe (accessed September 2, 2020). Readers may notice that the use of acupuncture at Lincoln was deeply rooted in community, and self-empowerment translated directly to and initiated community empowerment. Self-care meant community care. This is peculiar, as American acupuncture has largely been seen as part of the individualistically rooted movement of wellness and self-help. This history of community-rooted acupuncture thus argues for another historical understanding of acupuncture specifically and self-care generally.
61. Shakur, interview by Hinshaw.
62. Reverby, *Co-Conspirator for Justice*, 67. Other White doctors used their medical license to support Lincoln and later with BAANA, such as Barbara Zeller.
63. Shakur, interview by Hinshaw.
64. Nelson, "The Longue Durée of Black Lives Matter."
65. For patient accounts, see "In Memory of Richard Taft."
66. Ibid.
67. Ronald Sullivan, "Leaders of Drug Unit at Lincoln Removed on Orders From Koch," *New York Times*, November 29, 1978, available at https://www.nytimes.com/1978/11/29/archives/leaders-of-drug-unit-at-lincoln-removed-on-orders-from-koch-unit.html (accessed November 2, 2020). Then-assemblyman Chuck Schumer also claimed that there was $1 million in unsubstantiated payroll costs, which was contested by members of the city's Health and Hospital Corporation. See David Medina, "1M Payroll Gap in Dope Clinic's Audit Denied," *Daily News*, November 15, 1977, 8.
68. Alba, interview by Porzig; Blanchard, "How the Young Lords Took Lincoln Hospital." For example, in response to the Health and Hospital Corporation firing of employees at the detox program, the activists took to direct action, which ranged from peaceful protesting to property damage. See "Seize Health Offices to Protest Firings," *Daily News*, September 25, 1975, 7; Hugh Wyatt, "Delay Detox Firings in Lincoln Protest," *Daily News*, September 26, 1975, 7.
69. Sullivan, "Leaders of Drug Unit at Lincoln Removed on Orders From Koch."
70. Shakur, interview by Hinshaw.
71. Ronald Sullivan, "Countercharges by Lincoln Drug Unit," *New York Times*, November 30, 1978, available at https://www.nytimes.com/1978/11/30/archives/countercharges-by-lincoln-drug-unit-fear-of-disturbance-eases.html (accessed November 2, 2020).
72. Reverby, *Co-Conspirator for Justice*, 86, 93. See also The Students of the Black Acupuncture Association of North America, "Open Letter From the Students of BAANA," Mutulu Shakur, January 1, 1985, available at http://mutulushakur.com/site/1985/01/open-letter-from-baana (accessed November 2, 2020).
73. Reverby, *Co-Conspirator for Justice*, 93.
74. BAANA included members of the May 19th Communist Organization, a collective of White revolutionaries who supported the self-defense of communities of color. Activist Marilyn Jean Buck was a connection between BAANA and May 19th and was tried and convicted of the Racketeer Influenced and Corrupt Organization conspiracy (which included the 1981 Brinks case) along with Shakur. See Reverby, *Co-Conspirator for Justice*, 95, 111.
75. The 1981 Brinks case, and specifically Shakur's involvement, is highly contested. Conflicting sources present different pictures; Shakur, although not on the scene, was alleged to be a mastermind of the robbery (and several other expropriations). This has been disputed by his legal team and several others. This complex history requires far more exploration, which I will grapple with further in my future work. For purposes of this article, I focus on the revolutionaries' innovations in acupuncture, which, although they should not be understood separately from its context, can be highlighted. This article, then, serves as a call for scholars to delve deeper into this intricate history. For readers interested in a few (highly polarized) accounts of the Brinks case, see "Case Facts," Mutulu Shakur, January 19, 2017, available at http://mutulushakur.com/site/case-facts (accessed October 20, 2020); Kuwasi Balagoon, Matt Meyer, and Karl Kersplebedeb, *A Soldier's Story: Revolutionary Writings by a New Afrikan Anarchist* (Oakland, CA: PM Press, 2019); Dan Berger, *Outlaws of America: The Weather Underground and the Politics of Solidarity* (Oakland, CA: AK Press, 2006), 263–280; John Castellucci, *The Big Dance: The Untold Story of Kathy Boudin and the Terrorist Family That Committed the Brink's Robbery Murders* (New York, NY: Dodd, Mead, 1986); *Dope Is Death*, podcast audio, August 31, 2020; Reverby, *Co-Conspirator for Justice,* 109–116.
76. On grappling with the complex 1960s and 1970s American underground and radical histories, a few fine sources are Dan Berger, ed., *The Hidden 1970s: Histories of Radicalism* (New Brunswick, NJ: Rutgers University Press, 2010); Daniel Burton-Rose, ed., *Creating a Movement With Teeth: A Documentary History of the George Jackson Brigade* (Oakland, CA: PM, 2010); Laura Pulido, *Black, Brown, Yellow, and Left Radical Activism in Southern California* (Berkeley, CA: University of California Press, 2006); Jeremy Varon, *Bringing the War Home: The Weather Underground, the Red Army Faction, and the Revolutionary Violence in the Sixties and Seventies* (Berkeley, CA: University of California Press, 2004). The Black underground movement, however, has been most poorly documented. See, for example, Akinyele O. Umoja, "Repression Breeds Resistance: The Black Liberation Army and the Radical Legacy of the Black Panther Party," in Kathleen Cleaver and George Katsiaficus, *Liberation, Imagination, and the Black Panther Party* (New York, NY: Routledge, 2001), 3–19.
77. For a deeply insightful and important piece on how historians think through the questions of moral judgement, crafting meaningful narratives and balancing the multiplicity of truths, all while acknowledging one's own perspective, bias, and inevitable places of ignorance, see Susan M. Reverby, "Enemy of the People/Enemy of the State: Two Great(ly Infamous) Doctors, Passions, and the Judgment of History," *Bulletin of the History of Medicine* 88, no. 3 (2014): 403–430, https://doi.org/10.1353/bhm.2014.0062
78. *July Membership Café;* National Acupuncture Detoxification Association.
79. Alba, interview by Porzig; Blanchard, "How the Young Lords Took Lincoln Hospital."
80. Kenneth Carter and Michelle Olshan-Perlmutter, "NADA Protocol," *Journal of Addictions Nursing* 25, no. 4 (2014): 182–187, https://doi.org/10.1097/JAN.0000000000000045. The NADA protocol is also employed at the Substance Abuse Treatment Unit run by the Connecticut Mental Health Clinic (a partnership between Yale School of Medicine and State of Connecticut Department of Mental Health and Addiction Services), where psychiatry interns can be trained in administering the treatment.

See Lucile Bruce, “Ear Acupuncture: A Tool for Recovery,” Psychiatry, Yale School of Medicine, November 14, 2011, https://medicine.yale.edu/psychiatry/newsandevents/cmhcacupuncture (accessed November 2, 2020).

81. “Conversation With Elizabeth Ropp,” interview by author, July 22, 2020.
82. Elizabeth Stuyt, Claudia Voyles, and Sara Bursac, “NADA Protocol for Behavioral Health. Putting Tools in the Hands of Behavioral Health Providers: The Case for Auricular Detoxification Specialists,” Medicines 5, no. 1 (July 2018): 20, https://doi.org/10.3390/medicines5010020
83. Eana X. Meng, “Needles to Needles: How Ear Acupuncture Can Work for Substance Use Recovery,” *Somatosphere*, September 15, 2020, http://somatosphere.net/2020/needles-to-needles-ear-acupuncture.html (accessed September 16, 2020). There are many more programs that employ the five-point ear acupuncture protocol, although they do not always use the term “NADA” protocol in order to separate themselves from the NADA organization. See, for example, “Vision, Mission, and Strategy,” Acupuncturists Without Borders, available at https://acuwithoutborders.org/vision-mission-and-strategy (accessed November 6, 2020); “The Treatment,” Pathways to Health, available at http://www.pathwaystohealth.org.uk/treatment.html (accessed November 6, 2020).
84. For example, acupuncturist Tenisha Dandridge, inspired by Shakur and BAANA, set up the Black Acupuncturist Association in 2020. See “Home,” Black Acupuncturist Association, available at https://www.blackacupuncturist.com (accessed November 6, 2020). For NADA’s recent support for Shakur, see “National Acupuncture Detoxification Association Support for Dr. Mutulu Shakur,” Mutulu Shakur, August 2, 2020, available at http://mutulushakur.com/site/2020/08/national-acupuncture-detoxification-association-support (accessed November 2, 2020).
85. “Bay Area Rapid Response Healing for Black Lives,” Freedom Community Clinic, June 2020, available at https://www.freedomcommunityclinic.org (accessed October 20, 2020).
86. Small and Shakur later came to know of each other’s work, with Small planning to visit the South Bronx in the late 1970s. Unfortunately, however, he fell ill and could not make the trip.
87. Many patients have reported the benefits of acupuncture for helping with addiction—for Lincoln patients, see “In Memory of Richard Taft.” For modern-day NADA patients, see Jane Healey, “Pathways to Health Annual Report 2019–2020” (Pathways to Health: Brighton and Hove, 2020). See also Ryan Bemis, “Evidence for the NADA Protocol: Summary of Research,” National Acupuncture Detoxification Association, 2013, available at https://acudetox.com/evidence-for-the-nada-protocol-summary-of-research (accessed November 2, 2020). For testimonies of the effectiveness of acupuncture and political empowerment for patients, see, for example, Acupuncture Needles—Tools of Healing or Rebellion?, *Dope Is Death*, podcast audio, August 31, 2020, available at https://dopeisdeath.simplecast.com/episodes/three (accessed September 1, 2020). The question of efficacy for acupuncture (whether alone or as paired with political empowerment) is as complex as the notion of effective “cure” for addiction; it is difficult to “measure” efficacy when there is little consensus on what and how to measure. I would also be remiss not to acknowledge the question of the placebo effect. The field of anthropology, however, offers important frameworks to our understanding of acupuncture, and the complexities of translating a practice based in a different kind of body philosophy into the biomedical lexicon. It advocates for a more holistic understanding of efficacy, and for the patient experience to be taken seriously. An excellent overview is Linda L. Barnes, “American Acupuncture and Efficacy: Meanings and Their Points of Insertion,” *Medical Anthropology Quarterly* 19, no. 3 (2005): 239–266, https://doi.org/10.1525/maq.2005.19.3.239.
88. In a study conducted by the National Center for Health Statistics on data from 2002–2012, the largest population of CAM users are Non-Hispanic White, a trend that increased during the decade. Non-Hispanic Blacks had not only the lowest rate of CAM utilization, but the percentage decreased over time. This history is a needed correction to the understanding that CAM practices have, outside of Asian communities, only been largely engaged with by White populations since Reston’s article. See Tainya C. Clarke et al., “Trends in the use of complementary health approaches among adults: United States, 2002–2012,”*National Health Statistics Reports* 79 (2015): 1-16.
89. There is an increasing focus on the entwinement of health care and social movements in the United States in the 20th century. A few key texts are Anne-Emanuelle Birn and Theodore M. Brown, *Comrades in Health: US Health Internationalists, Abroad and at Home* (New Brunswick, NJ: Rutgers University Press, 2013); Merlin Chowkwanyun and Benjamin Howell, “Health, Social Reform, and Medical Schools—The Training of American Physicians and the Dissenting Tradition,” *New England Journal of Medicine* 381, no. 19 (2019): 1870–175, https://doi.org/10.1056/nejmms1907237; John Dittmer, *The Good Doctors: the Medical Committee for Human Rights and the Struggle for Social Justice in Health Care* (Jackson: University Press of Mississippi, 2017); Elizabeth Fee and Theodore Brown, ed., *Making Medical History: The Life and Times of Henry E. Sigerist* (Baltimore, MD: Johns Hopkins University Press, 1997); Naomi Rogers, “Caution: The AMA May Be Dangerous to Your Health: The Student Health Organizations and American Medicine 1965–1970,” *Radical History Review* 80 (2001): 5–34; Sigrid Schmalzer, Daniel S. Chard, and Alyssa Botelho, *Science for the People: Documents From America’s Movement of Radical Scientists* (Amherst, MA: University of Massachusetts Press, 2018).
90. Important missing analysis and next steps include delving deeper into the “efficacy” of the Lincoln acupuncture program in the long run. How successful was it in the long term? By what measures? What happened to the thousands of people who visited the program? Did they continue with acupuncture treatment when Lincoln relocated? What happened at Lincoln, and what unfolded afterwards, promise to be a fruitful place of investigation for the field of addiction and public health at large.

Mass SARS-CoV-2 Testing in a Dormitory-Style Correctional Facility in Arkansas

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See also Macmadu and Brinkley-Rubinstein, p. 776.

Objectives. To assess SARS-CoV-2 transmission within a correctional facility and recommend mitigation strategies.

Methods. From April 29 to May 15, 2020, we established the point prevalence of COVID-19 among incarcerated persons and staff within a correctional facility in Arkansas. Participants provided respiratory specimens for SARS-CoV-2 testing and completed questionnaires on symptoms and factors associated with transmission.

Results. Of 1647 incarcerated persons and 128 staff tested, 30.5% of incarcerated persons (range by housing unit = 0.0%–58.2%) and 2.3% of staff tested positive for SARS-CoV-2. Among those who tested positive and responded to symptom questions (431 incarcerated persons, 3 staff), 81.2% and 33.3% were asymptomatic, respectively. Most incarcerated persons (58.0%) reported wearing cloth face coverings 8 hours or less per day, and 63.3% reported close contact with someone other than their bunkmate.

Conclusions. If testing remained limited to symptomatic individuals, fewer cases would have been detected or detection would have been delayed, allowing transmission to continue. Rapid implementation of mass testing and strict enforcement of infection prevention and control measures may be needed to mitigate spread of SARS-CoV-2 in this setting. (*Am J Public Health*. 2021;111:907–916. https://doi.org/10.2105/AJPH.2020.306117)

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In the United States, nearly 2.2 million people are incarcerated in jails and federal or state prisons at any given time.[1] Similar to other congregate settings,[2,3] correctional facilities have emerged as high-risk environments for transmission of SARS-CoV-2, the virus that causes COVID-19.[4,5] Controlling the spread of COVID-19 in correctional facilities, particularly those with dormitory-style housing, is challenging because of densely populated housing units with shared living areas.[6,7] Open floorplans, the lack of floor-to-ceiling walls or doors dividing bunk areas, and shared bathrooms make social distancing in dormitory-style correctional facilities difficult. The traditional method to quarantine individuals exposed to SARS-CoV-2 (i.e., separation from other individuals) is often not feasible in correctional settings because of space limitations. Transfers of incarcerated persons both within and between facilities, movement of staff within the facility, and movement of staff between the facility and the community, even when minimized as much as possible, further complicate mitigation efforts and put incarcerated persons, staff, and the surrounding communities at risk for acquiring COVID-19.[4,7,8] In addition, incarcerated populations have a high prevalence of chronic medical conditions, including those associated with severe illness from SARS-CoV-2 infection.[9,10] As of December 14, 2020, 1299 correctional and detention facilities in the United States reported 316 732 cases of COVID-19 among incarcerated persons and staff, with 1685 deaths.[11]

In March 2020, an Arkansas prison complex implemented infection prevention and control measures to prevent the introduction of SARS-CoV-2 to the incarcerated population. Initial efforts included suspending visitation, implementing staff temperature and symptom screenings upon entry, and quarantining incoming incarcerated persons for 14 days upon arrival. On March 28, Facility A, a low-security, dormitory-style correctional facility that is part of the prison complex, detected its first case of COVID-19 in an incarcerated person. Three Facility A staff members subsequently tested positive for SARS-CoV-2 on April 1. One of these staff members had close contact with the first case and the other 2 worked in the building where the initial case was housed. Within 1 week of the initial case, 9 incarcerated persons across 5 housing units developed symptoms and tested positive. Following the detection of the first case of COVID-19 in Facility A, additional infection prevention and control measures were implemented to reduce transmission in the facility. Incarcerated persons and staff were given face coverings, and efforts were made to promote social distancing and prevent interactions among incarcerated persons from different housing units, including closing dining areas, discontinuing all work service except for laundry, and ending multi-housing unit recreation time. Incarcerated persons who exhibited COVID-19 signs and symptoms were isolated and tested for SARS-CoV-2.

On April 9, an investigation team visited Facility A to provide technical assistance to prison officials in responding to cases of COVID-19. Recommendations following the visit included (1) establishing separate isolation spaces for 4 groups of individuals (laboratory-confirmed COVID-19 cases, symptomatic persons awaiting SARS-CoV-2 testing or results, asymptomatic persons awaiting SARS-CoV-2 testing or results, and symptomatic persons with negative SARS-CoV-2 test results that required medical care) when individual housing options were unavailable, (2) avoiding adding new individuals to a group of quarantined individuals and restarting the 14-day quarantine period for the entire group if it was necessary for an additional individual to join, (3) increasing SARS-CoV-2 testing as additional resources became available, and (4) implementing additional infection prevention and control measures and daily temperature checks for all incarcerated persons in Facility A.

Because of continued spread of SARS-CoV-2 within the facility, Facility A requested further assistance to investigate epidemiological aspects of SARS-CoV-2 transmission within the facility and examine strategies that might be useful in slowing transmission of SARS-CoV-2 in a correctional setting. A second investigation team deployed to Facility A on April 21. The objectives of this deployment were 4-fold: (1) establish point prevalence of COVID-19 among incarcerated persons in Facility A, (2) assess behaviors and other factors that could contribute to transmission among incarcerated persons, (3) establish point prevalence of COVID-19 among staff within the entire correctional complex, and (4) recommend infection prevention and control measures and other strategies that could slow SARS-CoV-2 transmission in this correctional facility and, more broadly, in other similar settings.

METHODS

Facility A is a low security, dormitory-style, all-male, correctional facility within a larger prison complex (age range of incarcerated persons: 19–82 years). The facility has 12 main housing units, each of which house between 100 and 160 incarcerated persons. Bunk areas within the units are separated by half-wall dividers and lack doors. Bathrooms and living facilities are shared. Incarcerated persons can interact freely with others in the unit. The facility also has a special housing unit (SHU) where incarcerated persons are separated from the general population and housed either alone or with other persons in a separated living quarter. Interaction between persons is limited.

Testing was offered to all incarcerated persons without a previous diagnosis of COVID-19 within Facility A. Because of the mobility of staff between facilities within the complex, testing was offered to all staff within the larger prison complex.

Design

To establish the point prevalence of COVID-19 among incarcerated persons and staff, mass testing events were held from April 29 to May 15. Mass testing approaches for both populations are briefly described in the following paragraphs (for detailed information, see the Appendix, section "Detailed Methods," available as an online supplement to the article at http://www.ajph.org).

Incarcerated persons. From April 29 to May 2, the investigation team and Facility A staff conducted mass testing for SARS-CoV-2 in 4 of the 12 Facility A housing units. Specimens from each housing unit were collected within a 24-hour period. Based on results, testing was extended to all incarcerated persons in the remaining housing units from May 12 to 15, including 8 standard housing units, the SHU, and a small housing unit occupied by incarcerated persons assigned to laundry work service. (For detailed information on housing units within Facility A, see the Appendix, section "Facility Description.")

All incarcerated persons in the housing unit on the day of the testing event were eligible for testing (total eligible: 1661). Those with a COVID-19 diagnosis had previously been moved to a separate isolation unit. Before testing, incarcerated persons provided written consent, and those within most housing units (excluding Unit A, SHU, and laundry service) were asked to complete a brief questionnaire on (1) symptoms experienced during the preceding 14 days and (2) the number of hours they wore their cloth face covering per day. Incarcerated persons in a subset of housing units (Units B, C, and D) were also asked to respond to questions regarding additional factors associated with SARS-CoV-2 transmission. Questionnaires were self-administered unless assistance from an investigation team member was requested. An extract of electronic medical records was used to obtain information on date of birth, race, ethnicity, and preexisting medical conditions.

Staff. From May 5 to 7, investigation team staff offered SARS-CoV-2 testing on a voluntary basis to staff working at the prison complex. Testing was offered on the complex's property. All staff (n = 542) were eligible to be tested. Before testing, staff provided written consent and completed (1) the Centers for Disease Control and Prevention's (CDC's) Human Infection With 2019 Novel Coronavirus Person Under Investigation and Case Report Form[12] and (2) a supplemental form about their specific work locations within the complex and participation in previous SARS-CoV-2 testing.

Specimen Collection and Laboratory Testing

Detailed specimen collection and laboratory testing methods are provided in the Appendix, section "Specimen Collection and Laboratory Testing." In brief, the investigation team and Facility A medical staff collected respiratory specimens from incarcerated persons, and the investigation team collected respiratory specimens from staff. All were collected in accordance with CDC guidelines.[13] The majority (65.9%; n = 1086) of incarcerated persons' specimens and all staff specimens were analyzed by CDC's COVID-19 surge diagnostic testing laboratory using reverse transcriptase polymerase chain reaction (RT-PCR). Facility A sent approximately one quarter (23.1%; n = 381) of incarcerated persons' specimens to a commercial laboratory that used RT-PCR for analysis, and 10.9% (n = 180) were analyzed using the facility's onsite Abbott ID NOW (Abbott Diagnostics Scarborough, Scarborough, ME) instrument for rapid molecular testing. All specimens submitted to CDC and the commercial laboratory were nasopharyngeal specimens. Nasopharyngeal and oropharyngeal specimens were collected for onsite analysis using the ID NOW instrument.

Results (positive, negative, or inconclusive) were reported for all specimens analyzed. In addition, CDC's COVID-19 surge diagnostic testing laboratory reported cycle threshold (Ct) values for the N1 and N2 viral nucleocapsid protein gene regions, 2 genetic markers used to determine the presence of viral RNA, for all positive test results processed in their laboratory (390 of 1086 specimens). In the case of SARS-CoV-2 testing, Ct values represent the number of cycles during RT-PCR testing needed before detection of viral RNA occurs. These values are inversely correlated with the amount of viral RNA present in a specimen. Values below 40 indicate a positive SARS-CoV-2 test result, with lower values indicating a larger amount of viral RNA. Because N1 and N2 Ct values did not significantly differ, N1 Ct values are reported in this article.

An additional specimen was collected from incarcerated persons with inconclusive test results, when possible. These specimens were analyzed onsite using the Abbott ID NOW instrument. The results of these retests are reported as the final test result.

Statistical Analyses

We used the Pearson χ^2 and Fisher exact tests to examine associations between SARS-CoV-2 test results and dichotomous or categorical demographic, symptom, and questionnaire variables. Statistical significance was set at a P level of less than .05 for all analyses. Significance testing was not conducted with staff data because of the limited number of staff who tested positive. We analyzed data with SAS software version 9.4 (SAS Institute, Cary, NC).

RESULTS

Of the 1661 incarcerated persons eligible for the mass testing events in Facility A, 1647 (99.2%) provided consent and a specimen. Among those, 502 (30.5%) tested positive for SARS-CoV-2.

Demographic characteristics and most preexisting medical conditions among those tested did not significantly differ by test result, although preexisting chronic lung disease was more common among those with positive results (Table 1).

Among the 431 incarcerated persons who tested positive and responded to symptom questions, 81.2% (n = 350) did not report experiencing symptoms (Table 1). The symptoms most frequently reported by those with a positive result were headache, runny nose, chills, and cough, all of which were reported by less than or equal to 6% of incarcerated persons. Feeling feverish and experiencing chills, loss of taste, and loss of smell were significantly more frequently reported by those with positive test results. Symptom status differed by age group (Table A, available as a supplement to the online version of this article at https://www.ajph.org).

Percent positivity varied by housing unit (range = 0.0%–58.2%; Table 2). In one third of the 12 main housing units (i.e., excluding the SHU and the laundry service unit), more than half of incarcerated persons tested positive. Housing units tested within 20 days of their first confirmed case had greater-than-50% positivity; those tested 40 or more days from their first case had a less-than-25% positivity rate (Table B, available as a supplement to the online version of this article at http://www.ajph.org). Housing units tested within 12 days of their first case had the lowest average Ct values (Units B and J; 25.3 and 26.5, respectively), indicating larger amounts of viral RNA in the specimen; those tested 20 or more days since their first case had average Ct values that ranged from 32.5 to 35.0.

Factors associated with SARS-CoV-2 transmission, including cloth face covering use, handwashing behaviors, and close contact with others, did not significantly differ by test result (Table 3; results by housing unit in Tables C and D, available as supplements to the online version of this article at http://www.ajph.org). However, more than 50% of all incarcerated persons tested reported wearing a cloth face covering for 8 hours or less daily, and close contact (within 2 feet) with someone other than a bunkmate or someone who slept nearby was reported by 63.3% of all incarcerated persons, irrespective of test result.

Of 542 prison staff, 128 (23.6%) provided consent and a specimen. Fifty (39.1%) reported working in Facility A; the remainder reported working in other facilities within the complex (Table E, available as a supplement to the online version of this article at http://www.ajph.org). One third (n = 43) reported working in housing units, 19.5% (n = 25) in administrative offices, and 12.6% (n = 16) in medical units. Among those who worked in housing units, 28 of 43 (65.1%) reported working in multiple housing units, ranging from 2 to 13.

Three (2.3%) staff tested positive. All 3 reported working in housing units (2 worked in Facility A housing units). One worked in only 1 housing unit while 2 reported working within multiple units. Two of the 3 reported experiencing symptoms associated with COVID-19. One reported fever, sore throat, headache, diarrhea, and runny nose; the other reported runny nose.

DISCUSSION

The point prevalence of COVID-19 was high among incarcerated persons within Facility A (30.5%) and varied significantly by housing unit. Available data on the number of cases within each housing unit before mass testing, dates of detection, and average Ct values of positive results suggest that units with the highest percent positivity (i.e., Units B and J) were experiencing active or more recent transmission at the time of testing, while housing units with lower percent positivity (e.g., Units D and K) had less recent transmission. Therefore, the cumulative incidence of COVID-19 in this setting may have been greater than 30.5%.

Active transmission of SARS-CoV-2 among incarcerated persons within this facility was noted despite implementation of daily symptom screenings and several infection prevention and control strategies, including isolating people who tested positive in a separate housing area, limiting interactions between housing units, promoting social distancing, and providing cloth face coverings. While most incarcerated persons reported using cloth face coverings, more than 50% reported wearing them 8 hours a day or less, despite residing in a congregate setting 24 hours a day. Education on the utility of wearing a cloth face covering within congregate settings and reminders to use them properly and as much as possible may be needed.

Furthermore, many incarcerated persons indicated that they do not wash their hands before eating, after coughing or sneezing, or after having physical contact with other individuals within the unit. Encouraging frequent hand washing, ensuring sufficient quantities of hand hygiene supplies, and intensifying cleaning and disinfection practices can help to prevent transmission of SARS-CoV-2.[7] These prevention practices are particularly important in dormitory-style housing units, where open floorplans, the lack of floor-to-ceiling walls or doors dividing bunk areas, shared living and bathroom areas, and often dense

TABLE 1— Demographics and Reported Symptoms for Incarcerated Persons From Facility A by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Test Result: Arkansas, April 29–May 15, 2020

	SARS-CoV-2 Test Result[a]			
Characteristic	**Positive, No. (%)[b]**	**Negative, No. (%)[b]**	**Total, No. (%)[b]**	***P***
Overall	502 (100)	1144 (100)	1646 (100)	
Age, y				.58
<35	100 (19.9)	237 (20.7)	337 (20.5)	
35–44	171 (34.1)	414 (36.2)	585 (35.5)	
45–54	125 (24.9)	291 (25.4)	416 (25.3)	
55–64	86 (17.1)	162 (14.2)	248 (15.1)	
≥65	20 (4.0)	40 (3.5)	60 (3.7)	
Race				.5
Black/African American	200 (39.8)	498 (43.5)	698 (42.4)	
White/Caucasian	294 (58.6)	624 (54.6)	918 (55.8)	
Asian	3 (0.6)	10 (0.9)	13 (0.8)	
Native American	5 (1.0)	12 (1.1)	17 (1.0)	
Ethnicity				.06
Hispanic	46 (9.2)	75 (6.6)	121 (7.4)	
Non-Hispanic	456 (90.8)	1069 (93.4)	1525 (92.7)	
Preexisting medical condition(s)				
Any	252 (50.2)	558 (48.8)	810 (49.2)	.6
Chronic lung disease	64 (12.8)	105 (9.2)	169 (10.3)	.028
Hypertension	195 (38.8)	431 (37.7)	626 (38.0)	.65
Diabetes	89 (17.7)	168 (14.7)	257 (15.6)	.12
Cardiovascular disease	20 (4.0)	54 (4.7)	74 (4.5)	.51
Chronic kidney disease	9 (1.8)	13 (1.1)	22 (1.3)	.29
Chronic liver disease	199 (39.6)	417 (36.5)	616 (37.4)	.22
Overall—with information on symptoms[c]	431 (100)	995 (100)	1426 (100)	
New symptoms in last 14 d[a]				.004
Asymptomatic	350 (81.2)	867 (87.1)	1217 (85.3)	
Symptomatic	81 (18.8)	128 (12.9)	209 (14.7)	
Specific symptoms[a]				
Felt feverish	11 (2.6)	5 (0.5)	16 (1.1)	.002
Chills	21 (4.9)	9 (0.9)	30 (2.1)	<.001
Loss of taste	17 (3.9)	16 (1.6)	33 (2.3)	.007
Loss of smell	19 (4.4)	22 (2.2)	41 (2.9)	.023
Muscle aches	14 (3.3)	17 (1.7)	31 (2.2)	.07
Cough (or worsening cough)	21 (4.9)	32 (3.2)	53 (3.7)	.13
Runny nose	22 (5.1)	34 (3.4)	56 (3.9)	.13
Nasal congestion	20 (4.6)	33 (3.3)	53 (3.7)	.22
Sore throat	7 (1.6)	15 (1.5)	22 (1.5)	.87
Headache	26 (6.0)	43 (4.3)	69 (4.8)	.17
Shortness of breath	8 (1.9)	17 (1.7)	25 (1.8)	.85
Nausea	4 (0.9)	2 (0.2)	6 (0.4)	.07
Vomiting	2 (0.5)	0 (0.0)	2 (0.1)	.09

Continued

TABLE 1— Continued

	SARS-CoV-2 Test Result[a]			
Characteristic	**Positive, No. (%)[b]**	**Negative, No. (%)[b]**	**Total, No. (%)[b]**	***P***
Diarrhea	6 (1.4)	17 (1.7)	23 (1.6)	.66
Abdominal pain	4 (0.9)	6 (0.6)	10 (0.7)	.5

[a] Information on incarcerated person with inconclusive test result (n = 1) is not reported.
[b] Column percent.
[c] Symptom information was not collected from incarcerated persons in 1 of the 12 standard housing units (Unit A), special housing unit, or laundry (n = 220).

populations make practicing adequate social distancing difficult. Our investigation highlighted this by finding that 63.3% of incarcerated persons reported close contact with someone other than their bunkmate or someone who slept nearby, despite the facility's attempts to promote social distancing.

Among incarcerated persons who tested positive in this investigation, 81.2% reported no symptoms. This is consistent with other reports that indicate high rates of asymptomatic or presymptomatic SARS-CoV-2 infections.[3,14–16] The large proportion of asymptomatic cases detected among incarcerated persons in this setting indicates that, if testing remained limited to symptomatic individuals, fewer cases would be detected, or detection would be delayed. Following the identification of 1 case of COVID-19 in a dormitory-style correctional setting, rapid implementation of mass testing of incarcerated persons within the housing unit may identify presymptomatic or asymptomatic cases and help interrupt transmission of SARS-CoV-2. Implementing routine screening procedures may also identify cases earlier than testing based on symptoms.

Because testing may not detect viral material in specimens collected early in the course of infection and given potential delays in receiving testing results, during which time an individual may be

TABLE 2— Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Testing Results for Incarcerated Persons From Facility A by Housing Unit: Arkansas, April 29–May 15, 2020

Housing Unit	Positive, No. (%)[a]	Negative, No. (%)[a]	Inconclusive, No. (%)[a]	N1 Ct Value for Positive Results, Mean (SD)[b]
Unit A	66 (51.6)	62 (48.4)	0 (0.0)	. . .
Unit B	61 (52.1)	56 (47.9)	0 (0.0)	25.3 (5.6)
Unit C	79 (51.6)	74 (48.4)	0 (0.0)	32.5 (3.4)
Unit D	25 (18.7)	109 (81.3)	0 (0.0)	33.4 (3.3)
Unit E	20 (21.3)	74 (78.7)	0 (0.0)	33.4 (2.8)
Unit F	62 (43.7)	80 (56.3)	0 (0.0)	33.5 (2.7)
Unit G	36 (27.3)	95 (72.0)	1[c] (0.7)	34.4 (3.1)
Unit H	30 (23.6)	97 (76.4)	0 (0.0)	34.6 (2.1)
Unit I	11 (9.1)	110 (90.9)	0 (0.0)	. . .
Unit J	82 (58.2)	59 (41.8)	0 (0.0)	26.5 (5.5)
Unit K	25 (19.7)	102 (80.3)	0 (0.0)	35.0 (2.4)
Unit L	0 (0.0)	139 (100.0)	0 (0.0)	. . .
Special housing unit	0 (0.0)	76 (100.0)	0 (0.0)	. . .
Laundry service unit	5 (31.3)	11 (68.8)	0 (0.0)	. . .
Total	502 (30.5)	1144 (69.5)	1 (0.1)	. . .

Note. Ct = cycle threshold.

[a] Row percent.
[b] Ct values are only available for specimens processed in the Centers for Disease Control and Prevention's COVID-19 surge diagnostic testing laboratory.
[c] Individual with inconclusive results was unable to be retested.

TABLE 3— Factors Associated With Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Transmission Among a Subset of Incarcerated Persons From Facility A by Test Result: Arkansas, April 29–May 15, 2020

	SARS-CoV-2 Test Result[a]			
Characteristic	**Positive, No. (%)[b]**	**Negative, No. (%)[b]**	**Total, No. (%)[b]**	**P**
Overall—cloth face covering use[c]	431 (100)	995 (100)	1426 (100)	
Hours per day cloth face covering was worn				.96
0–3	107 (25.1)	257 (26.1)	364 (25.8)	
4–8	137 (32.2)	317 (32.2)	454 (32.2)	
9–12	75 (17.6)	175 (17.8)	250 (17.7)	
> 12	107 (25.1)	236 (24.0)	343 (24.3)	
Overall—all other behaviors[d]	165 (100)	239 (100)	404 (100)	
Times per day hands are washed				.59
0–9	33 (20.4)	56 (23.7)	89 (22.4)	
10–19	74 (45.7)	110 (46.6)	184 (46.2)	
> 19	55 (34.0)	70 (29.7)	125 (31.4)	
Specific times when hands are washed				
Before eating	92 (55.8)	134 (56.1)	226 (55.9)	.95
Before touching face	78 (47.3)	103 (43.1)	181 (44.8)	.41
After touching a common phone	136 (82.4)	193 (80.8)	329 (81.4)	.67
After touching a computer	134 (81.2)	191 (79.9)	325 (80.5)	.75
After coughing or sneezing	109 (66.1)	169 (70.7)	278 (68.8)	.32
After touching another person	94 (57.0)	127 (53.1)	221 (54.7)	.45
After using the bathroom	162 (98.2)	235 (98.3)	397 (98.3)	> .99
After touching dirty laundry	101 (61.2)	158 (66.1)	259 (64.1)	.31
After working	98 (59.4)	128 (53.6)	226 (55.9)	.25
Never	1 (0.6)	1 (0.4)	2 (0.5)	> .99
Near anyone in the last 2 weeks who had a fever, cough, trouble breathing, or appeared sick				.82
Yes	46 (27.9)	63 (26.4)	109 (27.0)	
No	76 (46.1)	107 (44.8)	183 (45.3)	
Unsure	43 (26.1)	69 (28.9)	112 (27.7)	
Spent time closer than 2 feet from anyone other than bunkmate or someone that sleeps nearby				.59
Yes	99 (60.4)	156 (65.3)	255 (63.3)	
No	51 (31.1)	64 (26.8)	115 (28.5)	
Unsure	14 (8.5)	19 (8.0)	33 (8.2)	

[a] Information on incarcerated person with inconclusive test result (n = 1) is not reported.

[b] Column percent.

[c] Information on cloth face covering use was not collected from incarcerated persons in Unit A, special housing unit, or laundry (n = 220). Fifteen incarcerated persons did not report hours per day that the cloth face covering was worn.

[d] All other behavior questions were only asked during mass testing in 3 housing units: Units B, C, and D (n = 404). The following questions had missing responses: times per day hands were washed (n = 6); spent time closer than 2 feet from anyone other than bunkmate or someone that sleeps nearby (n = 1).

exposed or expose others, facilities should consider retesting those who initially test negative for SARS-CoV-2 to interrupt transmission.[17] This strategy has been used to increase detection of SARS-CoV-2 infections in correctional and detention facilities[16] and other congregate settings.[3,15,18] Repeat viral testing of previously negative incarcerated persons may be considered every 3 to 7 days until no new SARS-CoV-2 infections are detected for at least

14 days.[17,19] In addition, continual testing on intake and quarantining those who test negative before release into the general incarcerated population is needed to prevent introduction of SARS-CoV-2 into the facility.[7] Likewise, allowing individuals to go through a 14-day release quarantine and testing before release into the general public can help to prevent spread from the correctional facility to the general public.[7]

Only 23.6% of staff volunteered to be tested during the mass testing events described here. Anecdotal evidence provided by staff at the facility indicated that participation in testing may have been low because testing positive for SARS-CoV-2 would have excluded a staff member from work. This likely resulted in self-selection bias among staff. While prevalence among staff tested was low (2.3%), only 39.1% of staff who participated reported working in Facility A where the outbreak was detected. Staff working within correctional facilities are estimated to have the second-highest risk of occupational exposure to infection and disease in the country, preceded only by health care workers.[20] Had more Facility A staff participated in testing, particularly those with work duties that put them in closer proximity to incarcerated persons for longer periods of time, including staff working within housing and medical units, prevalence may have been higher.

Despite low prevalence among the limited number of staff tested, all staff who tested positive in this investigation worked inside correctional housing units (2 worked in multiple units). Thus, the risk of transmission within the facility and between the facility and the community through staff remains a concern. In this investigation, more than half of staff who participated and reported working in housing units responded that they had worked in multiple housing units over the past 5 days. Facilities should consider designating staff to work in specific housing units to prevent transmission between units.[7] In addition, prevention practices, including conducting daily temperature and symptom screenings, encouraging the proper use of and making readily available appropriate personal protective equipment,[7] ensuring access to soap and encouraging frequent hand washing, providing disinfectants, and encouraging social distancing as work duties allow are needed to mitigate the spread of SARS-CoV-2 between the surrounding communities and correctional facilities. While some employers cannot legally mandate SARS-CoV-2 testing for staff, employers may encourage staff testing (beyond testing only close contacts) as part of a broad testing strategy if there is concern for widespread transmission, or to reduce the chance of a large outbreak, following identification of a confirmed case.[17]

Limitations

This investigation had several limitations. First, staggered testing among incarcerated persons in different housing units makes establishing an overall point prevalence difficult. Point prevalence within each housing unit is likely more accurate than the overall point prevalence within the facility. Second, because we did not test for SARS-CoV-2 antibodies, it is unknown if housing units that identified cases earlier and had a lower point prevalence during viral testing had previously experienced high rates of infection. Future investigations should include both viral and antibody tests to obtain a better understanding of how SARS-CoV-2 moves through congregate settings. Third, questionnaires could not be distributed during testing in all housing units; thus, symptom data are missing for some incarcerated persons tested. This may have led to an over- or underestimate of asymptomatic cases.

Fourth, symptom status was not reevaluated following testing, which prevented us from distinguishing between asymptomatic or presymptomatic infection. Fifth, because testing was voluntary, selection bias likely occurred among staff who participated; this prevented us from assessing prevalence among all staff. Sixth, because the initial data were collected as part of a public health response, different testing modalities were utilized to obtain results as efficiently as possible. Current literature indicates the sensitivity and specificity of each test is thought to be relatively high[21–25]; therefore, the different testing modalities were not thought to have had a significant effect on the results. Despite these limitations, lessons learned from this investigation can inform testing and infection prevention and control strategies in other dormitory-style correctional facilities and potentially other congregate settings, such as college dormitories and military barracks.

Public Health Implications

SARS-CoV-2 can spread rapidly after introduction into dormitory-style correctional facilities. In our investigation, housing units tested within 20 days of their first confirmed case had greater than 50% positivity and units tested within 12 days of their first case had the lowest average Ct values (25.3 and 26.5). In addition, the large proportion of asymptomatic cases identified in this investigation provides evidence for expanding testing beyond symptomatic individuals in this type of setting. After the identification of at least 1 COVID-19 case in a dormitory-style correctional facility housing unit, rapid implementation of mass testing of incarcerated persons and staff may identify additional cases and help interrupt transmission of SARS-CoV-2.

We also discuss infection prevention and control measures and other strategies that could slow SARS-CoV-2 transmission in this correctional facility and, more broadly, in other similar settings. Retesting of those who initially tested negative may be considered, and infection prevention and control measures should continue to be strictly enforced throughout the facility, regardless of whether there have been recent known cases in a housing unit, to interrupt transmission of SARS-CoV-2 in this setting.

The findings of this investigation can be used by correctional and detention facility officials, public health officials, and other key stakeholders to prepare for potential SARS-CoV-2 transmission and, if introduced, to prevent the spread of SARS-CoV-2 within correctional and detention facilities or other similar settings.

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The authors have no conflicts of interest to disclose.

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The investigation was reviewed by the CDC and was determined to be public health surveillance in accordance with US Department of Health and Human Services, Title 45 Code of Federal Regulations 46, Protection of Human Subjects.

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COVID-19 Contact Tracing Conundrums: Insights From the Front Lines

John Schneider, MD, PhD, Willie Love, BS, Laura Rusie, ScM, Ariana Flores, MA, Beth Tadesse, MPH, Anu Hazra, MD, and David Munar, BS

See also Perry, p. 778.

COVID-19 contact tracing is an induction social network intervention in which the structure of the social network is leveraged to deploy proven COVID-19 interventions such as testing and social distancing. The Howard Brown Health organization has rapidly expanded to include COVID-19 testing, contact tracing, and linkage to resources since the first cases were identified in Chicago, Illinois. COVID-19 is penetrating the most vulnerable networks in the United States; existing inequities are widening as community resources and organizations have had to place services on hold.

Here we address several questions that arise as organizations build capacity for contact tracing, including questions involving the potential impact of contact tracing, stakeholders who could be involved, the timing of contact tracing deployment, and the impact potential for digital technology.

Contact tracing is critical at later stages of epidemic decline given the potential for isolated outbreaks as larger events, schools, stadiums, and festivals reopen. Local contact tracing efforts can have other indirect benefits with respect to limiting transmission, such as increasing testing rates and addressing structural barriers through provision of life-saving resources and access to crucial social support. (*Am J Public Health*. 2021;111:917–922. https://doi.org/10.2105/AJPH.2021.306200)

The end of April 2020 marked the rapid escalation of contact tracing at the local, regional, and federal levels to decrease the rate of SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) transmission and the number of COVID-19 cases. Partners for Health, for example, was one of the first agencies to develop a robust contact tracing plan, partnering with the Massachusetts COVID-19 Community Tracing Collaborative and the Massachusetts Department of Public Health.[1,2] Similarly, the National Opinion Research Center, a prominent survey research organization, launched time-sensitive contact tracing efforts in Delaware and Maryland.[3,4]

Several of these early adopters used guidelines and training methodologies for contact tracing created by the Association of State and Territorial Health Officials and Johns Hopkins University.[5,6] The Centers for Disease Control and Prevention has designated $10.25 billion toward COVID-19 resources through the Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases agreement, which includes scalable contact tracing of confirmed or suspected cases of COVID-19.[7,8]

Until very recently, contact tracing remained underdeveloped for much of the nation. As several sites move toward growing this work, lessons can be learned from the vantage point of Howard Brown Health (HBH), an early adopter of COVID-19 contact tracing. HBH, a federally qualified health center located in Chicago, Illinois, has rapidly expanded its services and service areas to include COVID-19 testing and linkage to resources in areas with long-standing disinvestment and racialized policies. COVID-19 contact tracing was initiated when the first HBH patient was diagnosed at the organization on March 13, 2020.

As an early adopter, HBH was faced with difficult questions around the legitimacy and effectiveness of contact tracing; we have organized this article to address these concerns. We also define several significant questions that should be addressed by government and partnering agencies that are rapidly scaling up contact tracing in the United States to mitigate the COVID-19 pandemic.

PURPOSE OF COVID-19 CONTACT TRACING

From our experience, we see 3 clear objectives of contact tracing. First, the main function of contact tracing is to interrupt transmission of SARS-CoV-2 within social networks. COVID-19 contact tracing is an induction social network intervention in which the structure of the social network is leveraged to deploy proven COVID-19 interventions such as testing and social distancing.[10] During stay-at-home orders, HBH found that more than 70% of household members linked to an index case patient had either a COVID-19 diagnosis or symptoms of COVID-19 (HBH, unpublished data, 2020). People located outside index case patients' homes were significantly less likely to contract or demonstrate symptoms of COVID-19 (HBH, unpublished data, 2020). Household network clusters and bridges to other network clusters require immediate intervention to diminish transmission to other connected networks.[9,10]

The second function of contact tracing is to check in with index clients diagnosed with COVID-19. Misinformation and bias pertaining to COVID-19 are common in widely accessed social and news media.[11] This can result in problematic decision-making that is not informed by medical professionals and COVID-19 experts. Currently there is no standardized protocol for health care providers to deliver comprehensive education about SARS-CoV-2 transmission, the role of self-quarantine, or the significance of symptom duration to their immediate networks during the testing encounter. High-demand testing facilities are often hurried, with staff working over capacity to satiate the need for testing, making it difficult to have these conversations.[12]

Test results can create network microshocks that require ongoing consultation and guidance from health professionals to address and alleviate client anxiety. More than 70% of clients contacted by HBH contact tracers continue to have basic questions about COVID-19 transmission, which can exacerbate underlying anxiety, depression, or obsessive–compulsive tendencies (HBH, unpublished data, 2020).

Third, we have found that COVID-19 is penetrating the most vulnerable networks in poor, underserved, stigmatized, and marginalized communities. In Chicago and around the United States, Black and Brown communities experience structural barriers attributable to poverty, housing instability or homelessness, food insecurity, and lack of access to basic health care. The COVID-19 pandemic has only widened these existing inequities, as community resources and organizations have had to place services on hold to follow Centers for Disease Control and Prevention guidelines.[13] Although Black individuals in Illinois account for only approximately 14% of the population, they accounted for 23% of positive cases and 30% of COVID-related deaths in May 2020.[14] We still do not have a complete picture of how COVID-19 affects marginalized groups, as many of these groups are unable to access health care services as a result of their disenfranchisement.[12–14]

Immigrant populations have been especially vulnerable during this time, fearful that accessing COVID-19-related services could affect their opportunity to gain permanent residency.[15] Incidents of US Immigration and Customs Enforcement obtaining testing rosters to facilitate raids, many of which were conducted during stay-at-home orders, prevent at-risk undocumented populations from receiving testing or treatment.[16] In July 2020, Immigration and Customs Enforcement confirmed 3000 positive cases of COVID-19 in detention centers across the country; despite the increasing number of positive cases, the agency continues to transport undocumented immigrants to detention centers across the United States and to other countries such as Haiti, El Salvador, and Honduras.[16,17] A tailored public health approach to marginalized groups is necessary, and contact tracing has the potential to provide access to systems and structures that, when resourced properly, can provide needed services and social support.

DEPLOYING COVID-19 CONTACT TRACING

At the individual level, COVID-19 contact tracing should be deployed as early as possible to have the greatest impact in limiting further transmission events.[7] Transmission rate studies estimate that peak transmissibility occurs 1 day before symptom onset, but the infectious period can begin approximately 2 days prior to symptoms appearing.[18] Public health agencies and organizations should work to isolate incidents earlier than the current standard to decrease transmission rates.[19] However, contact tracing outside the 10-day transmission period is still beneficial in reducing transmission as a result of network dynamics and, in particular, network changes that can result from awareness of test results.[19]

Ideally, contact tracing would start at the time of the exposure or transmission event (Figure 1); however, tracing at the time of exposure is nearly impossible. The next potential contact tracing initiation would occur at symptom onset or, for an asymptomatic individual with a potential COVID-19 exposure, the testing event. Contact tracing initiation typically occurs too late in the progression of COVID-19, starting a week or more after onset, making it difficult to interrupt transmission events.[5,6]

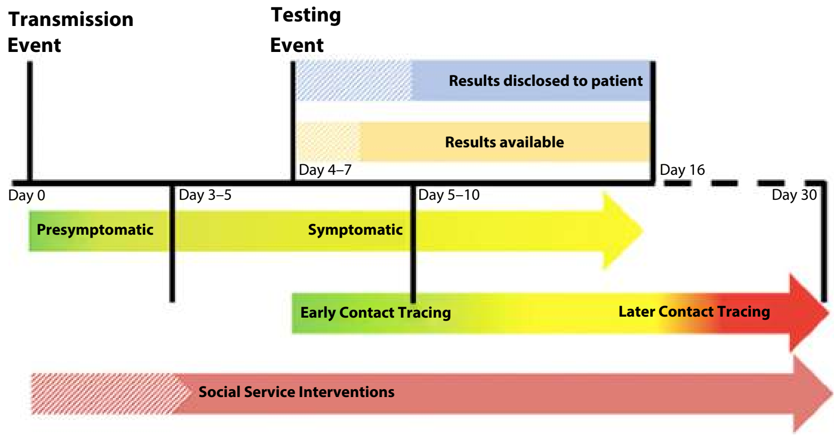

FIGURE 1— Howard Brown Health COVID-19 Contact Tracing Timeline: Chicago, IL, 2020–2021

One HBH testing site with a 60% positivity rate began piloting presumptive contact tracing before or immediately after sample collection among symptomatic clients and before a result is known (Figure 1; HBH, unpublished data, 2020). Presumptive contact tracing is an untested approach aimed at initiating contact tracing earlier in the continuum to reduce transmission events and rates, but such tracing requires adequate resources in communities with high prevalence. Despite resource limitations, delayed contact tracing can still be beneficial and even more so if network members are engaged in testing and isolation.

Finally, at a macro level, contact tracing can be deployed at all phases of an epidemic. As the United States continues to combat COVID-19 transmission, the importance of trusted leaders in persuading communities to engage in early tracing efforts will be fundamental in halting further outbreaks, as seen in other countries around the world.[20] During the Ebola crisis of 2014–2015, enlisting local leaders was an approach that helped to build a trusting relationship between public health officials and the community, and this effort had a positive impact on uptake of interruption interventions.[21] Local leaders to whom communities can relate can bolster feelings of shared identity and foster in-group assurance and adherence to public health recommendations.[22] Contact tracing is critical at later stages of epidemic decline given the potential for isolated outbreaks as larger events, schools, stadiums, and festivals reopen and increase the need for outbreak cluster investigations.

PERFORMING COVID-19 CONTACT TRACING

At a macro level, an important balance between local contact tracing efforts and testing and community engagement should be achieved. Local organizations performing COVID-19 testing can minimize the delay from the test to initiation of contact tracing, possibly the most important variable in COVID-19 contact tracing success. If larger organizations, including health departments, are to minimize delays, they will have to match local organizations in providing up-to-date information on testing sites and availability, supportive resources, and a process for obtaining said resources.

At HBH, more than 30% of individuals testing positive for COVID-19 report food insecurity, housing instability, and a need for health insurance or employment (HBH, unpublished data, 2020). HBH offers many of these services internally, providing a seamless referral process that can have the secondary benefit of promoting collaborative trust within existing COVID-19 transmission networks. However, local contact tracing efforts are often underresourced and serving at their maximum capacity, limiting their reach and impact in high-prevalence communities.[12] Federally qualified health centers in affected communities in Chicago have been underresourced for decades and usually do not have prior contact tracing experience. As a result, these centers have been late adopters of the basic prerequisites required for contact tracing (e.g., provision of COVID-19 testing).

HBH has moved quickly to hire temporary workers and transition sexual health contact tracers (35 full-time tracers and 60 volunteer tracers) to COVID-19 contact tracing, ensuring that the organization has the capacity to appropriately engage the 2900 positive index clients and associated 5100 network members in contact tracing (HBH, unpublished data, 2020). In addition, HBH has trained more than 50 bilingual contact tracers, including individuals from the Latino Medical Student Association, foreign medical graduates, and temporary employees through a local hiring firm (HBH, unpublished data, 2020).

One of the strengths of larger health department entities is their authority and ability to mobilize resources during large outbreaks and engage in active monitoring of outbreak investigations.[23] Local organizations could complement these efforts by gaining trust from the public, particularly in cases in which communities have experienced marginalization and harm from governmental or affiliated institutions.

As shown in Figure 1, social services are a critical component of contact tracing efforts and mitigation of long-term effects on patients. Social services can offer a variety of types of support (e.g., meal delivery, child care, general health services), but services in the communities most affected by COVID-19 are often not sufficiently funded or resourced to manage demands.[15] According to the Nonprofit Finance Fund, 60% of social service organizations are facing long-term financial hardship, 56% report limited staff availability, and beginning in March 2020 their demand for service increased by 25%.[14] Crucial social service organizations are struggling to keep their doors open because of rapid increases in need.[14,24] Contact tracing efforts cannot exist without concurrent delivery of social services to help mitigate the impact of transmission; funders of social service organizations need to consider awarding less restrictive funds to allow for organizations to pay employee salaries, rent, and other overhead costs so that they can keep their necessary services running.[24]

INNOVATING WITH ADVANCED SMARTPHONE TECHNOLOGY

In a highly publicized joint venture, Apple and Google have proposed a tracking app, Proximity, that will "combat the virus and save lives."[25] This comes on the heels of South Korea and Singapore's TraceTogether, a GPS-based app that notifies community members when they are in proximity to a case patient.[26] Reports on TraceTogether's efficacy have been of great interest to the Western world given the app's capacity to alert community members to a COVID-19 exposure through cutting-edge Bluetooth technology.[26] Although these 2 app programs are well intentioned, there are several fundamental barriers to their bending the curve relative to COVID-19 contact tracing as described here.

First, it is challenging to achieve the correct balance of sensitivity and specificity to drive health behaviors. High sensitivity could generate more noise and limit behavior change such as social distancing or self-isolation. This, combined with limited specificity, can create an atmosphere that generates more anxiety, which could be counterproductive and spread misinformation.[7,11] Second, and most important, it is unclear what sort of penetration these 2 apps, which require voluntary self-reports, would achieve across affected communities. At HBH, the majority of individuals reporting stigma as a result of COVID-19 are Black and Latinx (HBH, unpublished data, 2020). High levels of medical and government mistrust attributable to national policies, particularly among undocumented clients, would be an important concern to address; concerns about state surveillance would limit engagement in such tracking interventions.[12,15–17]

Finally, Singapore and South Korea have robust national health care programs that are equipped with key health data systems and can quickly adapt to local conditions and merge with other available data sources in real time.[27] In addition, variations in cultural norms and expectations between the United States and Singapore and South Korea should be considered. Both Eastern countries value collectivism and prioritize the health and safety of the community, such as maintaining herd immunity, over personal desires.[27–29] The United States could benefit not from increasing technology to address COVID-19 but by first ensuring the prioritization of the public health system and of scientifically driven COVID-19 prevention and treatment approaches.

POTENTIAL IMPACT

Although challenging to evaluate, contact tracing has been found to be effective in limiting onward transmission of COVID-19 in early reports.[30] Successful contact tracing is elicitation of relevant network members including household members and those who bridge to other households or networks. In network transmission by visualization, infectious diseases are often assumed to be linear such that spread will have occurred several steps away by the time an intervention is deployed.[31] Rather, transmission often resembles clusters of individuals and includes multiple triads.[32] It is crucial to stay ahead of transmission through identifying and intervening with bridging network members. Intervening with one member of a triad can have an impact on the other members as well as other connections linked to the triad.[6,7]

When contact tracing is conducted rapidly (Figure 1), HBH has found that 70% of close contacts are either positive or have symptoms consistent with COVID-19 (HBH, unpublished data, 2020). This leaves an opportunity to prevent 30% of potential infections and, with a case fatality rate of 1% in the case of HBH, equates to a potential saving of at least 18 lives from initiating tracing for 2000 individuals (HBH, unpublished data, 2020). The challenge is the first step in the contact tracing continuum, eliciting partners, with only 50% of index clients having at least one partner elicited. However, reaching contacts of index case patients has proven difficult (HBH, unpublished data, 2020). Contact tracers who penetrate networks to the second and third degrees, of course, would have a greater chance of limiting onward transmission.[7]

HBH has interrupted many potential transmission events, including an asymptomatic household member about to be sent to another household, a relative about to visit a positive network member who experienced stigma and did not want to disclose, and an asymptomatic but positive person attending a large gathering of older adults (HBH, unpublished data, 2020). HBH has also provided corrective advice on merging family networks during holiday weekends (HBH, unpublished data, 2020). Communicating appropriately tailored health messages that correct misinformation and affirm community are necessary to complement any COVID-19 testing intervention. The World Health Organization declared the pandemic an “infodemic,” defining misinformation as “cases in which people’s beliefs about factual matters are not supported by clear evidence and expert opinion.”[33,34] Engaging at-risk networks through contact tracing allows for individuals to receive accurate and up-to-date information from reliable health organizations.

These COVID-19 contact tracing lessons from the frontlines, ongoing professional guidance, and prevention of misinformation will be key to reopening schools, large events, and even a robust meat packing industry. Contact tracing can help us understand when protective measures should be reinitiated in the context of relaxation as well as when public health systems should intervene with respect to social distancing and other measures related to personal protection.[5–7] Contact tracing can be applied in all phases of an epidemic: early on to halt the epidemic before generalized community spread can occur, during a surge to help flatten the curve by having contacts isolate and quarantine, and as the epidemic declines to mitigate sporadic outbreaks that may occur. Finally, we again emphasize the importance of local contact tracing efforts. In addition to their primary focus, these efforts have indirect benefits in terms of limiting onward transmission such as increasing testing rates, offering life-saving resources, and providing access to crucial social support.

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Critical Care Requirements Under Uncontrolled Transmission of SARS-CoV-2

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Objectives. To estimate the critical care bed capacity that would be required to admit all critical COVID-19 cases in a setting of unchecked SARS-CoV-2 transmission, both with and without elderly-specific protection measures.

Methods. Using electronic health records of all 2432 COVID-19 patients hospitalized in a large hospital in Madrid, Spain, between February 28 and April 23, 2020, we estimated the number of critical care beds needed to admit all critical care patients. To mimic a hypothetical intervention that halves SARS-CoV-2 infections among the elderly, we randomly excluded 50% of patients aged 65 years and older.

Results. Critical care requirements peaked at 49 beds per 100 000 on April 1—2 weeks after the start of a national lockdown. After randomly excluding 50% of elderly patients, the estimated peak was 39 beds per 100 000.

Conclusions. Under unchecked SARS-CoV-2 transmission, peak critical care requirements in Madrid were at least fivefold higher than prepandemic capacity. Under a hypothetical intervention that halves infections among the elderly, critical care peak requirements would have exceeded the prepandemic capacity of most high-income countries.

Public Health Implications. Pandemic control strategies that rely exclusively on protecting the elderly are likely to overwhelm health care systems. (*Am J Public Health*. 2021;111:923–926. https://doi.org/10.2105/AJPH.2020.306151)

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The prevailing epidemiological view is that a sustainable plan for the COVID-19 pandemic requires 2 components: measures to protect vulnerable groups, including the elderly, and measures to control viral transmission in the entire population. The most extreme example of the latter measures are lockdowns, such as those instituted worldwide in spring 2020, to suppress infections to low levels, avoid the collapse of the health care system, and prepare countries to better control transmission after a lockdown. This view has been summarized in the John Snow Memorandum.[1]

The resurgence of SARS-CoV-2 in fall 2020 has led to new rounds of lockdowns, especially where systems for adequate pandemic control were not developed after the original lockdown. The resulting frustration and economic uncertainty have reawakened proposals, as summarized in the Great Barrington Declaration,[2] to pursue "herd immunity" through natural infection. The idea is to protect individuals at the highest risk for dying of COVID-19 while allowing those at low risk to resume their normal lives to build up immunity to the virus through natural infection, something that would eventually protect the vulnerable.[2] The American Public Health Association and other public health groups have warned against this proposal[3] because young people cannot be effectively isolated from the rest of society, natural infection may not provide lasting immunity,[4] and many young people suffer serious diseases, have long-term sequelae, or die after SARS-CoV-2 infection.

An understudied implication of the herd immunity proposal is its potential to overwhelm the health care system, which happened when SARS-CoV-2 was uncontrolled in spring 2020.[5] In places with seroprevalence was greater than 10% during the first months of the pandemic, such as Madrid, Spain, admissions to an intensive care unit (ICU) were reported to surpass prepandemic capacity.[6] Yet it is not precisely known what ICU capacity would have been required to care for COVID-19 patients in a setting of unchecked SARS-CoV-2 transmission if protection measures aimed at the vulnerable had been in place.

We used electronic health records from a large teaching hospital in Madrid to identify critical cases between February 28 and April 23, 2020, regardless of whether they were actually admitted to an ICU. We then estimated the number of ICU beds that would have been required to admit all critical cases with and without a hypothetical intervention to protect the elderly.

METHODS

Our study included 2432 individuals aged 16 years and older who were admitted with a COVID-19 diagnosis to La Paz University Hospital in Madrid for 24 hours or longer between February 28 and April 23, 2020. The Madrid region is divided into 15 health districts, each assigned to a major hospital. The catchment area of La Paz University Hospital encompasses 527 000 people (18.7% of them aged 65 years or older). During the study period, all Madrid hospitals were overwhelmed and could not admit patients from outside their catchment area.

La Paz University Hospital routinely maintains 30 medical ICU and 10 cardiac ICU beds, in line with the average 9.7 critical care beds per 100 000 adults in Spain[7] and most European countries (this is higher than in, e.g., England [10.5] and Italy [2.5], but lower than in, e.g., Germany [33.9] and the United States [25.8]).[7] The prepandemic average ICU occupancy in Spain was about 70%,[8] that is, an influx of COVID-19 patients greater than 30% of prepandemic capacity would strain the health care system.

In the absence of other clinical criteria supporting nonadmission, inpatients were admitted to the ICU for possible invasive mechanical ventilation when they had a capillary oxygen saturation of less than 90% (an arterial partial pressure of oxygen of approximately < 60 mmHg) despite being on a reservoir (e.g., nonrebreather) mask or noninvasive mechanical ventilation. We defined COVID-19 inpatients as needing critical care when they were either (1) admitted to an ICU, or (2) not admitted to an ICU but had at least 2 recorded saturation measurements less than 90% while on a reservoir mask or on noninvasive mechanical ventilation.

To estimate the number of ICU beds that would have been needed to admit all critical care patients, we conservatively assumed that 5 beds per 100 000 (about two thirds of the usual occupancy) would have been occupied by non–COVID-19 patients throughout the study period and that critical care patients not admitted to the ICU would have stayed at the ICU an average of 12 days until discharge or death,[9–11] had they been admitted.

To estimate the number of ICU beds that would have been needed under a hypothetical intervention that would somehow prevent half of SARS-CoV-2 infections in the elderly, we repeated our calculations after randomly excluding 50% of patients aged 65 years or older. We used the 2.7 and 97.5 percentiles of a nonparametric bootstrap with 300 samples to quantify the uncertainty attributable to the random exclusion of patients.

RESULTS

Of 2432 patients (57.1% aged 65 years or older) admitted to La Paz University Hospital with a COVID-19 diagnosis between February 28 and April 23, 2020, 243 (41.9% aged 65 years or older) were admitted to an ICU and an additional 69 met our criteria for critical care, for an estimated total of 312 patients (54.5% aged 65 years or older) requiring ICU admission.

The estimated number of ICU beds that would have been required to admit all critical care patients in the hospital's catchment area during the study period peaked at 49 beds per 100 000 on April 1—2 weeks after the start of a national lockdown (Figure 1a). The estimated peak would have been 39 (37–40) beds per 100 000 if a hypothetical intervention had decreased infections in the elderly by half (Figure 1b).

Figure A (available as a supplement to the online version of this article at http://www.ajph.org) represents ICU bed peak requirement estimates when using an 18-day ICU stay (the reported average stay for admitted patients during the study period) for nonadmitted critical care patients.

DISCUSSION

The peak ICU requirements in Madrid under uncontrolled transmission of SARS-CoV-2 were about fivefold higher than prepandemic capacity. Faced with this extraordinary demand, hospitals increased critical care capacity more than threefold by temporarily reallocating beds in coronary, surgical, and other units.[6] Despite this massive effort, demand outpaced ICU capacity. In fact,

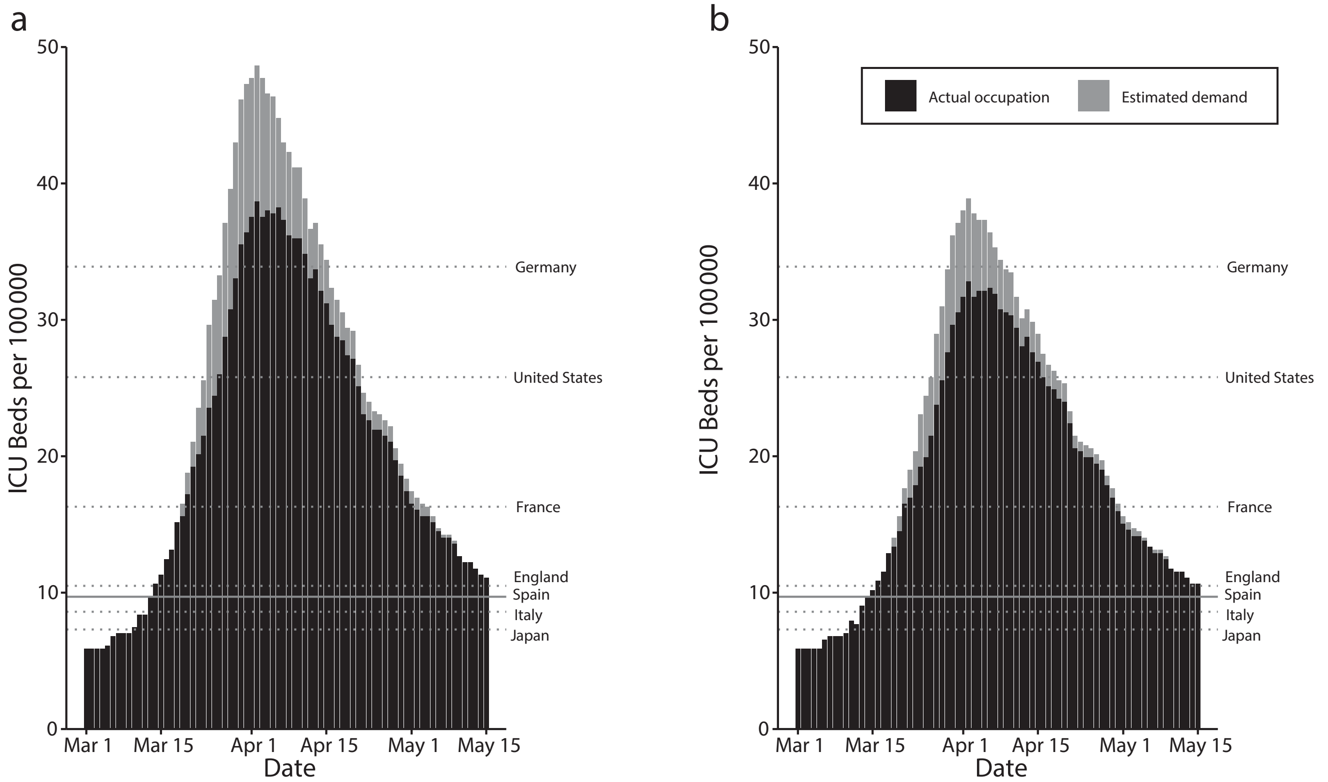

FIGURE 1— Estimated Number of Intensive Care Unit (ICU) Beds Required to Admit All Patients Requiring Critical Care in the Catchment Area of La Paz University Hospital (a) Under No Hypothetical Interventions, and (b) Under a Hypothetical Intervention That Reduces SARS-CoV-2 Infection by Half in Individuals Aged 65 Years or Older: Madrid, Spain, February 28–April 23, 2020

Note. Horizontal lines show ICU capacity in selected countries. A general lockdown was implemented in Madrid on March 14, 2020.

this level of ICU demand would have exceeded the prepandemic capacity of any developed country.

When we considered a hypothetical intervention—not yet specified by proponents of the herd immunity approach—that halved infections in the elderly, the estimated peak ICU demand would have been more than threefold higher than usual capacity. This ICU demand is still beyond the usual capacity of most countries, and even those with the highest number of ICU beds per capita would need to substantially expand capacity to preserve care not related to COVID-19.

Note that our analysis is likely to underestimate critical care requirements. Our estimate of 12.7% hospitalized patients requiring ICU admission is in the lower range of those reported elsewhere.[9–11] Also, although sole reliance on capillary oxygen saturation to determine the need for critical care may slightly overestimate ICU bed needs, our overall estimates are still conservative because (1) they are based on shorter than reported average duration of ICU stays and non–COVID-19 occupancy, (2) we excluded 162 patients who had just 1 recorded saturation greater than 90% while on a reservoir mask or noninvasive mechanical ventilation, and (3) we did not consider nonhospitalized COVID-19 patients. Our results can inform decision makers from dense metropolitan areas such as Madrid, but replication studies are required to clarify to what extent these estimates can be transported across settings.

PUBLIC HEALTH IMPLICATIONS

With more than 80% of the population still unexposed to SARS-CoV-2 in most countries and in the absence of effective treatments for COVID-19, pandemic control strategies that rely exclusively on protection of the elderly would overwhelm the health care system. AJPH

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CONTRIBUTORS

G. Martínez-Alés, A. Domingo-Relloso, M. Quintana-Díaz, and M. A. Hernán designed the analyses. G. Martínez-Alés and M. Quintana-Díaz acquired the data. G. Martínez-Alés and M. A. Hernán conceptualized the study and drafted the brief. A. Domingo-Relloso processed the data and implemented the analyses. All authors contributed to study design and interpretation of results and reviewed, revised, and approved the brief.

CONFLICTS OF INTEREST

The authors report no conflicts of interest relevant to this study.

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HUMAN PARTICIPANT PROTECTION

This study was approved by the La Paz University Hospital's institutional review board.

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Family Health Strategy, Primary Health Care, and Social Inequalities in Mortality Among Older Adults in Bagé, Southern Brazil

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See also Miles, p. 762, and Galea and Vaughan, p. 787.

Objectives. To investigate the role of the Family Health Strategy (FHS) in reducing social inequalities in mortality over a 9-year follow-up period.

Methods. We carried out a population-based cohort study of individuals aged 60 years and older from the city of Bagé, Brazil. Of 1593 participants at baseline (2008), 1314 (82.5%) were included in this 9-year follow-up (2017). We assessed type of primary health care (PHC) coverage and other variables at baseline. In 2017, we ascertained 579 deaths through mortality registers. Hazard ratios and their 95% confidence intervals modeled time to death estimated by Cox regression. We also tested the effect modification between PHC and wealth.

Results. The FHS had a protective effect on mortality among individuals aged 60 to 64 years, a result not found among those not covered by the FHS. Interaction analysis showed that the FHS modified the effect of wealth on mortality. The FHS protected the poorest from all-cause mortality (hazard ratio [HR] = 0.59; 95% confidence interval [CI] = 0.36, 0.96) and avoidable mortality (HR = 0.46; 95% CI = 0.25, 0.85).

Conclusions. FHS coverage reduced social inequalities in mortality among older adults. Our findings highlight the need to guarantee universal health coverage in Brazil by expanding and strengthening the FHS to promote health equity. (*Am J Public Health*. 2021;111:927–936. https://doi.org/10.2105/AJPH.2020.306146)

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Socioeconomic inequalities in mortality are a major public health issue because the associated burden is on a grand scale[1] and persists at older ages.[1–3] Monitoring the magnitude of socioeconomic inequalities in mortality among older adults has become even more important because of worldwide population aging.[2] Such inequalities indicate the need for improvements in life expectancy among lower socioeconomic groups[2] as well as policies that address both social and medical determinants of health.[4,5]

Policies toward universal public health systems[5] framed by the values and principles of primary health care (PHC) represent the main strategy to achieve the World Health Organization's stated goal of health for all.[6] PHC was introduced in the Brazilian public health system during the 1980s and implemented after the creation of the Unified Health System (Sistema Único de Saúde [SUS]), which made considerable progress toward delivering universal and comprehensive health care during the last 30 years.[7] During the 1990s, the Family Health Strategy (FHS) was developed to reorganize and restructure the health system, aiming to strengthen primary care.[7–9]

The FHS has multidisciplinary teams, including community health workers, that are responsible for meeting the heath care needs of approximately 1000 households in a defined geographical area.[10,11] By contrast, traditional primary health care (TPHC) teams do not have a fixed structure; contain more medical professionals, sometimes including specialists such as pediatricians, obstetricians, and gynecologists; do not serve a defined number of families or geographical area; and do not usually include community health workers.[9] TPHC focuses on specific diseases, dispenses curative care, and acts on emerging demands, with little ability to solve health problems related to family and social issues[9]; on the other hand, the FHS delivers a range of services, including acute care, comprehensive and longitudinal health care, risk factor management, referral, prevention, health promotion, and health education, bringing health care closer to where people live and work.[9,11] Under the FHS model, the household is part of the care environment and the team is expected to be proactive, identifying the social and health problems and the most vulnerable members of the population.[9,11] In the FHS, professionals also deliver home health care to those who are unable to reach health services—for example, those who are bedridden or have other serious health conditions.[9] The transformation of the care model in Brazilian PHC is not a discretionary change in which the Ministry of Health implements a new policy changing the organization of PHC throughout the country, but gradual, where the municipal governments are responsible for FHS service provision and population coverage, with funding primarily from the federal government.

Most Brazilian municipalities have adopted the FHS (often by replacing TPHC),[9] and it has become the largest community-based PHC program in the world.[11] The number of family health teams increased from 2054 in 1998[12] to 43 508 in 2019.[13] The proportion of older adults registered by the FHS in this period increased from 4.4% (620 000) to 64.2% (18 million).[13] The priority was to implement the FHS first in the poorest and medically underserved areas, guided by the National Policy on Primary Care, to promote universal access and reduce health inequalities.[8,9] In 2013, the FHS covered 53.4% of all Brazilian households, with higher coverage in rural (70.9%) than in urban (50.6%) areas, and in the poorest regions and states.[14]

Expansion of the FHS has been associated with improvements in general population health indicators,[15] but there is a scarcity of studies about the impact of this strategy on older adults. Evidence shows reductions in mortality from cardiovascular disease[16] (the main cause of death in Brazil among those aged 60 years or older), reduction in hospitalization rates from ambulatory care–sensitive conditions,[17] improvement in quality of health care as a result of enhanced continuity of care,[18] and increased access and utilization of health services, including home health care.[9] These findings suggest that the FHS is a potential vehicle for addressing social inequalities in health.[8,9,15]

Worldwide, however, there is a paucity of knowledge on how PHC may help to reduce the impact of social inequalities on health. Two Brazilian[19,20] and 2 North American studies[21,22] investigated the impact of PHC on reducing the effect of social inequalities by race and socioeconomic groups; 3 North American studies focused on income, education, and other sociodemographic covariates[23–25]; and 1 North American study considered urban and nonurban health inequalities.[26] We found no studies on the relationship between primary care and social inequalities in mortality among older Brazilian adults.

In this context, our aim was to investigate the role of the FHS in reducing social inequalities in all-cause and avoidable mortality among older adults in Bagé, Rio Grande do Sul, Brazil. In addition, we assessed whether PHC coverage type modified the effect of wealth on mortality. There is a higher mortality risk among those living in lower social conditions,[1,3,4] who make up the majority in the area covered by the FHS.[9] However, we expected no difference in mortality by PHC coverage type, given that the FHS should be able to minimize the impact of social inequalities by offering access to health care among the poorest.

METHODS

The Bagé Longitudinal Study of Ageing (SIGa-Bagé) is a population-based cohort study of people aged 60 years and older in Bagé city, in the state of Rio Grande do Sul, Brazil. It is the first longitudinal aging study in Brazil to assess the impact of PHC services on social inequities in health and mortality. In 2008, 1593 participants recruited from private households took part of the baseline interview. The sample was representative of the urban area of the city, which was covered by PHC services.[9] Its sampling design and data collection methods are described elsewhere.[9]

Surviving cohort members had face-to-face interviews after 9 years of follow-up. Of the 1593 participants at baseline, complete data were available for 1314 participants at follow-up in 2016 and 2017 (735 reinterviewed + 579 confirmed deaths). Among the 735 participants, 54% were covered by the FHS and 46% by the TPHC.

Mortality Data Source

We defined type of PHC coverage (FHS or traditional) at baseline for the whole cohort, and assessed vital status in the follow-up.[9] We ascertained deaths through the Mortality Information System. We obtained death certificates for 91% of the participants (579 cases: FHS = 53.5% and TPHC = 46.5%) who were reported to have died through August 2017 (638 cases). We obtained cause of death for 564 participants, using the *International Classification of Diseases, 10th Revision* (*ICD-10*). Additionally, we classified deaths into nonavoidable and potentially avoidable causes, using a previously developed list of avoidable mortality conditions from Brazil.[27]

Primary Health Care Coverage Type

At baseline (2008), Bagé had 20 PHC service centers; 15 of them had implemented the FHS and 5 had followed the TPHC model. Half of the city's population (51%) was covered by the FHS, offering multidisciplinary team- and community-based family health care in the city's periphery, which comprises the most deprived areas of the city. TPHC services covered populations from the central and less deprived area of the city and did not incorporate multidisciplinary teams, home visits, or other community-based services.[9] If one imagines a circle, in the baseline study, the richest—covered by TPHC—lived in the city's central portion and the poorest—covered by the FHS—in the city's periphery. Assuming that we had a probabilistic distribution of the sample in the city,[9] 852 respondents (54%) lived in areas covered by the FHS, making our study a type of natural experiment.[28]

Covariates

Covariates were obtained in 2008 (Table 1) and included age, gender, marital status (partner vs no partner), multigenerational household, and

TABLE 1— Selected Baseline Characteristics of Participants by Type of Primary Health Care Service: The SIGa-Bagé Cohort Study, Bagé, Rio Grande do Sul, Brazil, 2008–2017

Variables	Total (n = 1314), No. (%)	TPHC (n = 605), No. (%)	FHS (n = 709), No. (%)	*P*
Marital status				.38
Partner	658 (50.08)	295 (48.76)	363 (51.20)	
No partner	656 (49.92)	310 (51.24)	346 (48.80)	
Race/ethnicity				< .001
White	1064 (80.97)	521 (86.12)	543 (76.59)	
Black, Brown, Asian, Indigenous	250 (19.03)	84 (13.88)	166 (23.41)	
Multigenerational household				.91
No	613 (46.65)	281 (46.45)	332 (46.83)	
Yes	701 (53.35)	324 (53.55)	377 (53.17)	
Per capita income, US$				.15
≥ 129.7	1110 (84.67)	520 (86.24)	590 (83.33)	
< 129.7	201 (15.33)	83 (13.76)	118 (16.67)	
Years of schooling				< .001
≥ 8	270 (20.55)	183 (30.25)	87 (12.27)	
4–7	404 (30.75)	194 (32.07)	210 (29.62)	
< 4	640 (48.71)	228 (37.69)	412 (58.11)	
Wealth				< .001
AB (richest)	340 (26.07)	206 (34.22)	134 (19.09)	
C	506 (38.80)	246 (40.86)	260 (37.04)	
DE (poorest)	458 (35.12)	150 (24.92)	308 (43.87)	
Current smoker				.004
No	1110 (84.47)	530 (87.60)	580 (81.81)	
Yes	204 (15.53)	75 (12.40)	129 (18.19)	
Sedentary				.008
No	766 (58.30)	329 (54.38)	437 (61.64)	
Yes	548 (41.70)	276 (45.62)	272 (38.36)	
Hypertension				.61
No	583 (44.37)	273 (45.12)	310 (43.72)	
Yes	731 (55.63)	332 (54.88)	399 (56.28)	
Diabetes				.039
No	1111 (84.55)	525 (86.78)	586 (82.65)	
Yes	203 (15.45)	80 (13.22)	123 (17.35)	
Depression				.026
No	1014 (81.64)	483 (84.29)	531 (79.37)	
Yes	228 (18.36)	90 (15.71)	138 (20.63)	
Disability (ADL + IADL)				.001
No	827 (63.03)	409 (67.60)	418 (59.12)	
Yes	485 (36.97)	196 (32.40)	289 (40.88)	

Continued

TABLE 1— Continued

Variables	Total (n = 1314), No. (%)	TPHC (n = 605), No. (%)	FHS (n = 709), No. (%)	P
Self-perception of health				.51
Good/very good	726 (57.26)	339 (58.25)	387 (56.41)	
Regular/bad/worse	542 (42.74)	243 (41.75)	299 (43.59)	
Gender				.07
Female	815 (62.02)	391 (64.63)	424 (59.80)	
Male	499 (37.98)	214 (35.37)	285 (40.20)	
Age, y				.011
60–64	312 (23.74)	124 (20.50)	188 (26.52)	
65–74	567 (43.15)	260 (42.98)	307 (43.30)	
≥ 75	435 (33.11)	221 (36.53)	214 (30.18)	
Private health insurance				< .001
No	864 (66.11)	343 (56.88)	521 (74.00)	
Yes	443 (33.89)	260 (43.12)	183 (26.00)	
Hospitalization[a]				.73
No	1069 (81.42)	495 (81.82)	574 (81.07)	
Yes	244 (18.58)	110 (18.18)	143 (18.93)	
Visited a doctor[b]				.24
No	559 (45.62)	265 (43.87)	334 (47.11)	
Yes	714 (54.38)	339 (56.13)	375 (52.89)	
Home health care				< .001
No	1218 (92.84)	582 (96.20)	636 (89.96)	
Yes	94 (7.16)	23 (3.80)	71 (10.04)	
PHC coverage type				
TPHC	605 (46.04)	... ...	... ...	...
FHS	709 (53.96)	... ...	... ...	...

Note. ADL = activities of daily living; FHS = Family Health Strategy; IADL = instrumental activities of daily living; PHC = primary health care; TPHC = traditional primary health care.

[a] Hospitalization during the last y before the interview.
[b] Visited a doctor during the last 3 m before the interview.

self-reported ethnicity (White, Brown, Black, Asian, or Indigenous). Because of the very small numbers, we merged the deaths of Black, Brown, Asian, and Indigenous individuals into 1 group. For stratification by monthly per capita income, we followed the Brazilian government guidelines that define a low-income family as one with a per capita monthly income up to half of the federal minimum wage. We considered the participant to be living in a low-income family when per capita monthly income was lower than US $129.7 at baseline (exchange rate, US $1 = 1.60 Brazilian reals).

We categorized schooling into 3 groups (< 4, 4–7, and ≥ 8 years). We assessed wealth using the Brazilian Economic Classification Criteria scale, which considers information on household furniture(s), car(s), housekeeper(s), and the highest educational attainment of the head of the household. We grouped participants into 5 categories (from A [the richest] to E [the poorest]). For statistical purposes, we merged the categories as follows: D and E = poorest, C = middle, and A and B = richest.

Health behaviors included were current smoking (no, yes) and physical inactivity (no, yes), defined as when a participant did not walk or perform any moderate or vigorous-intensity activities for at least 10 minutes at least once a week. Health conditions included were self-reported doctor-diagnosed hypertension and diabetes (i.e., “Did a doctor ever tell you that you had ...?”); depression (no, yes) as measured by the abbreviated instrument of the Geriatric Depression Scale; disability based on the basic activities of daily living and instrumental activities of daily living as measured by the Katz and Lawton scales[29]; and self-rated health status, which we collected in 5 categories and then merged into 2 categories (good or very good vs regular, bad, or worse).[9]

For health services indicators, we considered having private health insurance (no, yes), home health care from a health care professional during the last 3 months (no, yes), hospitalization during the last year before the interview at baseline (no, yes), physician visits during the last 3 months before the interview at baseline (no, yes), and, finally, PHC models (TPHC, FHS).

Statistical Analyses

First, we described all variables and compared proportions using a χ^2 test. Second, we used Cox proportional hazards models adjusted by gender, age, and wealth to examine the size of the risk by age group in both PHC types and the risk by PHC types in each age group. The time modeled was the period each participant was in the study, calculated as the difference in years (continuous variable) between date of birth and date of death or the study’s end date.

TABLE 2— Adjusted Cox Regression of All-Cause and Avoidable Mortality Risk Among Older Adults: The SIGa-Bagé Cohort Study, Bagé, Brazil, 2008–2017

Variables	All-Cause Mortality (n = 579), HR (95% CI)	Avoidable Mortality (n = 380), HR (95% CI)
Level 1		
Marital status (Ref: partnered)	1.33 (1.13, 1.57)	1.44 (1.18, 1.77)
Race/ethnicity (Ref: White)	1.04 (0.84, 1.28)	1.01 (0.77, 1.31)
Multigenerational household (Ref: yes)	1.01 (0.84, 1.19)	1.01 (0.81, 1.25)
Per capita income (Ref: ≥ 129.7)	1.27 (1.03, 1.58)	1.43 (1.11, 1.84)
Years of schooling (Ref: ≥ 8)[a]	1	1
4–7	1.18 (0.92, 1.51)	1.22 (0.89, 1.66)
< 4	1.28 (1.02, 1.60)	1.37 (1.03, 1.82)
Wealth (Ref: richest)[a]	1	1
Middle	1.17 (0.91, 1.49)	1.11 (0.81, 1.54)
Poorest	1.11 (0.83, 1.47)	1.07 (0.74, 1.53)
Level 2		
Smoking (Ref: no)	1.11 (0.89, 1.39)	1.16 (0.88, 1.52)
Inactivity (Ref: no)	2.11 (1.79, 2.49)	1.92 (1.57, 2.35)
Level 3		
Diabetes (Ref: no)	1.03 (0.81, 1.31)	1.16 (0.87, 1.54)
Hypertension (Ref: no)	0.91 (0.77, 1.09)	0.89 (0.71, 1.10)
Depression (Ref: no)	1.13 (0.91, 1.41)	1.14 (0.87, 1.51)
Disability (Ref: no)	1.69 (1.42, 2.03)	1.71 (1.37, 2.13)
SPH (Ref: good/very good)	1.36 (1.14, 1.62)	1.30 (1.04, 1.61)
Level 4		
Age, y (Ref: 60–64)[a]	1	1
65–74	1.39 (1.07, 1.78)	1.38 (1.01, 1.88)
≥ 75	2.61 (2.02, 3.39)	2.37 (1.73, 3.27)
Gender (Ref: male)	0.60 (0.49, 0.73)	0.60 (0.47, 0.76)
Level 5		
PHC type (Ref: TPHC)	1.04 (0.86, 1.26)	1.19 (0.94, 1.52)
Home health care (Ref: no)	1.61 (1.16, 2.22)	1.47 (0.98, 2.21)
Private health insurance (Ref. no)	0.91 (0.75, 1.11)	0.84 (0.65, 1.08)
Hospitalization (Ref. no)	1.38 (1.11, 1.71)	1.38 (1.06, 1.81)
Visited doctor (Ref: no)	0.86 (0.72, 1.03)	0.80 (0.64, 1.01)

Continued

Third, we used multivariate analysis by Cox proportional hazards models to verify associations between PHC coverage type and all-cause and avoidable mortality, while adjusting for covariates. We summarized results using hazard ratios and their respective 95% confidence intervals. We built a conceptual hierarchical framework of risk factors for mortality in older adults. This is an approach to reduce the analysis matrix in order to improve the power of analysis of distal determinants of health.[30] In our hierarchical model, for each level of adjustment, we retained all variables with a *P* value of .20 or less in the subsequent levels. Level 1 included socioeconomic risk factors. In level 2, we added health behaviors to the socioeconomic variables selected from level 1. In level 3, we added health condition variables. In level 4, we added demographic variables. In level 5, we added health services variables to those selected in levels 1, 2, 3, and 4. We used backward stepwise elimination by levels (1 variable at a time) to build the final model. In the final step, we tested the interaction between PHC type and wealth along with both variables separately. The variables kept in the final adjustment model are

TABLE 2— Continued

Variables	All-Cause Mortality (n = 579), HR (95% CI)	Avoidable Mortality (n = 380), HR (95% CI)
	Final adjustment model[b]	
PHC type (Ref: TPHC)	1.77 (1.19, 2.63)	2.54 (1.37, 3.57)
Wealth (Ref: richest)[a]	1	1
Middle	2.07 (1.46, 2.93)	2.21 (1.37, 3.57)
Poorest	1.75 (1.16, 2.61)	1.75 (1.00, 3.06)
PHC type##wealth (Ref: richest)		
FHS#middle[c]	0.44 (0.27, 0.71)	0.31 (0.17, 0.58)
FHS#poorest[c]	0.59 (0.36, 0.96)	0.46 (0.25, 0.85)

Note. CI = confidence interval; FHS = Family Health Strategy; HR = hazard ratio; PHC = primary health care; SPH = self perception of health; TPHC = traditional primary health care. Level 1 = adjusted to socioeconomic conditions: marital status, skin color, multigenerational household, per capita income, school and wealth. Level 2: adjusted to selected variables from level 1 + health behaviors: smoking and physical inactivity. Level 3: adjusted to selected variables from levels 1 and 2 + health conditions: hypertension, diabetes, depression, disabilities, and SPH. Level 4: adjusted to selected variables from levels 1, 2, and 3 + demographic conditions: gender and age. Level 5: adjusted to selected variables from levels 1, 2, 3, and 4 + health service indicators: PHC type, home health care, private health insurance, hospitalization, and visited a doctor.

[a] Testparm (Wald test).

[b] Final adjustment model for all-cause mortality included the following: marital status, per capita income, school, inactivity, disability, SPH, age, gender, home health care, visited a doctor, hospitalization, and interaction between PHC type and wealth. Final adjustment model for avoidable mortality included the following: marital status, per capita income, school, inactivity, disability, SPH, age, gender, PHC type, home health care, private health insurance, visited a doctor, hospitalization, and interaction between PHC type and wealth.

[c] Reference level is richest in FHS. Test of proportional-hazards assumption with a robust variance-covariance matrix used the following: all-cause mortality—level 2: inactivity $P = .003$, and level 5: home health care $P = .022$; avoidable-cause mortality—level 2: inactivity $P = .001$, and level 4: gender $P = .011$.

described in the footnote to Table 2. Variables with a P value of .05 or less were considered significant.

We used Schoenfeld residuals to test the proportional-hazards assumption with a robust variance–covariance matrix in each level. We did not find multicollinearity between demographic and socioeconomic variables included in the model (variance inflation factor ≤ 1.5). We applied likelihood ratio tests to compare nested models, and the presence of the interaction term improved model fit. In the case of significant interactions, we decided to explain the interaction rather than stratify in subgroups, for statistical efficiency (low number of observations). We used Stata 14.0 (Stata Corp, College Station, TX) for the analysis.

RESULTS

Of the 1593 eligible participants at baseline, information was available for 1314. There was no difference in the proportion of included and excluded participants by PHC type ($P = .428$; Table A, available as a supplement to the online version of this article at http://www.ajph.org). Those included in our analyses were slightly older than those excluded (71.6 years [SD = 8.4] vs 69.2 years [SD = 7.1]; $P < .001$).

Table 1 shows selected baseline characteristics of participants by PHC type. The mean age was 71.6 years (SD = 8.4), but participants in TPHC were slightly older than those in the FHS (72.3 [SD = 8.5] vs 71.0 [SD = 8.3]; $P = .007$). Compared with participants in TPHC, participants in the FHS were more similar in terms of proportion of men and women, marital status, multigenerational household, monthly per capita income, hypertension, self-perception of health, hospitalization, and physician visits. Compared with participants in TPHC, however, those in the FHS were more likely to be Black, Brown, Asian, and Indigenous (13.9% vs 23.4%, respectively); to have lower levels of schooling (37.7% vs 58.1%); to be in wealth group DE (poorest; 24.9% vs 43.9%); to be current smokers (12.4% vs 18.2%); and to have diabetes (13.2% vs 17.3%), depression (15.7% vs 20.6%), or disability (32.4% vs 40.9%). Compared with participants in TPHC, FHS participants were less likely to be aged 75 years or older (36.5% vs 30.2%, respectively), to have private health insurance (43.1% vs 26.0%), or to be physically inactive (42.6% vs 38.4%; Table 1).

There were 579 deaths confirmed by the Mortality Information System over the follow-up period (mean duration = 6.4 years; SD = 2.6). The overall unadjusted mortality rate was 67.6 (62.3–73.3) deaths per 1000 person-years: 69.0 (61.2–77.7) in TPHC services and 66.3 (59.4–74.2) in the FHS.

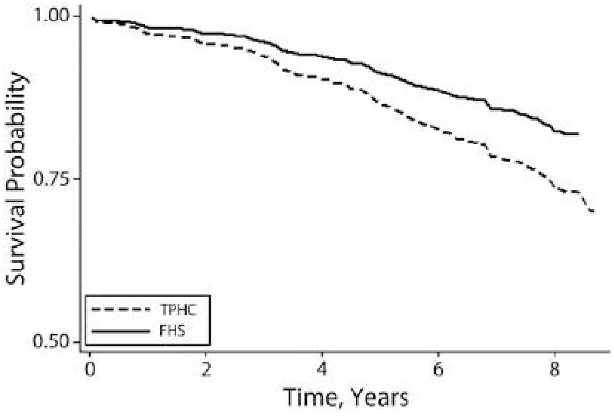

FIGURE 1— **All-Cause Mortality by Primary Health Care Coverage in Age Group 60–64 Years, Adjusted for Gender, Age, and Wealth: The SIGa-Bagé Cohort Study, Bagé, Rio Grande do Sul, Brazil, 2008–2017**

Note. FHS = Family Health Strategy; TPHC = traditional primary health care. The sample size was 309 observations and 83 failures.

Regarding all-cause mortality risk by age group in TPHC and the FHS, adjusted for gender and wealth, there was a difference between the youngest and the middle age group in the FHS (60–64 years: hazard ratio [HR] = 0.24; 95% confidence interval [CI] = 0.17, 0.33; 65–74 years: HR = 0.40; 95% CI = 0.31, 0.51; ≥ 75 years = reference) that was not found in TPHC (60–64 years: HR = 0.36; 95% CI = 0.25, 0.51; 65–74 years: HR = 0.38; 95% CI = 0.29, 0.50; ≥ 75 years = reference). Figure 1 shows all-cause mortality risk by PHC type among those aged 60 to 64 years, adjusted for gender, age, and wealth; it suggests a lower mortality risk among those in the FHS (HR = 0.64; 95% CI = 0.40, 1.01) compared with TPHC, attaining marginal significance (*P* = .056). There was no difference in mortality risk by PHC type among those aged 65 to 74 years (*P* = .523) and those 75 years or older (*P* = .370; Figures A and B, available as a supplement to the online version of this article at http://www.ajph.org).

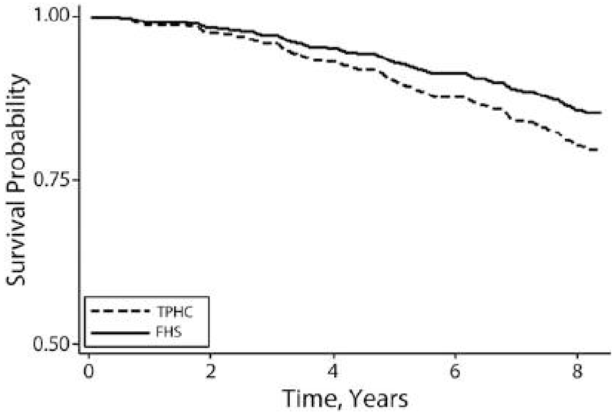

FIGURE 2— **Avoidable Mortality by Primary Health Care Coverage in Age Group 60–64 Years, Adjusted for Gender, Age, and Wealth: The SIGa-Bagé Cohort Study, Bagé, Rio Grande do Sul, Brazil, 2008–2017**

Note. FHS = Family Health Strategy; TPHC = traditional primary health care. The sample size was 309 observations and 55 failures.

Avoidable mortality corresponded to 67.4% of the total deaths, and there was no difference in the proportion by PHC type (TPHC = 62.8% and FHS = 71.3%; *P* = .097). Among the avoidable causes, 87.1% were related to noncommunicable diseases, 11.1% to infectious causes, and 1.8% to external causes. There were no avoidable causes of death related to immune preventive actions. Poorly defined causes comprised 2.5%. Figure 2 shows avoidable mortality risk by PHC type among those aged 60 to 64 years. No difference was found (FHS: HR = 0.70; 95% CI = 0.39, 1.26; *P* = .235), with similar results among those aged 65 to 74 years (*P* = .247) and those 75 years or older (*P* = .087; Figures C and D, available as a supplement to the online version of this article at http://www.ajph.org).

In the first level of the multivariable-adjusted regression model (Table 2), wealth was not associated with mortality. In the final adjusted model, wealth was associated with all-cause and avoidable mortality, with a higher risk among the middle group and the poorest. Interaction analyses revealed that the effect of wealth on mortality was modified by PHC type (likelihood-ratio test *P* = .004). In the FHS, the middle and the poorest wealth group had lower risk of all-cause mortality (middle: HR = 0.44; 95% CI = 0.27, 0.71; poorest: HR = 0.59; 95% CI = 0.36, 0.96) and avoidable mortality (middle: HR = 0.31; 95% CI = 0.17, 0.58; poorest: HR = 0.46; 95% CI = 0.25, 0.85), compared with the richest (Table 2).

DISCUSSION

To our knowledge, this is the first study to analyze the role of the FHS in reducing social inequalities in mortality among older Brazilian adults. As expected, social vulnerability is higher in those living in FHS areas, and consequently a higher proportion of health problems were observed in these areas. However, the FHS was negatively associated with all-cause mortality in the youngest age group, a result not found among those covered by TPHC. Moreover, PHC type significantly modified the effect of wealth on all-cause and avoidable mortality, with the FHS having a protective role among the middle and lowest wealth groups.

A middle-income country like Brazil is the perfect setting for evaluating the relationship between PHC and health inequalities.[8,15,19] Brazil has some of the world's highest income (Gini coefficient = 0.53 in 2017)[31] and health inequalities[3,32] along with one of world's fastest population aging rates.[5] Despite the need of more studies that address social inequalities in mortality among older adults in low- and middle-income countries,[3] the effect of social determinants on health is well-known.[4,5] What is not yet clear is the impact or effectiveness of health programs and policies, such as those based on PHC principles, in addressing the social determinants of health and reducing health inequalities.

The characteristics of the FHS enable the health team to deliver health actions throughout the life course for those with social and health vulnerabilities, reducing mortality in the youngest age group. The youngest elderly have a higher probability of being in the early stages of disease development, mainly noncommunicable diseases, which facilitates treatment, recovery, prevention of complications, and, when offered, health service access and quality, home health care, and health promotion and education—a role of the FHS. Intervening in the disease pathway is a way to reduce hospitalizations and avoid premature mortality.

The higher proportion of avoidable mortality corroborates evidence from other Brazilian studies.[33] We found no other study dealing specifically with the impact of PHC types on avoidable mortality due to interventions at the SUS.[27] There are, however, studies on hospitalizations from ambulatory care–sensitive conditions that suggest that the FHS is more equitable than TPHC.[34]

Interaction analysis highlighted that PHC coverage type modified the effect of wealth on mortality. Survival probabilities were higher among the middle and the lower wealth groups compared with the richest in FHS areas. This study showed a greater effect of the FHS on social inequalities in all-cause and avoidable mortality than we expected, confirming the effectiveness of the FHS in reducing social inequalities. A recent study showed that FHS utilization in urban poor Brazilian populations was associated with lower mortality risk, with greater reductions among more deprived racial/ethnic and socioeconomic groups.[20] Relevant characteristics of the FHS that differ from those of TPHC and that could explain our findings include the presence of multidisciplinary teams that include community health workers, better access and quality, home health care, monitoring and follow-up care delivered in the neighborhood and individuals' homes, and targeting actions toward the family and individuals in the community.

The FHS alone cannot protect one from exposure to social and lifestyle risk factors. However, it is able to reduce health inequalities by addressing one's health needs. In part, these results could be related to social policies implemented during the last 2 decades (e.g., the Bolsa Família Program, whose conditional cash transfers benefit low-income families).[7] Evidence from Brazil shows that reduction in infant mortality was associated with both greater coverage by the FHS and the Bolsa Família Program, demonstrating the importance of combining interventions for the most vulnerable populations.[35]

The superiority of the FHS over TPHC has become a national and international consensus.[15] However, these gains are fragile. Brazil is undergoing a sociopolitical and economic transition, accompanied by austerity policies, changes in the financing of health programs, and reorganization of successful health programs, which is likely to adversely affect the SUS and PHC, worsening inequalities.[7] These changes and their impact on health must be monitored.

Brazilian experts in PHC services propose the universalization of the FHS, political commitment, sufficient public financing, and efficient allocation of resources to increase the superiority of the FHS[7,8,15] in facing increased health and social demands among older adults, the users most affected by multimorbidity and mental health problems.[15]

Strengths and Limitations

This study has strengths and limitations. Its strengths are its long follow-up period and high response rate. Furthermore, the data collected at baseline were obtained by trained professionals using standard techniques with quality control checks. The findings are from a city of more than 100 000 inhabitants in the south of Brazil, and despite the low number of observations, we had the power to find statistical differences. Among the limitations, both the PHC coverage type and the other covariates were assessed only at baseline; therefore, we did not capture any change in these variables over time. The present study also did not allow us to perform analyses for specific causes of death.

Because the information on doctor-diagnosed conditions was self-reported, there is a risk of underestimating the prevalence of comorbidities. Another limitation of this study is that it considered all older ages, whereas the classification of avoidable mortality due to interventions at the SUS was intended for the population aged 5 to 69 years.[27]

Public Health Implications

The FHS is a powerful tool for reducing social inequalities in all-cause and avoidable mortality among older adults. It is an effective approach to organizing PHC and may accelerate the achievement of the goal of health for all. The expansion of FHS coverage and the strengthening of health policies based on PHC principles should be considered. However, the expansion of the FHS should not be only about the number of health teams but also about effective health actions, putting into practice Brazil's policy on health promotion. Bagé city has achieved equity in health through political stability and sustained health investment, a model that provides important lessons for other cities around the world. AJPH

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CONTRIBUTORS

M. Kessler, E. Thumé, L. Soares Wachs, and P. Moraes Volz collected the data. M. Kessler, J. Macinko, and F. Borges Nedel analyzed the data. M. Kessler, E. Thumé, L. A. Facchini, F. Borges Nedel, and C. de Oliveira interpreted the data. M. Kessler, L. Soares Wachs, and P. Moraes Volz wrote the first draft of the article, and E. Thumé, M. Marmot, J. Macinko, L. A. Facchini, F. Borges Nedel, and C. de Oliveira revised the article. All authors read and approved the final article.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

The SIGa-Bagé cohort study was approved by the Ethics Board of the Federal University of Pelotas, Brazil (protocol no. 015/2008 and 678.664/2014). Participants gave full informed consent.

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Change Over Time in Public Support for Social Distancing, Mask Wearing, and Contact Tracing to Combat the COVID-19 Pandemic Among US Adults, April to November 2020

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See also Gollust, p. 765.

Objectives. To examine how sociodemographic, political, religious, and civic characteristics; trust in science; and fixed versus fluid worldview were associated with evolving public support for social distancing, indoor mask wearing, and contact tracing to control the COVID-19 pandemic.

Methods. Surveys were conducted with a nationally representative cohort of US adults in April, July, and November 2020.

Results. Support for social distancing among US adults dropped from 89% in April to 79% in July, but then remained stable in November 2020 at 78%. In July and November, more than three quarters of respondents supported mask wearing and nearly as many supported contact tracing. In regression-adjusted models, support differences for social distancing, mask wearing, and contact tracing were most pronounced by age, partisanship, and trust in science. Having a more fluid worldview independently predicted higher support for contact tracing.

Conclusions. Ongoing resistance to nonpharmaceutical public health responses among key subgroups challenge transmission control.

Public Health Implications. Developing persuasive communication efforts targeting young adults, political conservatives, and those distrusting science should be a critical priority. (*Am J Public Health*. 2021;111:937–948. https://doi.org/10.2105/AJPH.2020.306148)

Nonpharmaceutical public health measures—including social distancing,[1–3] mask wearing,[4,5] and contact tracing[6]—are critical approaches to combatting the COVID-19 pandemic. Since lockdowns were lifted in early summer 2020, the uptake of these measures has depended largely on voluntary adoption. Nearly a year into the pandemic, we know relatively little about which factors facilitate or impede public support for adherence to lifesaving public health measures aimed at controlling disease transmission. Little scholarly research has explored this question, and most press accounts of variable adoption of public health measures have focused on young adults,[7] political conservatives,[8-10] men,[11] and rural residents.[12]

Factors such as beliefs about science may also play a role.[13,14] Distrust of science has the potential to create fertile ground for misinformation to take hold. Likewise, social networks through religious affiliations or civic organizations or norms within geographic regions may be influential in determining attitudes about social distancing, mask wearing, and contact tracing.

Finally, whether a person has a fixed or fluid worldview could provide an alternative explanation for diverging public views on social distancing, mask wearing, and contact tracing to combating the pandemic. A person with a fixed worldview—sometimes described as having an authoritarian worldview[15]—tends to prioritize social order and hierarchies to bring a sense of control to a world that is perceived to be chaotic.[16] This construct has taken on renewed relevance in light of the economic and social instability brought on by the pandemic. In their book *Prius or Pickup? How the Answers to Four Simple Questions Explain America's Great Divide*, Hetherington and Weiler explain worldview as what is going on deep down inside people and their perception of labeling the world as a dangerous place (fixed) or not a dangerous place (fluid).[16] The concept of worldview has gained increased prominence among scholars attempting to explain the growing divide in fundamental beliefs, distinct from political partisanship, that characterized the Trump administration.

In this study, we analyzed data from 3 data collection waves of a nationally representative cohort survey of US adults. We used public opinion data from April, July, and November 2020 to examine how sociodemographic, political, religious, and civic characteristics; trust in science; and worldview were associated with evolving public support for social distancing, indoor mask wearing, and contact tracing to control the COVID-19 pandemic. While various data collection efforts are underway to capture the experiences of people in the United States during the COVID-19 pandemic,[17,18] we are aware of no nationally representative studies that track public attitudes longitudinally on these topics across multiple phases of the pandemic in 2020.

METHODS

We fielded 3 waves of the Johns Hopkins COVID-19 Civic Life and Public Health Survey collected from April 7 to 13, 2020 (wave 1), July 7 to 22, 2020 (wave 2), and November 11 to 30, 2020 (wave 3) using NORC's AmeriSpeak Panel. The AmeriSpeak Panel is a probability-based panel designed to be representative of the US adult population. The panel is drawn from NORC's area probability sample and US Postal Service addresses and covers 97% of US households.[19] The AmeriSpeak panel's recruitment rate is 34%, and the panel includes approximately 35 000 individuals. NORC obtained informed consent before enrolling individuals in the AmeriSpeak Panel. The sample for this study was drawn from the AmeriSpeak panel who completed the survey online, with 1468 respondents (70.4% completion rate) in wave 1. Of the original wave-1 respondents, 1337 responded in wave 2, and 1222 responded in wave 3, resulting in 91% and 92% completion rates, respectively. (See Appendix, Exhibit B, available as a supplement to the online version of this article at http://www.ajph.org, to compare unweighted and weighted socioeconomic and political characteristics of the study population to national data.) Data analyses were restricted to the 1222 respondents who completed all 3 survey waves.

Measures

Outcome measures. In all waves, we used 5-point Likert scales to measure respondents' support for the importance of social distancing to slow transmission of the coronavirus (extremely important to not at all important). In waves 2 and 3 only, we used 5-point Likert scales to measure respondents' agreement that wearing a mask in indoor public spaces and contact tracing are important for slowing coronavirus transmission (from strongly agree to strongly disagree). Contact tracing was defined as tracking and identifying people who might have come in contact with an individual infected with COVID-19 and asking them to quarantine to slow disease transmission. For parsimony and interpretability, Likert scales were collapsed to dichotomous outcome measures of support for social distancing, mask wearing, and contact tracing. Respondents who answered that social distancing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. Respondents who answered that mask wearing or contact tracing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. (See Appendix, Exhibit A, for exact wording of the survey questions used and Appendix Exhibits D and E for full distributions for all measures).

Explanatory measures. We collected detailed sociodemographic and health characteristics including gender, race and ethnicity (non-Hispanic White, non-Hispanic Black, other non-Hispanic, and Hispanic), age (18–34, 35–49, 50–64, or ≥65 years), household income (<$35 000, $35 000–74 999, or ≥$75 000), education (high-school diploma or less, some college, bachelor's degree, or greater), and self-reported health status (excellent, good, fair, or poor). To reflect the dynamic nature of employment status, we looked at change in employment across waves categorizing respondents as continuously employed across all waves, employed in March 2020 but unemployed or not in the workforce for another reason in July or November 2020, or not employed in March 2020 (i.e., unemployed, caregiver, retired, disabled, or not working for a not-classified reason). Respondents were categorized as residing in a census region (Northeast, Midwest, South, or West) and by the urbanicity of their locale (metropolitan, micropolitan, or rural).

Respondent political party affiliation was coded as Democrat, Independent, or Republican. We categorized respondents as attending religious services "often" if they reported attending services nearly every week or more frequently, "sometimes" if they reported attending services less than once per year to about once a month, "never," or "unknown." To measure civic engagement, we asked respondents whether they never, rarely, sometimes, or often participated in 3 types of civic engagement. Respondents were given the following prompt: "We want to understand how you have been interacting with others in your community since March 2020. Since March, how often have you done the following?" (1) Participated in offering aid or support to others, through formal or informal community organizations, including social service organizations, faith-based organizations, or informal groups providing aid; (2) Participated in advocacy around changes you would like to see from government through a community-based or digital civic, political, or faith-based organization; and (3) Interacted with other people in the community to think about what you can do together to help solve some of the problems people have been experiencing. Respondent were coded as "engaged" if they answered "often" or "sometimes" to 1 or more questions.

To measure trust in science, respondents were asked "In general, would you say that you trust science a lot, some, not much, or not at all?" Those responding "not much" (n = 53) and "not at all" (n = 12) were collapsed into a single category. We coded worldview following previous research[16,20] based on 4 questions about child rearing. Respondents were asked which they thought was more important for a child: (1) to have independence or respect for elders, (2) obedience or self-reliance, (3) to be considerate or to be well-behaved, and (4) to have curiosity or good manners. Respondents who selected "respect for elders," "obedience," "well-behaved," and "good manners" were categorized as having fixed worldview. Respondents who selected "independence," "self-reliance," "considerate," and "curiosity" were categorized as having a fluid worldview. All other respondents were categorized as mixed.

Statistical Analyses

We tested for unadjusted differences in support for social distancing in April, July, and November, and for indoor mask wearing and contact tracing in July and November overall and stratified by political partisanship, trust in science, and fixed versus fluid worldview using the χ^2 test. We used logistic regression to estimate differences in public support for social distancing, mask wearing, and contact tracing within each wave and across waves adjusting for gender, race/ethnicity, age, household income, education, health status, frequency of attending religious service, civic engagement, geographic region, county urbanicity, political party affiliation, trust in science, and worldview. We calculated average predicted probabilities of support within each subgroup using the observation values in our sample for all other variables.

Independent variables came from survey baseline data, wave 1, or wave 2 data collection. For nonvarying respondent characteristics, we used data from baseline or wave 1 including gender, race/ethnicity, age, education level, political affiliation, geographic region, and urbanicity. Trust in science and fixed versus fluid worldview, collected in wave 1, were treated as static over the study period. (We asked respondents about trust in science at each wave and found minimal over-time variation; worldview was asked about in wave 1 only.) Household income and religiosity came from baseline and health status, and civic engagement came from wave 2. The individual values for these 4 measures were treated as unvarying across the 3 waves; however, they could have changed over the study period. We calculated the employment change variable using multiple waves of data. We conducted all analyses in Stata version 16 (StataCorp LP, College Station, TX), applying survey weights to calculate nationally representative estimates.

RESULTS

From April to July 2020, public support for social distancing to slow coronavirus transmission dropped from 89% to 79% among US adults, but then remained stable at 78% support in November 2020 (Figure 1). While no data on public support for mask wearing in indoor public spaces or contact tracing was available for April, support was at 80% in July and 79% in November for mask wearing and at 74% in July and 73% in November for contact tracing.

Figure 2 shows unadjusted differences in support for social distancing in April, July, and November 2020 and for indoor mask wearing and contact tracing in July and November stratified by partisanship, trust in science, and fixed versus fluid worldview. Public support among Democrats was consistently higher than among Independents and Republicans for all 3 public health approaches. In November,

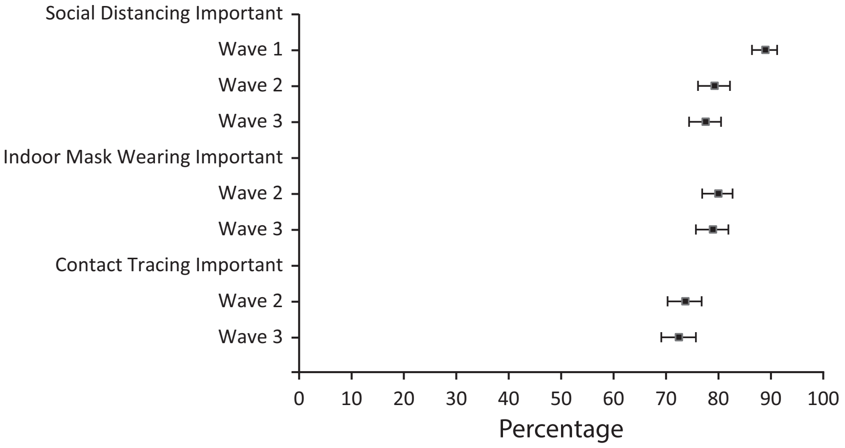

FIGURE 1— **Unadjusted Differences in Public Support Among US Adults for Public Health Measures to Prevent Coronavirus Transmission in April, July, and November 2020**

Note. The figure shows point estimates and 95% confidence intervals for support for each public health measure by wave. Respondents were only asked about the importance of wearing a mask or contact tracing in waves 2 and 3, not wave 1. Respondents who answered that social distancing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. Respondents who answered that mask wearing or contact tracing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero.

the support gap between Democrats and Republicans was 30 percentage points for social distancing, 26 percentage points for mask wearing, and 28 percentage points for contact tracing. The support gaps in November between adults who trusted science a lot and not much or not at all were 45 percentage points for social distancing, 45 percentage points for mask wearing, and 55 percentage points for contact tracing. Unadjusted differences between those with a fixed and fluid worldview were statistically significant in all time periods for all 3 public health approaches. For mask wearing, for example, support among those with a fixed worldview was 25 percentage points lower relative to those with a fluid worldview in November 2020.

Adjusted Support for Social Distancing Over Time

Adjusted regression models controlling for covariates displayed in Table 1 show large, consistent differences in public support for social distancing across all 3 time periods by subgroup. Adjusted support for social distancing was lowest among Republicans, particularly in July and November, and among those trusting science not much or not at all.

Table 1 also shows substantial declines over time in public support for social distancing based on adjusted regression models controlling for covariates. From April to November, the most striking declines in public support for social distancing (of 15 percentage points or greater) in adjusted models were among young adults aged 18 to 34 years (15.2 percentage points), those with some college education (15.4 percentage points), those with health status self-reported as excellent (18.5 percentage points), Republicans (21 percentage points), those residing in the Northeast (22.7 percentage points), and those trusting science some, or not much or not at all (18.4 and 19.2 percentage points, respectively). Importantly, most declines occurred between April and July, with support levels largely unchanged from July to November. The only exception to this were respondents with fair to poor health status. Within this group, little change was observed in support for the importance of social distancing from April to July (88.1% vs 86.4%), but support dropped 8.2 percentage points to 78.2% in November. Declines in support for social distancing over time among Blacks and Latinos, Democrats, those engaged in civic life, and those residing in the West were minimal and statistically insignificant in adjusted models.

In April 2020, those who reported being engaged civically with their communities had nearly identical levels of support for social distancing as those who reported being unengaged (89.0% vs 86.2%; $P = .894$). However, support dropped off significantly among the unengaged from April to November 2020 (−10.2 percentage points). By contrast, the decline in support for social distancing over time among those reporting attending religious services often, sometimes, or never was sizable and fairly uniform (10.5, 11.9, and 13.5 percentage point declines, respectively).

Adjusted Support for Mask Wearing and Contact Tracing

Adjusted regression models controlling for covariates displayed in Table 2 show large differences in public support for mask wearing and contact tracing by sociodemographic, political, religious, and civic characteristics; trust in science; and worldview in both July and August 2020. Results were consistent over the 2 periods with no statistically significant declines in support from July to November detected among any subgroups.

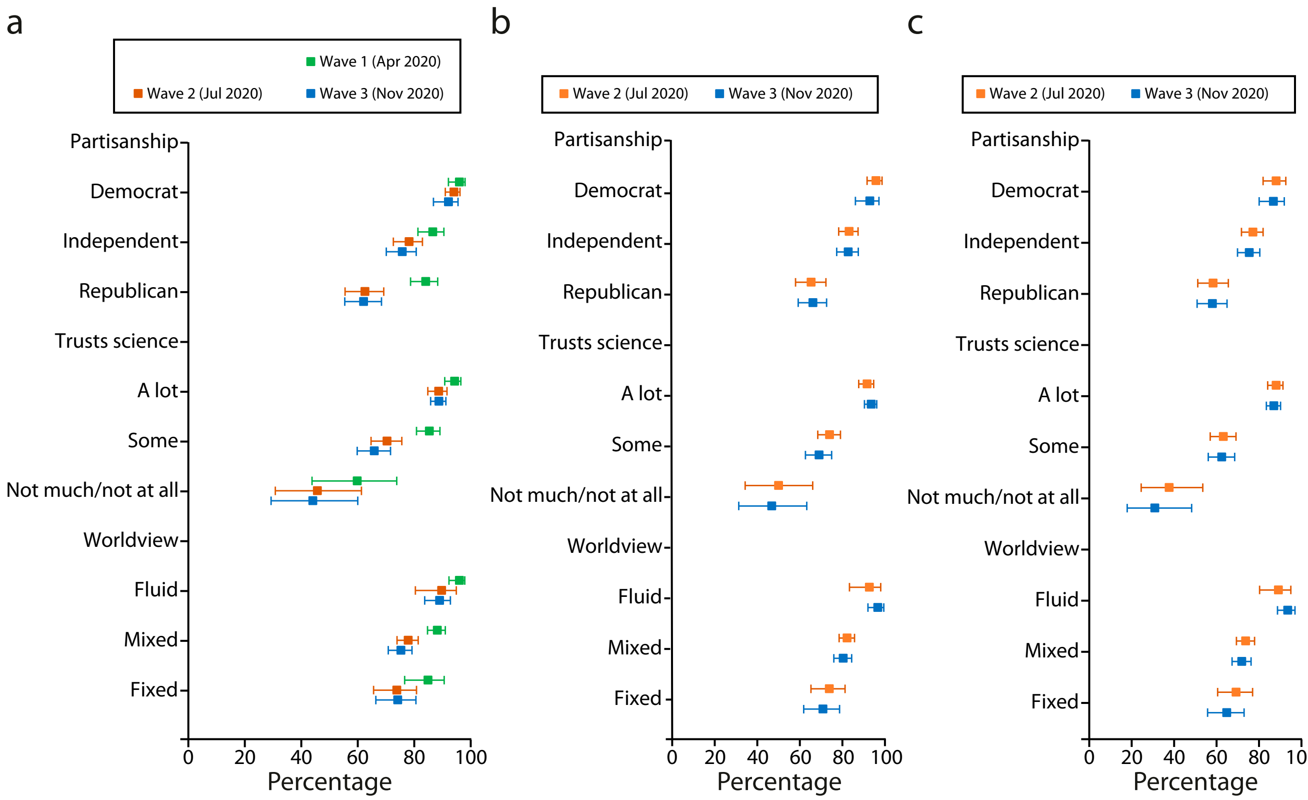

FIGURE 2— **Unadjusted Differences in Public Support Among US Adults for (a) Social Distancing, (b) Indoor Mask Wearing, and (c) Contact Tracing by Political Partisanship, Trust in Science, and Worldview in April, July, and November 2020**

Note. The figure shows point estimates and 95% confidence intervals for support for each public health measure by wave. Respondents were only asked about the importance of wearing a mask or contact tracing in waves 2 and 3, not wave 1. Partisanship was assessed at baseline; trust in science and worldview were assessed in wave 1. Respondents who answered that social distancing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. Respondents who answered that mask wearing or contact tracing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero.

In both periods, adults older than 50 years were more likely to view both mask wearing and contact tracing as important relative to younger adults. In November, women were more likely to support contact tracing (76.4%) compared with men (68.1%). No differences were identified between women and men in support for mask wearing. Adults with higher incomes were more likely than those in lower-income households to support mask wearing and contact tracing, and those with a bachelor's degree or greater were also more likely to support mask wearing compared with those with less education. In both July and November, the support gap between Democrats and Republicans on mask wearing and contact tracing was more than 20 percentage points. Support gaps between those trusting science and those with doubts about science were large in both time periods. In November, for example, 89.2% of those trusting science supported mask wearing compared with only 55.1% of those reporting trusting science not much or not at all, a 34-percentage-point support gap. Similarly, in November, 82.6% of those trusting science supported contact tracing compared with 34.8% among those trusting science not much or not at all, a 47.8-percentage-point support gap.

We found no differences in support for mask wearing among those with a fixed versus fluid worldview in adjusted models. However, those with a fixed or a mixed worldview were less likely to support contact tracing compared with those with a more fluid worldview in November.

DISCUSSION

This study explored shifting public attitudes in April, July, and November 2020 on nonpharmaceutical COVID-19 mitigation approaches. Over this period, rhetoric on public health responses became increasingly polarized and

TABLE 1— Adjusted Public Support for Importance of Social Distancing Among a National Sample of US Adults in April, July, and November 2020

	Social Distancing Important Wave 1 (April 2020), Predicted Probability of Support	Social Distancing Important Wave 2 (July 2020), Predicted Probability of Support	Social Distancing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (April to July 2020)	Adjusted Percentage Point Change (July to November 2020)	Adjusted Percentage Point Change (April to November 2020)
Gender						
Male (Ref)	88.7	78.9	74.9	−9.8††	−4.0	−13.8††
Female	89.3	79.7	80.0	−9.6††	0.3	−9.3††
Race/ethnicity						
Non-Hispanic White (Ref)	90.1	78.0	76.2	−12.1††	−1.8	−13.9††
Non-Hispanic Black	86.2	83.4	76.2	−2.8	−7.2	−10.0
Non-Hispanic other	91.8	85.4	88.1**	−6.4	2.7	−3.7
Hispanic	85.8	78.9	77.4	−6.9	−1.5	−8.4
Age, y						
18–34 (Ref)	86.8	72.3	71.6	−14.5††	−0.7	−15.2††
35–49	84.1	72.4	72.4	−11.7††	0.0	−11.7††
50–64	91.2	84.6**	82.4**	−6.6†	−2.2	−8.8††
≥ 65	94.3*	89.1**	84.5**	−5.2†	−4.6	−9.8††
Household income, $						
< 35 000 (Ref)	88.2	73.4	73.9	−14.8††	0.5	−14.3††
35 000 –74 999	89.8	81.7*	77.8	−8.1††	−3.9	−12††
≥ 75 000	89.0	81.9*	80.3	−7.1†	−1.6	−8.7††
Education						
≤ high-school diploma (Ref)	86.9	76.9	76.9	−10.0††	0.0	−10.0††
Some college	90.9	79.3	75.5	−11.6††	−3.8	−15.4††
≥ bachelor’s degree	90.1	82.6	80.3	−7.5††	−2.3	−9.8††
Health status						
Excellent (Ref)	90.3	76.5	71.8	−13.8†	−4.7	−18.5††
Very good	89.1	77.1	76.3	−12.0††	−0.8	−12.8††
Good	89.1	78.2	79.8	−10.9††	1.6	−9.3††
Fair or poor	88.1	86.4	78.2	−1.7	−8.2†	−9.9†
Employment status						
Employed in March, July, and November (Ref)	89.1	77.7	76.5	−11.4††	−1.2	−12.6††
Employed in March, but unemployed or not in workforce for another reason in July or November	92.1	82.7	77.3	−9.4†	−5.4	−14.8††
Not employed in March	87.7	80.2	78.8	−7.5†	−1.4	−8.9†
Political affiliation						
Democrat (Ref)	95.9	93.0	91.2	−2.9	−1.8	−4.7
Independent	86.9**	79.0**	77.1**	−7.9††	−1.9	−9.8††

Continued

TABLE 1— Continued

	Social Distancing Important Wave 1 (April 2020), Predicted Probability of Support	Social Distancing Important Wave 2 (July 2020), Predicted Probability of Support	Social Distancing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (April to July 2020)	Adjusted Percentage Point Change (July to November 2020)	Adjusted Percentage Point Change (April to November 2020)
Republican	84.2**	65.2**	63.2**	−19.0††	−2.0	−21.0††
Religious service attendance						
Never (Ref)	89.4	76.0	75.9	−13.4††	−0.1	−13.5††
Sometimes	89.0	80.0	77.1	−9.0††	−2.9	−11.9††
Often	89.7	79.0	79.2	−10.7††	0.2	−10.5††
Unknown	87.1	83.4	77.9	−3.7	−5.5	−9.2
Civic engagement						
Unengaged (Ref)	89.0	78.8	77.4	−10.2††	−1.4	−11.6††
Engaged	89.6	86.5	78.3	−3.1	−8.2	−11.3
Trusts science						
A lot (Ref)	93.7	87.6	87.9	−6.1††	0.3	−5.8††
Some	86.4**	72.9**	68.0**	−13.5††	−4.9	−18.4††
Not much or not at all	68.0**	50.0**	48.8**	−18.0	−1.2	−19.2
Worldview						
Fluid (Ref)	91.2	81.1	78.1	−10.1††	−3.0	−13.1††
Mixed	88.9	78.9	76.5	−10.0††	−2.4	−12.4††
Fixed	88.3	79.6	79.9	−8.7†	0.3	−8.4†
Region						
Northeast (Ref)	94.7	74.0	72.0	−20.7††	−2.0	−22.7††
Midwest	86.9*	75.8	76.5	−11.1††	0.7	−10.4††
South	89.4	82.7*	79.3	−6.7†	−3.4	−10.1††
West	86.4*	80.5	79.5	−5.9	−1.0	−6.9
Urbanicity						
Metropolitan (Ref)	89.0	79.6	77.1	−9.4††	−2.5	−11.9††
Micropolitan	89.5	78.4	80.2	−11.1†	1.8	−9.3†
Rural	88.2	77.1	76.7	−11.1	−0.4	−11.5

Note. Logistic regression models examining dichotomous measures of agreement that social distancing is important. Respondents who answered that social distancing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. The table reports average predicted probabilities, which are calculated by using the observation values in our sample for all other variables. The gender, race/ethnicity, age, household income, education, political affiliation, frequency of attending religious service, region, and county urbanicity variables are baseline data gathered as part of each individual's participation in the NORC AmeriSpeak panel. The trust in science and worldview variables were collected in wave 1. In this table, health status and civic engagement were collected in wave 2. To reflect the dynamic nature of employment status, we looked at change in employment status across the waves.

*$P \le .05$; **$P \le .01$ statistically significant difference from reference category (top row for each category) within wave 1, within wave 2, or within wave 3.
$^{\dagger}P \le .05$
$^{\dagger\dagger}P \le .01$ statistically significant difference within row.

"COVID fatigue" regarding the sustained effort needed to maintain social distancing set in. Support for social distancing dropped sharply from April to July, but then stabilized in November. By November, 9 months into the pandemic, more than three quarters of US adults supported social distancing and mask wearing, and nearly as many (73%) supported contact tracing. Adjusted differences in support for social distancing, indoor mask wearing, and

TABLE 2— Adjusted Public Support Among a National Sample of US Adults for Indoor Mask Wearing and Contact Tracing in July and November 2020

	Mask Wearing Important Wave 2 (July 2020), Predicted Probability of Support	Mask Wearing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (July to November 2020)	Contact Tracing Important Wave 2 (July 2020), Predicted Probability of Support	Contact Tracing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (July to November 2020)
Gender						
Male (Ref)	80.4	76.7	−3.7	73.2	68.1	−5.1
Female	79.4	81.4	2.0	74.0	76.4**	2.4
Race/ethnicity						
Non-Hispanic White (Ref)	78.3	79.0	0.7	72.1	70.3	−1.8
Non-Hispanic Black	85.0	78.0	−7.0	76.2	75.9	−0.3
Non-Hispanic other	84.3	76.8	−7.5	79.8	80.9*	1.1
Hispanic	80.3	81.3	1.0	74.2	73.0	−1.2
Age, y						
18–34 (Ref)	75.8	75.0	−0.8	69.8	71.3	1.5
35–49	71.6	72.4	0.8	64.1	60.9*	−3.2
50–64	84.8*	81.7	−3.1	79.4*	76.0	−3.4
≥ 65	88.8**	88.6**	−0.2	83.0**	82.6*	−0.4
Household income, $						
< 35 000 (Ref)	75.4	74.3	−1.1	73.8	65.4	−8.4
35 000–74 999	79.6	78.6	−1.0	72.1	73.6*	1.5
≥ 75 000	83.9*	84.4**	0.5	74.9	77.4**	2.5
Education						
≤ high-school diploma (Ref)	78.8	76.3	−2.5	69.5	71.3	1.8
Some college	79.8	77.4	−2.4	71.9	70.8	−1.1
≥ bachelor's degree	81.5	85.5**	4.0	80.2	75.7	−4.5
Health status						
Excellent (Ref)	81.1	73.8	−7.3	77.1	72.7	−4.4
Very good	77.7	77.3	−0.4	74.8	68.3	−6.5
Good	80.2	80.4	0.2	69.3	71.4	2.1
Fair or poor	82.8	81.8	−1.0	78.5	81.9	3.4
Employment status						
Employed in March, July, and November (Ref)	76.7	77.4	0.7	69.8	70.7	0.9
Employed in March, but unemployed or not in workforce for another reason in July or November	85.0*	86.8*	1.8	74.3	77.4	3.1
Not employed in March	82.0	78.2	−3.8	78.0*	72.9	−5.1
Political affiliation						
Democrat (Ref)	91.0	89.1	−1.9	82.9	81.8	−1.1
Independent	81.1**	80.2**	−0.9	75.9	73.5*	−2.4

Continued

TABLE 2— Continued

	Mask Wearing Important Wave 2 (July 2020), Predicted Probability of Support	Mask Wearing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (July to November 2020)	Contact Tracing Important Wave 2 (July 2020), Predicted Probability of Support	Contact Tracing Important Wave 3 (November 2020), Predicted Probability of Support	Adjusted Percentage Point Change (July to November 2020)
Republican	67.2**	67.4**	0.2	61.0**	61.6**	0.6
Religious service attendance						
Never (Ref)	78.2	77.5	−0.7	71.4	70.7	−0.7
Sometimes	82.4	79.3	−3.1	77.2	73.1	−4.1
Often	75.4	80.4	5.0	72.7	73.0	0.3
Unknown	85.0	78.4	−6.6	69.4	72.5	3.1
Civic engagement						
Unengaged (Ref)	80.2	79.4	−0.8	73.7	72.5	−1.2
Engaged	75.2	74.4	−0.8	72.3	72.5	0.2
Trusts science						
A lot (Ref)	87.3	89.2	1.9	84.2	82.6	−1.6
Some	74.4**	71.0**	−3.4	64.2**	64.9**	0.7
Not much or not at all	52.2**	55.1**	2.9	41.7**	34.8**	−6.9
Worldview						
Fluid (Ref)	81.5	86.1	4.6	75.6	83.1	7.5
Mixed	80.6	79.0	−1.6	73.1	71.3**	−1.8
Fixed	76.7	76.2	−0.5	74.0	69.3**	−4.7
Region						
Northeast (Ref)	84.3	78.1	−6.2	78.4	71.4	−7.0
Midwest	77.0	77.5	0.5	69.9	71.9	2.0
South	80.6	83.5	2.9	74.0	73.6	−0.4
West	78.4	73.7	−4.7	73.2	71.8	−1.4
Urbanicity						
Metropolitan (Ref)	80.7	79.7	−1.0	73.4	72.3	−1.1
Micropolitan	77.4	79.2	1.8	74.9	75.9	1.0
Rural	73.5	68.6	−4.9	73.4	67.1	−6.3

Note. Logistic regression models examining dichotomous measures of agreement that mask wearing or contact tracing is important. Respondents who answered that mask wearing or contact tracing is extremely or moderately important were coded as 1, and those who answered that it is neutral, slightly important, or not important at all were coded as zero. The table reports average predicted probabilities, which are calculated by using the observation values in our sample for all other variables. The gender, race/ethnicity, age, household income, education, political affiliation, frequency of attending religious service, region, and county urbanicity variables are baseline data gathered as part of each individual's participation in the NORC AmeriSpeak panel. The trust in science and worldview variables were collected in wave 1. In this table, health status and civic engagement were collected in wave 2. To reflect the dynamic nature of employment status, we looked at change in employment status across the waves.

*$P \leq .05$; **$P \leq .01$ statistically significant difference from reference category (top row for each category) within wave 1, within wave 2, or within wave 3.
†$P \leq .05$
††$P \leq .01$ statistically significant difference within row.

contact tracing were most pronounced by age, partisanship, and trust in science.

The dramatic decline observed in support for social distancing among young adults corresponds with evidence of rapidly rising case counts among people in their 20s and 30s.[21] Young adults also had much lower support for mask wearing and contact tracing relative to those older than 50 years. These findings reinforce the need for communication approaches targeting younger adults to increase their knowledge and encourage their adherence. Differences in support for all 3 public health measures were minimal between men and women adjusting for other characteristics, undercutting the caricature that men are unsupportive of mask wearing.[11]

Stark differences between adults trusting science and those with doubts about science persisted in models controlling for political party affiliation. This suggests that trust in science crosscuts political partisanship. Among Republicans, 46% reported trusting science a lot, 49% trusted science some, and 5% trusted science not much or not at all (see Appendix, Exhibit F). Among the subset of Republicans who trusted science a lot, three quarters viewed social distancing as important, but only 52% of Republicans who trusted science some and 44% who trusted science not much or not at all supported social distancing in November 2020. This same pattern held in the earlier waves of data collection. Beyond the current pandemic, it will be essential to develop more effective communication and outreach methods for tackling distrust in science among the public, regardless of party affiliation, given that there remains a sizable percentage of the public who do not trust science.

In adjusted models controlling for partisanship, having a fixed worldview was associated with lower support for contact tracing in November, but not mask wearing or social distancing. The notion of a fixed (vs fluid) worldview that is connected to but distinct from partisanship has been a growing topic of inquiry following the 2016 election.[22,23] Worldview has been hypothesized to drive mundane areas of personal taste (e.g., choice of car or pet) and global shifts such as gravitation in US policy toward isolationist responses to perceived threats in areas like trade, immigration, and law and order.[16,24] To our knowledge, no empirical research has examined in depth the role of a fixed versus fluid worldview on public health attitudes. Those with fixed worldviews tend to view life in more concrete, black and white terms and often display a greater than average need for order, while those with a more fluid worldview have more comfort with ambiguity. The desire for order associated with a fixed worldview might seemingly imply a stronger embrace of rule following. As contact tracing is a function of public health law, as is mask wearing in locations with mask mandates on the books, we might have expected those with fixed worldviews to more closely follow legal required measures.

However, in our analysis, we observed the opposite—those respondents with more fixed (and mixed) worldviews supported contact tracing to control COVID-19 transmission at lower levels than those with fluid worldviews. This likely reflects a higher share of those with fixed worldviews among President Trump's supporters and a tendency to adhere to the example set by the former president—in this instance, by disregarding public health mandates. As Hetherington and Weiler explain, people with fixed worldviews tend to resonate with the Trump administration's core messaging (e.g., strong antiimmigration and law-and-order stances).[16] That affinity with President Trump has likely been influential in following his lead on COVID-19 instead of following public health law. A preference for hierarchy and deference to strong authority predisposes those with a fixed worldview to follow a political leader with President Trump's personal attributes.

Limitations

While our study offers national estimates of support for public health measures aimed at controlling the coronavirus pandemic, several limitations are worth noting. First, our survey items measuring support for public health approaches to combat COVID-19 were developed for this study and are not directly comparable with prepandemic attitudes. Second, while the AmeriSpeak panel used probability-based recruitment aligning with best-practice survey research standards, results may be vulnerable to sampling biases.[25] Third, while attrition was quite low, those retained across the entire study period differed from the subset lost to follow up in waves 2 and 3. Those lost to follow up were younger; less likely to be non-Hispanic White; more likely to be Black; less likely to have a bachelor's degree or higher; more likely to be low income, to reside in the West of the country, and to identify as Independent; and less likely to support social distancing (see Appendix, Exhibit C).

Fourth, while measures of household income, religiosity, health status, and civic engagement were treated as unvarying across the 3 waves, in reality, they may have changed over the study period, and this was an important limitation. Fifth, our study relied on a general measure of trust in science; we did not directly measure trust in the scientific evidence base for specific public health approaches (e.g., the science on mask wearing). We chose to examine opinion on trust in science in general terms to capture a broader sentiment transcending any single scientific domain.

However, we cannot directly measure how beliefs about the scientific evidence base underlying specific approaches (e.g., the scientific evidence supporting mask wearing) correspond to support for strategies to combat the pandemic. Finally, our sample size may inhibit our ability to detect statistically significant differences in support for public health measures with certain subgroups. However, our ability to follow the same survey respondents in April, July, and November is an important strength of the approach.

Conclusions

To better mobilize support for the pandemic response, it is critical to understand the sources of people's skepticism. Public health measures including social distancing, mask wearing, and contact tracing are among the best available options for controlling coronavirus spread and minimizing mortality and morbidity associated with COVID-19. Understanding and developing strategies to tackle subgroups of the population with lower support for these lifesaving measures is essential for sustaining the robust, collective response that will be needed until widespread immunity is achieved.

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CONTRIBUTORS

C. L. Barry contributed to the conceptualization and design of the study, interpretation of the data, drafting of the article, and review and revision of the article. H. Han, R. Presskreischer, and E. E. McGinty contributed to the conceptualization and design of the study and interpretation of the data and critically reviewed and revised the article. K. E. Anderson contributed through conducting the statistical analyses, interpreting the data, and critically reviewing and revising the article. All authors approved the final article as submitted and agree to be accountable for all aspects of the work.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (approval 13323).

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The Changing Epidemiology of Hepatitis C Virus Infection in the United States During the Years 2010 to 2018

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See also del Rio and Springer, p. 768.

Hepatitis C virus (HCV) infection remains an important cause of morbidity and mortality throughout the world, leading to serious health problems among those who are chronically infected. Since 1992, the Centers for Disease Control and Prevention has been collecting data on the incidence of HCV infection in the United States. In 2018, more than 50 000 individuals were estimated to have acute HCV infection.

The most recently reported data on the prevalence of infection indicate that approximately 2.4 million people are living with hepatitis C in the United States. Transmission of HCV occurs predominantly through sharing contaminated equipment for injecting drugs.

Two major events have had a significant impact on the incidence and prevalence of hepatitis C in the past few decades: the US opioid crisis and the discovery of curative treatments for HCV infection. To better understand the impact of these events, we examine reported trends in the incidence and prevalence of infection. (*Am J Public Health*. 2021;111:949–955. https://doi.org/10.2105/AJPH.2020.306149)

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Hepatitis C virus (HCV) infection, the most commonly reported bloodborne infection in the United States, is an important cause of morbidity and mortality. If left untreated, chronic HCV infection can lead to serious health problems, including liver damage, cirrhosis, liver cancer, and death. In 2012, the number of deaths associated with HCV infection began to surpass the number of deaths combined from 60 other nationally notifiable infectious conditions reported to the Centers for Disease Control and Prevention (CDC).[1]

The CDC has been collecting data on the incidence of HCV infection in the United States since 1992. In 2018, a total of 3621 cases of acute hepatitis C were reported to the CDC.[2] To be reported, acute cases must meet both clinical (discrete onset of symptoms and either jaundice or elevated alanine aminotransferase levels) and laboratory (positive test for antibodies to HCV) criteria. However, because infection with HCV is typically asymptomatic, many individuals are unaware that they are infected and either do not seek care or have limited access to care. Moreover, many of those at increased risk for HCV infection are not identified for testing.[3] As a result, their illness is not diagnosed and they are not reported to public health authorities as having an acute infection.

Accounting for underreporting and underascertainment (i.e., cases not meeting the CDC case definition for acute hepatitis C),[4] the CDC estimates that, in 2018, the actual number of acute hepatitis C cases was approximately 50 300. Prevalent HCV infection has been estimated from national population surveys, and during 2013 to 2016 approximately 2.4 million US residents were reported to be living with hepatitis C.[5] In the United States, HCV is transmitted primarily through sharing contaminated equipment for injecting drugs. Two major events have had an important impact on the incidence and prevalence of hepatitis C in the past few decades. One is the current US opioid crisis, particularly injection of opioids, and the second is the discovery, development, and marketing of curative treatments for HCV infection.

EPIDEMIOLOGY OF HCV INFECTION IN THE UNITED STATES

These events are reflected by 2 opposing trends. The most recent estimates of prevalent HCV infection in the United States were derived from analyses of data obtained from respondents to the National Health and Nutrition Examination Survey and 4 additional populations:

incarcerated people, homeless people, active-duty military personnel, and nursing home residents.[5] The authors found that, between 2013 and 2016, approximately 4.1 million individuals were HCV antibody positive (indicative of past or current infection) and approximately 2.4 million were HCV-RNA positive (indicative of current infection). These results for the first time indicated a decline in the prevalence of chronic infection and, consequently, a decrease in mortality among the infected population (a decrease that, as the authors suggested, was most likely a result of the availability and receipt of curative treatment). Moreover, national data from death certificates show a 26% decline in the age-adjusted mortality rate for hepatitis C, from 5.01 deaths per 100 000 population in 2014 to 3.72 deaths per 100 000 population in 2018.[2]

By contrast, after a long decline in incident cases of HCV infection (from 2001 to 2010, the number of reported acute hepatitis C cases declined 48.2%, from 1640 to 850), the number of newly reported infections increased from 2194 in 2014 to 3621 in 2018; this translates to a rate increase of 0.7 per 100 000 population in 2014 to 1.2 per 100 000 population in 2018.[2] A more detailed assessment of trends in incidence reveals a number of notable findings.

According to age group, increases in rates of acute hepatitis C from 2011 to 2018 were larger among individuals 20 to 29 (from 1.2 to 3.1) and 30 to 39 (from 0.8 to 2.6) years of age than among adults in older age groups and children, although to a lesser degree there were also increases among adults aged 40 to 49, 50 to 59, and 60 years or older. Despite a small decline in incidence from 2016 to 2017 for the first time among adults aged 40 to 49 years, this age group again experienced an increase from 2017 to 2018.

The shift over time from older to younger adults reported with acute hepatitis C was similarly demonstrated among women in the United States in a study by Ly et al.[6] The researchers compared the number of reported cases of HCV infection (including past or present infections) among women of reproductive age (15–44 years) and women 45 to 64 years of age from 2006 to 2014. Whereas from 2006 to 2012 the number of cases among women in the older age group was consistently greater than the number among those 15 to 44 years old, by mid-2012 the number of cases among reproductive-aged women overtook the number in the older age group and continued to increase through 2014. Consequently, as cases of HCV infection increase among women of reproductive age, the risk of perinatal transmission also rises.

Increases in the incidence rate of HCV infection are also apparent when the surveillance data are examined by sex and race/ethnicity. From 2010 through 2018, rates of acute hepatitis C increased just over 4-fold among males and nearly 3-fold among females, with a small but widening difference between the sexes in the rate of infection over this period.

The data by race/ethnicity show that from 2003 to 2018, the incidence rate of acute hepatitis C among American Indians/Alaska Natives (3.6 per 100 000 population in 2018) remained high relative to rates in other racial/ethnic groups. By contrast, Asians/Pacific Islanders accounted for fewer cases than other racial/ethnic groups. The number of cases among both groups was small (nationally, only 83 total cases among American Indians/Alaska Natives and 29 cases among Asians/Pacific Islanders were reported in 2018), however, and thus no meaningful trends can be discerned. What is most striking from these data is the increase in the rate of infection among non-Hispanic Whites between 2010 (0.3 per 100 000 population) and 2018 (1.3 per 100 000 population), which outpaced the small increases observed among non-Hispanic Blacks and Hispanics.

Mortality from hepatitis C among US residents varies by demographic characteristics as well,[2] although current patterns reflect HCV infections that occurred 20 to 30 years ago because of the long lag time between diagnosis and death. In 2018, mortality rates were higher among individuals 55 to 64 and 65 to 74 years old than among individuals 45 to 54 years old and those older than 74 years. According to race/ethnicity, mortality rates were higher among Blacks than among Hispanics and Whites, and by sex rates were higher among males than females. Trends in mortality from 2014 to 2018 show the same decreases within age, race/ethnicity, and sex categories as they do overall. It remains to be seen how future trends in mortality will unfold with increases in HCV infection among adults who are younger and primarily White coupled with the relatively recent arrival of curative treatments.

The CDC also collects hepatitis C data by risk behavior or exposure category. Such categories include the following: injection drug use, men who have sex with men, multiple sex partners, occupation, dialysis patients, surgery, and needle stick injury. Injection drug use is the most frequently reported risk factor, accounting for more than half of acute hepatitis C cases each year since 2009. In 2018, 72% of patients with risk factor information reported injection drug use.

OPIOID USE, INJECTION DRUG USE, AND HCV INFECTION

In the United States, rising trends in illicit use of opioids are evident. In one report, data from the 2014 National Survey on Drug Use and Health showed increasing nonmedical use of prescription opioids among individuals 12 years old or older between 2002 and 2009.[7] A study involving Substance Abuse and Mental Health Services Administration data on admissions for substance use disorder treatment showed increases in injection of any opioid and injection of heroin from 2007 to 2014, coupled with an increase in injection of prescription opioids over the same time period.[8]

In that study, trends in injection of any opioid from 2004 to 2014 were compared with trends in the incidence of acute HCV infection during the same period to assess whether these events correlated over time. There were significant concurrent increases in reported cases of acute HCV infection and reported treatment admissions for injection of any opioid between 2004 and 2014, increases that were observed for the nation as a whole as well as among selected demographic populations. Specifically, positive correlations between injection of any opioid and HCV infection were observed primarily among individuals who were White and younger than 39 years, regardless of sex.

More recently, Han et al. examined trends in heroin use and heroin injection and found overall increases in both use and injection from 2002 to 2018 among US adults.[9] In addition, they found that heroin injection was more common among adults 18 to 49 years old and non-Hispanic Whites than among older adults and Blacks or Hispanics, respectively.

The national study that identified the role of the opioid crisis in increasing rates of acute HCV infection was preceded by a similar investigation in which trends from 2006 to 2012 in cases of acute infection among adolescents and young adults (30 years or younger) were compared with admissions to substance abuse treatment centers in 4 Appalachian states (Kentucky, Tennessee, Virginia, and West Virginia) attributed to injection of any opioid.[10] The same concurrent increasing trends in opioid injection and numbers of cases of HCV infection were found. What is notable about this earlier study is that the incidence of acute hepatitis C was significantly higher each year (2006–2012) among adolescents and young adults who resided in nonurban areas than in urban areas. In spite of these findings, a study examining national health insurance claims data revealed that rural residents were less likely to be screened for HCV, even when presenting for likely complications of injection drug use such as skin infection or overdose.[3]

Another study illustrates the impact of HCV infection in the Appalachian region. Researchers examined trends in HCV detection among women of childbearing age, HCV testing among children younger than 2 years, and the proportion of infants born to women nationally and in Kentucky.[11] From 2011 to 2014, the proportion of infants born to HCV-infected women nationally increased by 68%, whereas the proportion in Kentucky increased by 124%. Perinatal HCV transmission occurs in close to 6% of infants born to HCV-infected mothers and is higher among infants born to mothers coinfected with HIV.[12]

These studies show increases in rates of HCV infection in rural areas, but there are also data that demonstrate high rates of infection in urban areas. A 2018 study of 5190 people who inject drugs (PWID) conducted in 10 US cities (Chicago, IL; Dallas and Houston, TX; Los Angeles and San Francisco, CA; Miami, FL; New York, NY; Philadelphia, PA; San Juan, Puerto Rico; and Washington, DC) showed that more than 62% of PWID had been exposed to HCV. Forty percent of the participants had a current HCV infection, and 4% were identified as having an acute infection.[13]

Data from the CDC were also used in a study conducted by Powell et al. The authors compared state rates of acute HCV infection obtained from the CDC with state rates of misuse of OxyContin obtained from the National Survey on Drug Use and Health for the years 2004 to 2015, before and after development in 2010 of an abuse-deterrent version of OxyContin.[14] When the researchers compared rates of acute HCV infection in states with above-median OxyContin misuse rates and rates in states with below-median misuse rates, they found a 222% increase in the former states and only a 75% increase in the latter states between 2004 to 2009 and 2011 to 2015. Although the researchers did not specifically examine injection of OxyContin in their study, they found a concurrent increase from 2010 to 2015 in the rate of acute HCV infection and the mortality rate from heroin. Because injection drug use is the predominant mode of HCV transmission, this positive correlation points to injection of heroin.

Moreover, it has been shown that rates of heroin injection increased significantly between 2003 to 2005 and 2012 to 2014 in the United States,[15] also at the time that rates of HCV infection were increasing. An additional study comparing first use of 4 illicit drugs (heroin, methamphetamine/speed, cocaine, and crack cocaine) revealed that the transition from first use of the drug to injection was most rapid for heroin.[16]

A further key finding from the Powell et al. study was the decline from 2010 to 2014 in misuse of OxyContin after the development of the abuse-deterrent version, at the same time HCV infections were increasing.[14] Compton et al.

observed a similar declining trend from 2010 to 2014 in the number of individuals who used nonmedical prescription opioids and an increase in heroin use over the same period.[7] Fentanyl, frequently sold as heroin, may also be implicated in increasing HCV infection rates. Fentanyl is associated with an increase in the frequency of injections, which in turn is associated with increased risk of HCV transmission.[17,18]

So, what do the findings from these studies suggest? First, we see an increase in the number of cases of HCV infection since 2004, with an estimated 50 300 new cases reported in 2018. Second, most of the newly reported cases are among adults who are young (younger than 40 years) and White, rates are rising among both males and females, and rates are increasing among those who reside in rural and suburban areas, particularly in Appalachian and midwestern states, although selected urban areas have also experienced high rates of HCV infection. Third, these sociodemographic patterns and trends closely align with those observed among PWID, specifically those who inject opioids (including prescription opioids, heroin, and fentanyl).[19]

STEPS FOR PREVENTION

How, then, can hepatitis C and associated injection drug use be prevented? Two important steps are designing and implementing interventions to prevent or reduce the infectious disease consequences of injection drug use and identifying individuals infected with HCV and linking them to care and treatment. As demonstrated by prior research, one of the most effective ways to prevent the negative sequelae related to injecting opioids is to provide medications for opioid use disorder (MOUD) such as methadone and buprenorphine. Moreover, a systematic review of 44 studies of PWID showed that when treatment of substance use disorder and treatment of hepatitis C occurred simultaneously, PWID were more engaged in HCV treatment at all steps of the continuum from diagnosis to cure.[20]

However, national survey data show that there are critical unmet treatment needs in the United States. In 2018, approximately 2 million US persons were estimated to have an opioid use disorder.[21] Data from a national survey focusing on admissions for treatment of substance use disorders revealed that, in 2017, only 34% (n = 682 074) of admissions were for any opioid use, and of these admissions only 18% (n = 364 781) were for injection of heroin or other opioids.[22]

A study by Platt et al. reported findings from a Cochrane review and a meta-analysis assessing the effects of MOUD in addition to another important effort to prevent HCV transmission among PWID: syringe service programs (SSPs).[23] The researchers found that MOUD was associated with a 50% reduction in the risk of HCV infection even after adjustment for confounders and stratification by 3 regions of the world (Australia, North America, and Europe). However, for individuals who do not want or cannot access MOUD, SSPs can provide access to sterile injection equipment, education, and referrals to care. Although MOUD alone reduced the risk of HCV transmission, Platt et al. found that the benefit of MOUD was strengthened in combination with SSPs, with a 74% decrease in the risk of transmission. The study also revealed a reduced risk of HCV infection when SSPs provide sufficient sterile equipment for each injection and are geographically accessible.

For PWID, SSPs may provide not only access to sterile injecting equipment and disposal but also opportunities to receive services on site such as HCV testing, HIV counseling and testing, screening for sexually transmitted diseases, vaccinations for hepatitis A and B, and referral to facilities that provide MOUD.[24,25] Furthermore, data show that SSPs facilitate entrance to substance use treatment.[26–28] A study following PWID for 12 months revealed that those who used an SSP were 2.8 times more likely to substantially reduce (by more than 75%) the amount they injected than those who did not use an SSP and 3.5 times more likely to stop injecting.[29] Those who accessed SSPs after study enrollment were 5 times more likely to enter drug treatment than those who did not use a program.

Despite their proven effectiveness, the geographic spread of these programs in the United States is limited. In a study involving commercial laboratory data, researchers examined the geographic distribution of SSPs relative to the number of young people with HCV infection.[30] They found that 80% of 29 382 young people currently infected with HCV lived more than 10 miles from an SSP. The median distance was 37 miles, with greater distances in rural areas and in southern and midwestern states. The researchers estimated that 2200 more SSPs were needed to address these geographic disparities.

Geographic disparities and lack of access are not the only barriers to effective prevention of HCV infection among PWID and engagement of this population in care. One study examined the incidence of acute HCV infection and policies related to HCV preventive and treatment services for PWID in US states in 2015–2016, specifically laws governing access to safe injection equipment and Medicaid policies regarding eligibility for treatment of HCV infection.[31]

The researchers found that only 3 states had a set of state laws and permissive Medicaid treatment policies capable of comprehensively preventing and treating HCV among PWID: Massachusetts, New Mexico, and Washington. Because state and local policies can affect access to treatment, policymakers might want to consider the impact of these policies on infectious disease and public health.

We have even more opportunities to prevent increases in HCV infection among PWID with the advent of highly effective direct-acting antivirals to treat and cure infection. A modeling study conducted in 2011 showed that treating as few as 10 of every 1000 PWID could result in decreases in the prevalence of HCV infection by as much as 31% in 10 years.[32] This study assumed that fewer than 63% of people who are treated will be successfully cured, and we know today that more than 90% will be cured. Ensuring access to HCV care and treatment among PWID is an important public health issue. Although some success regarding treatment access has been achieved in terms of reducing restrictions based on sobriety and disease severity and expanding provider capacity, barriers remain, including those related to obtaining prior authorization for treatment.

Programs designed to link HCV-infected individuals to care and treatment have been implemented in various populations and locales in the United States, and a number of these efforts have been evaluated. Most recently, a study was conducted to examine the HCV care continuum (i.e., the steps along the pathway from diagnosis of chronic HCV infection to cure) among patients receiving care at 5 federally qualified health centers in Philadelphia where a testing and linkage to care program had been established.[33] Although treatment uptake was low overall, more than two thirds of patients with HCV infection were linked to care, and uptake was higher when treatment was provided on site by trained primary care providers. New CDC recommendations for adult hepatitis C screening should help to increase identification of HCV infections among younger adults, who are currently at greater risk of infection than older adults[34] and who were not included in previous recommendations as a result of their birth year cohort.[35]

To eliminate HCV as a public health threat—to increase the number of individuals who are identified with infection and linked to care and treatment, to increase access to MOUD and SSPs, and to attend to the comorbidities experienced by PWID—barriers limiting access to care among PWID need to be addressed. These barriers occur at the system level, including limited access to care, issues related to cost and insurance coverage, and segregated service delivery; at the provider level, including knowledge about HCV and perceptions or stigma regarding PWID; and at the patient level, including marginalization and competing health priorities.[36]

CONCLUSIONS

What is most notable from the epidemiology of HCV infection over the past decade is a decline in prevalence, due in part to mortality from chronic HCV infection among older adults (i.e., baby boomers) and, more recently, effective treatment that has cured many of those with infections. At the same time, there has been a rise in incidence as a result of new infections among younger adults, a trend that has been intensified by the opioid crisis. Another consequence is that, without treatment, it has been estimated that about 75% to 85% of people newly diagnosed with acute infection will progress to chronic infection, although data from a recent study of adult members of Kaiser Permanente Northern California over the years 1998 to 2017 showed a higher prevalence of spontaneous clearance of HCV infection of almost 69% by 2017.[37]

However, as noted, barriers to treatment remain at the system, provider, and patient levels. Consequently, many people with HCV infection, particularly individuals with limited resources and those who are members of marginalized populations, do not receive life-saving treatment, which in turn can result in higher health care costs associated with treating chronic HCV infection and uninterrupted transmission among the infected population. Such barriers may impede public health's ability to meet the HCV elimination goals outlined in a 2-part report prepared by the National Academies of Sciences, Engineering, and Medicine.[38] Because of the intersection of the rise in HCV infections and injection drug use with the opioid crisis, expanded access to MOUD and SSPs are key elements in the overall effort to prevent HCV infection. AJPH

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Note. The contents of this report on behalf of authors A. K. Asher and S. Schillie do not necessarily represent the official views of the CDC.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

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Association of "#covid19" Versus "#chinesevirus" With Anti-Asian Sentiments on Twitter: March 9–23, 2020

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See also Chou and Gaysynsky, p. 773.

Objectives. To examine the extent to which the phrases, "COVID-19" and "Chinese virus" were associated with anti-Asian sentiments.

Methods. Data were collected from Twitter's Application Programming Interface, which included the hashtags "#covid19" or "#chinesevirus." We analyzed tweets from March 9 to 23, 2020, corresponding to the week before and the week after President Donald J. Trump's tweet with the phrase, "Chinese Virus." Our analysis focused on 1 273 141 hashtags.

Results. One fifth (19.7%) of the 495 289 hashtags with #covid19 showed anti-Asian sentiment, compared with half (50.4%) of the 777 852 hashtags with #chinesevirus. When comparing the week before March 16, 2020, to the week after, there was a significantly greater increase in anti-Asian hashtags associated with #chinesevirus compared with #covid19 ($P < .001$).

Conclusions. Our data provide new empirical evidence supporting recommendations to use the less-stigmatizing term "COVID-19," instead of "Chinese virus." (*Am J Public Health*. 2021;111:956–964. https://doi.org/10.2105/AJPH.2021.306154)

In 2015, the World Health Organization (WHO) wrote

> Disease names really do matter. . . . We've seen certain disease names provoke a backlash against members of particular religious or ethnic communities.[1]

Consequently, the WHO recommended using the phrase "COVID-19" to describe the disease associated with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on February 11, 2020.[2] On February 24, 2020, the WHO stated, "Don't attach locations or ethnicity to the disease, this is not a 'Wuhan Virus,' 'Chinese Virus' or 'Asian Virus.'"[3] Other organizations, such as the US Centers for Disease Control and Prevention (CDC), issued similar guidelines.

The pandemic provides a natural experiment to evaluate the consequences of not adhering to these recommendations. One such test comes from a comparison of the phrase "COVID-19" versus "Chinese Virus," which was tweeted by previous US president Donald J. Trump at 18:51:00 on March 16, 2020, from his official verified Twitter account @realDonaldTrump, which has since been banned by Twitter as of January 8, 2021 (https://blog.twitter.com/en_us/topics/company/2020/suspension.html):

> The United States will be powerfully supporting those industries, like Airlines and others, that are particularly affected by the Chinese Virus. We will be stronger than ever before![4]

Because the former president used the platform often, and because of the power of his office, his tweets could be highly influential. This was the first time he used "Chinese Virus," and, according to newspaper reports, there was a rise in hate crimes against Asians after the president tweeted.[5,6] Yet, many have claimed that the terms are not discriminatory. For example:

> It's not racist. . . . it comes from China. . . . I want to be accurate.[7]
>
> —President Trump

> Anyone who complains that it's racist or xenophobic to call this virus the Chinese coronavirus or the Wuhan virus is a politically correct fool.[8]
>
> —Senator Tom Cotton, R-AR

Others downplayed the words' importance, as seen in a newspaper editorial:

> Hurling the racism charge over such minor issues such as disease names is silly.[9]
>
> —David Mastio

Thus, although the scientific community agrees that "COVID-19" should be used instead of "Chinese virus," influential voices in the government and press argue otherwise.

Social media data, such as from Twitter, may provide evidence regarding these claims. Twitter is an online platform for publicly expressing thoughts and feelings, making it useful for examining real-world behaviors.[10] For example, Twitter has been used to identify political sentiment to predict election results.[11–13] In addition, this information can be used to conduct ecological momentary assessment (ongoing evaluation of in-the-moment experiences)[14] and has been used to study shifts in emotions as a result of natural disasters.[15] Therefore, data from Twitter (tweets and hashtags) have the potential to detect changes in attitudes that lead to the formation of mass public opinions,[16] including hate toward specific groups.

People typically use hashtags to signify agreement and solidarity, but typically do not add hashtags to statements that they find disagreeable (similar to how people use bumper stickers on cars). Furthermore, hashtags can proliferate allied hashtags (e.g., #blacklivesmatter can inspire use of #blackpower, #buyblack, and #sayhername). Thus, hashtags allow information to travel beyond the initial social network and can form collations of speech.[17] This has led researchers to examine how hate-speech hashtags are associated with hate crimes.[18] In this research, the variable that best predicted real-world violence was the hashtag used in the tweet.[17,18]

One study examined 69 470 tweets and "#chinavirus" and "#chinesevirus," which the authors considered to be "representative racist hashtags."[19] The study found temporal fluctuations in use of these hashtags between January and March 2020, and suggested that these fluctuations coincided with worldwide changes in the policy response to the pandemic.[19] This study provided an important foundation, but left unanswered the question of whether the phrase "Chinese virus" is inflammatory in comparison with "COVID-19." This question is important for identifying and describing the consequences of attaching locations or ethnicity to diseases. Accordingly, we investigate these hypotheses:

Hypothesis 1: The tweets with the hashtag #chinesevirus will contain a greater proportion of anti-Asian hashtags than the tweets with the hashtag #covid19.

Hypothesis 2: Anti-Asian hashtags will rise after the president's tweet of "Chinese Virus."

Hypothesis 3: The rise in anti-Asian hashtags will be more pronounced among tweets with #chinesevirus compared with #covid19.

METHODS

We collected data from Twitter's Application Programming Interface, which procures tweets from Twitter's public stream that included the hashtags #covid19 or #chinesevirus. Data were from March 9 to 23, 2020, corresponding to the week before and week after the president's tweet with the phrase, "Chinese Virus." After excluding non-English tweets and hashtags, our analysis sample consisted of 668 597 tweets and 1 273 141 hashtags. In addition, we collected the timestamp of tweets and users (i.e., tweeters).

Analyses focused on hashtags because previous research indicates that hashtags are related to the formation of hate groups and hate crimes and because hashtags can be predictive of behaviors.[11,17,18]

Anti-Asian Hashtags

We studied whether the hashtags associated with #covid19 differed in terms of anti-Asian expressions compared with hashtags associated with #chinesevirus. Tweets with both #covid19 and #chinesevirus were included in each of the groups' analysis. Tweets containing only #covid19 or only #chinesevirus without any other hashtags were excluded in the hashtag analysis. To characterize anti-Asian expressions, the hashtags were independently coded by 2 trained research assistants who were blinded as to whether the hashtags belonged to #covid19 or #chinesevirus.[17]

The characterization of the hashtag was done through a qualitative investigation of the tweet and its neighboring hashtags. A hashtag was considered anti-Asian if it (1) was opposed to or hostile toward the region, the people, or culture of Asia; (2) demonstrated a general fear, mistrust, and hatred of Asian ethnic groups; (3) supported restrictions on Asian immigration; or (4) used derogatory language or condoned punishments toward Asian countries or their people. Examples of anti-Asian hashtags included #bateatingchinese, #yellowmanfever, #makethecommiechinesepay, #disgustingchinese, #commieflu, #chopstickchins, and #chinkflu.

We coded as “other” the remaining hashtags, including those that

1. were neutral (e.g., #washhands) or positive (e.g., #saferathome);
2. demonstrated hostility toward other racial groups (e.g., #nonrentingtoblacks);
3. were antiimmigrant (e.g., #secureourborders) but not specific to Asians;
4. criticized policies implemented by the Chinese government about Hong Kong, Taiwan, and Tibet (e.g., #tibetpolicestate); and
5. were conspiracy stories (e.g., #wuhancoverup).

Disagreements in coding between the 2 raters was minimal; the interrater reliability between them was 93.7%. Disagreements were adjudicated by a third coder.

Temporal Trends

A daily accumulation of the number of hashtags from tweets with #covid19 and #chinesevirus was calculated from March 9 to 23, 2020. In addition, we calculated and compared the daily growth of anti-Asian hashtags.

Statistical Analysis

We used the *t* test to compare the mean number of tweets per day, users per day, hashtags per day, and anti-Asian hashtags per day between the #covid19 and #chinesevirus group tweets. We used the χ^2 test to test the difference in the change in proportion of anti-Asian and non–anti-Asian hashtags between the #chinesevirus and #covid19 groups before versus after Trump’s tweet, which occurred at 18:51:00 on March 16, 2020. We used the *t* test to evaluate the difference in means before versus after Trump’s tweet for tweets per day, hashtags per day, anti-Asian hashtags per day, and users per day. We conducted analyses with R version 3.6 (R Core Team, Vienna, Austria).

RESULTS

Table 1 compares the #covid19 and #chinesevirus groups. For the #covid19 group, the total number of tweets was 247 958, the mean number of tweets per day was 6340.8 (SD = 6410.5), the mean number of users per day was 1816.9 (SD = 1427.9), the mean number of hashtags per day was 33 019.3 (SD = 31 366.0), and the mean number of anti-Asian hashtags per day was 6524.6 (SD = 6337.9). For the #chinesevirus group, the total number of tweets was 495 287, the mean number of tweets per day was 16 530.53 (SD = 19 471.7), the mean number of users per day was 4264.2 (SD = 4953.2), the mean number of hashtags per day was 51 856.8 (SD = 60 717.8), and the mean number of anti-Asian hashtags per day was 26 130.5 (SD = 31 174.81). We saw no significant differences in these descriptive statistics between the #covid19 and #chinesevirus groups. A significantly higher mean number of anti-Asian hashtags per day was seen in tweets within the #chinesevirus group compared with tweets within the #covid19 group.

Table 2 compares the #covid19 with #chinesevirus groups across the study period. Overall, there was a significantly higher proportion of anti-Asian hashtags in tweets within the #chinesevirus group compared with tweets within the #covid19 group ($P < .001$). From March 9 to 23, 2020, the total number of hashtags in the #covid19 group was 495 289 with 97 869 (19.8%) of those hashtags being coded as anti-Asian, and the total number of hashtags in the #chinesevirus group was 777 852 with 391 957 (50.4%) of those hashtags being coded as anti-Asian.

Table 2 and Figure 1 also show the changes in hashtags between the groups for #covid19 and #chinesevirus pre–post 18:51:00 on March 16, 2020. For the #covid19 group, the number of hashtags rose by 818.2% (398 005 tweets), and anti-Asian hashtags rose by 797.3% (78 243 tweets). For the #chinesevirus group, the number of hashtags rose by 19 462.6% (769 940 tweets), and anti-Asian hashtags increased by 17 400.2% (387 503 tweets). There was significantly higher proportion of the change in the occurrence of anti-Asian hashtags in tweets in the #chinesevirus group compared with tweets in the #covid19 group ($P < .001$). Viewed another way, within the group of #covid19, the percentage of anti-Asian hashtags declined from 20.2% to 19.7%, whereas in the #chinesevirus group, the percentage declined from 56.3% to 50.4%. Before Trump’s message, there were more hashtags in the #covid19 group than the #chinesevirus group. After his message, both hashtags increased in prevalence. However, there was a significantly larger ($P < .001$) increase in the proportion of hashtags in the #chinesevirus group compared with the #covid19 group. Furthermore, the number of #chinesevirus hashtags surpassed that of #covid19.

TABLE 1— Descriptive Comparisons of #covid19 and #chinesevirus Twitter Hashtags: March 9–23, 2020

Total Tweets	**#covid19 (n = 247 959), Mean (SD)**	**#chinesevirus (n = 495 287), Mean (SD)**	**Difference in Mean (95% CI)**	***t* Test**
Tweets per day	6 340.80 (6410.52)	16 530.53 (19 471.68)	10 189.73 (–21357.05, 977.58)	−1.93
Users per day	1 816.93 (1427.90)	4 264.20 (4953.23)	2 447.27 (–5264.49, 369.96)	−1.84
Hashtags per day	33 019.27 (31 365.97)	51 856.80 (60 717.80)	18 837.53 (–55536.06, 17861.00)	−1.07
Anti-Asian hashtags per day	6 524.60 (6337.90)	26 130.50 (31 174.80)	19 605.90 (–37 097.90, –2113.90)	−2.39*

Note. CI = confidence interval.

*$P < .001$.

Table 2 shows the same patterns for changes in daily averages. For example, the mean number of users per day in the #covid19 group rose from 559 to 2818 (404.11%) after Trump's tweet, whereas in the #chinesevirus group, it climbed from 94 to 7902 (8306.38%). Similarly, the mean number of anti-Asian hashtags per day in the #covid19 group rose from 1431 to 11 694, (717.19%), but the #chinesevirus group soared from 305 to 27 828 (9023.93%).

Figure 2 depicts the dramatic divergence between anti-Asian hashtags in the #chinesevirus group compared with the #covid19 group. There were slightly fewer anti-Asian hashtags associated with the #chinesevirus group than #covid19 group before Trump's message. Anti-Asian hashtags rose on March 16, and by March 17, there were more anti-Asian hashtags associated with the #chinesevirus group. There was a significantly higher difference in the change in the proportion of anti-Asian hashtags from tweets within the #chinesevirus group compared with the #covid19 group (χ^2 [1, n = 1 167 945] = 112 586; $P < .001$).

Although we had high interrater reliability (93.7%) between the 2 raters, we wanted to ensure that our analyses were robust to modeling assumptions. We performed 2 sensitivity analyses to examine if differences in coding changed our results. We reanalyzed the data assuming that

TABLE 2— Comparison of Hashtags #covid19 Versus #chinesevirus on Twitter Before and After 18:51:00 on March 16, 2020

	#covid19 (n = 495 289)			**#chinesevirus (n = 777 852)**			
Total Hashtags	**Pre, No. or Mean (SD)**	**Post, No. or Mean (SD)**	**% Change or Difference in Mean (95% CI)**	**Pre, No. or Mean (SD)**	**Post, No. or Mean (SD)**	**% Change or Difference in Mean (95% CI)**	**Difference in % Change Between #chinesevirus vs #covid19**
Total no.[a]							
All hashtags	48 642	446 647	818.20	3 956	773 896	19 462.60	371 935
Anti-Asian hashtags	9 813	88 056	797.30	2 227	389 730	17 400.20	309 260
Non–anti-Asian hashtags	38 829	358 591	823.50	1 729	384 166	22 119.00	62 675
No. per day							
Tweets	927.50 (168.58)	10 961.50 (5 472.4)	10 034.00 (–14 609.45, −5 458.55)	125.50 (101.35)	30 869.25 (15 960.88)	30 743.75 (–44 087.43, −17 400.07)	. . .
Hashtags	6 080.25 (1 208.12)	55 830.88 (26 367.34)	49 750.63 (–71 798.71, −27 702.54)	494.50 (423.01)	96 737.00 (49 397.71)	96 242.50 (–137 540.31, −54 944.69)	. . .
Anti-Asian hashtags	1 431.25 (321.75)	11 694.12 (5 988.17)	10 262.87 (–15 270.51, −5 255.24)	304.63 (264.53)	51 085.00 (27 828.04)	50 780.38 (–74 045.40, −27 515.35)	. . .
Users	588.50 (103.77)	2818.25 (1 279.66)	2 229.75 (–3 300.27, −1 159.23)	93.50 (69.65)	7 901.88 (4 079.67)	7 808.38 (–11 219.16, −4 397.59)	

Note. CI = confidence interval.

[a] X^2(1, n = 1 167 945) = 112 586; $P < .001$.

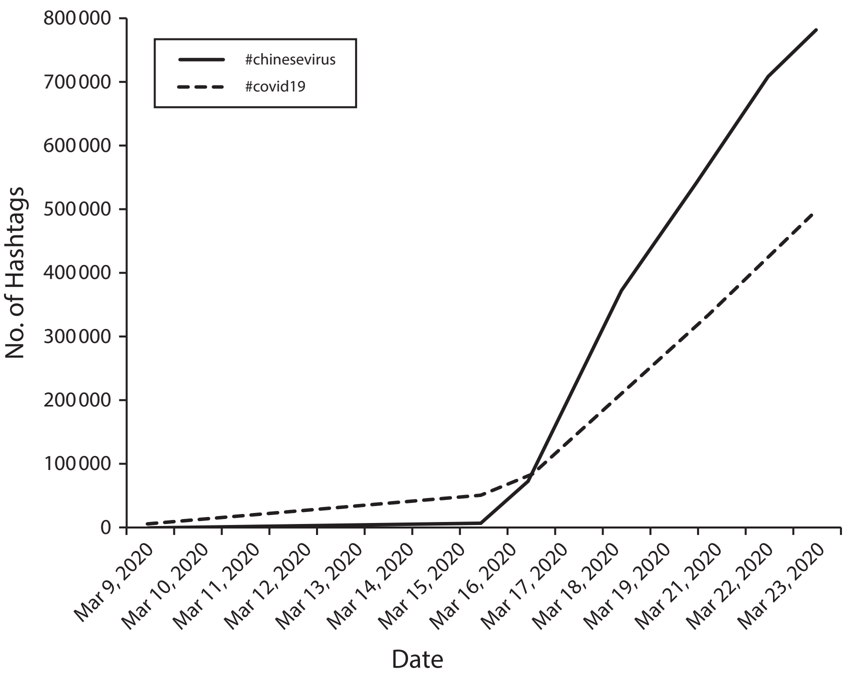

FIGURE 1— **Timeline of All Twitter Hashtags Under #covid19 (n = 495 289) and #chinesevirus (n = 777 852): March 9–23, 2020**

(1) the disagreements were all anti-Asian and (2) the disagreements were all not anti-Asian. The results of these analyses are similar to those reported.

DISCUSSION

A rise in discrimination against people of Asian descent during the COVID-19 pandemic has been reported around the world.[20,21] The United Nations Secretary-General António Guterres announced, "the pandemic continues to unleash a tsunami of hate and xenophobia, scapegoating and scaremongering."[22] To mitigate this discrimination, the WHO has recommended avoiding terms that connect diseases to countries or specific people, and instead promoted the use of neutral scientific terms. Our research on 1.2 million hashtags buttresses their recommendation by showing that the hashtag #chinesevirus is connected to more anti-Asian hashtags than #covid19. Approximately 1 in 5 hashtags with #covid19 were anti-Asian, whereas half of the hashtags with #chinesevirus were anti-Asian.

In the week beginning March 9, 2020, the hashtag #covid19 was more prevalent than #chinesevirus. Also, the number of anti-Asian hashtags associated with these phrases was relatively low and stable.

However, the president's tweet on March 16 coincided with several major changes. First, there was a massive increase in the volume of tweets for both the #covid19 and #chinesevirus groups and in the number of users. Both hashtags together climbed from about 53 000 to 1.2 million in the period studied. Trump's tweet appeared to increase discussion about the pandemic in general, as shown by these example tweets:

> Still seeing a lot of depleted shelves around the Milwaukee area. #covid19 #notoiletpaper (March 16, 2020)

> Best part of working from home? Turning that damn morning alarm off #quarantine #chinesevirus (March 19, 2020)

Second, there was a differential effect on the hashtag #chinesevirus. It overtook the hashtag #covid19 as the more popular hashtag and coincided with a major growth in the number of people using the phrase. The mean number of daily users from the #covid19 group rose by 379%, compared with an increase of 8351% for the #chinesevirus group. Furthermore, the phrase "Chinese virus" may have served as a rallying cry to some supporters, as seen in this example:

> The Coronavirus Outbreak Shows Clearly That President Trump Was Right All Along About Borders, Trade And Most Of All, He Was Right About China #coronaviruspandemic
>
> #chinavirus #chinacoronavirus #trump2020 #chinesevirus (March 17, 2020)

The proportion of anti-Asian hashtags attached to the groups of #covid19 and #chinesevirus declined slightly after March 16 (by 0.46% and 5.9%, respectively). Although statistically significant, we do not view this decline as substantively meaningful. Even with the decline, more than half of the #chinesevirus hashtags were associated with anti-Asian sentiment, compared with 1 in 5 of the #covid19 hashtags.

More importantly, the number of anti-Asian hashtags rose by 797% and 17 400% for #covid19 and #chinesevirus, respectively. This represents a combined increase from about 12 000 to almost a half a million anti-Asian hashtags. This finding aligns with previous studies that suggest a rise in prejudicial language following some of the

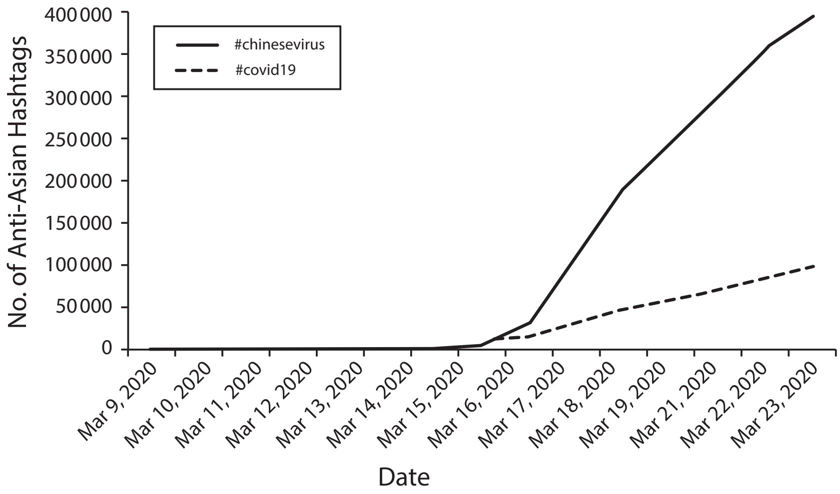

FIGURE 2— **Timeline of Anti-Asian Twitter Hashtags Under #covid19 (n = 97 869) and #chinesevirus (n = 391 957): March 9–23, 2020**

president's tweets and that racist attitudes may be reinforced by institutional support.[23,24]

The growing chorus of hateful words possibly contributed to the rise in hate incidents.[23] We do not have the data to investigate whether these sentiments translated directly to hate incidents. However, indirect evidence comes from the StopAAPIhate.org Web site. From March 19 to 25, 2020, they reported more than 600 anti-Asian hate incidents.

Although we were unable to assess the relationship between hateful hashtags and hate crimes, our results provide a plausible connection because many tweets and hashtags implied violence. For example,

> Fuck the ding dongs. Fuck the ching chongs. And most definitely, fuck the god damn chinks. #chinaliedpeopledied #coronavirus #fuckchina #chinesevirus #wuhanvirus #burnwuhan #bombchina (March 20, 2020)

> #chinesevirus please #nukechina (March 17, 2020)

Furthermore, even if the probability of a hashtag leading to a hate crime is low, the large volume of new hashtags might translate to a noticeable increase in incidents. Indeed, even a single hate crime is 1 too many. Previous studies have documented the link between racist discussion on social media like Twitter and Facebook and hate crimes.[18] One study found a relationship in the use of racist hashtags such as #banislam with hate crimes targeting Muslims.[18]

One other study documented the association of negative sentiment in tweets with #chinesevirus. Their study examined a smaller sample (n = 174 488) over a longer period of 3 months.[19] They identified temporal variation in sentiment of tweets with #chinesevirus, although their methodology differed from ours. They assumed that the phrase #chinesevirus was itself discriminatory, whereas we did not make that assumption. Rather, we wanted to provide some objective evidence as to whether this term might be considered biased through its connection with other prejudicial terms. Thus, our studies provide complementary information.

Previous studies have used sentiment analysis to identify opinions toward the topic of interest.[25,26] However, sentiment analysis is used to detect the polarity of the tweet (e.g., positive or negative opinion) and cannot detect anti-Asian expressions, inappropriate references, nuances, slang, or sarcasm.[27] For instance, sarcastic tweets without hashtags have been shown to be difficult to distinguish because hashtags convey an extralinguistic that is the equivalent of nonverbal expressions in live interactions.[28,29] Hence, hashtag extraction and the manual labeling of hashtags has been shown to be more effective at accurately identifying the position of users toward the topic of study.[27] In an example, the hashtags "#batmaneatingflu" or "#yellowmanflu" could be classified as a neutral sentiment using a lexicon and rule-based sentiment analysis tool, whereas we considered these hashtags anti-Asian in our study. Thus, a strength of our study was the use of qualitative assessments to directly code for anti-Asian sentiment.

Asian Americans face the dual stereotypes of being a "model minority" and the "yellow peril."[30] The former refers to the purported successes of Asian communities, and, as a consequence, Asians are viewed as easy targets for scapegoating. By contrast, the latter refers to the invasion by a foreign threat. The pandemic further illustrates how a disease can garner support for the yellow peril stereotype. We caution that even the model minority stereotype leads to problems and may generate a false idea that Asians are immune to prejudice and discrimination. It also ignores the many needs within the community and is used as a foil against other racial groups (i.e., If Asians are successful, why cannot other groups be too?). The more fundamental problem of both stereotypes is that they divert attention away from the broader issues of structural racism and White supremacy.

Limitations

We focused on hashtags and not tweets in this study. While a future study could code each individual tweet, we opted to use hashtags because of their categorical function, whose occurrence can become a trending topic.[27] A hashtag acts like a summary of the tweet, a global overview of the content in the text of the tweet. For instance, analysis of hashtags has been shown to be more effective at determining political affiliation of a user than analysis of the tweet because of its ability to better capture the real position of the user.[27] Therefore, hashtags allow us to identify what topics and groups the user intends to be connected to more than the tweet itself. Furthermore, hashtags archive messages and allow messages to be found by organizations and spread virtually to users outside of their direct network. Hashtags help access new audiences, maximize reach, and increase likelihood of viral attention to posts.[31] Thus, hashtagging increases the level of engagement of users.[31]

We also caution that opinions on Twitter may not be generalizable to the population, and there are potential selection biases on who uses the platform. Furthermore, our analyses do not extend to other social media platforms (e.g., Facebook) or modes of communication (e.g., newspapers). It would be useful for future research to study the other sources.

In addition, we did not code hashtags targeted to the Chinese government and conspiracy theories as anti-Asian. We took this approach because some hashtags are used to categorize information (e.g., curate a list of theories related the pandemic's origins). This likely made our analyses more conservative by underestimating antipathy directed toward Asians.

Public Health Implications

These results imply some possible suggestions for research and action. First, it has been encouraging that many agencies have issued statements against stigmatizing language. However, communication strategies have not been well-coordinated or thoughtfully planned. As we move into the second year of this pandemic, public health agencies should coordinate with policy makers, communication experts, and media outlets to not only avoid words that carry pejorative connotations but also to design countermessaging strategies to reverse the harm that has already been done to Asian communities.

Second, the monitoring, prevention, and prosecution of hate crimes is usually the purview of the Department of Justice. Yet, the pandemic clearly illustrates how such crimes are interwoven with diseases and other health issues, and, hence, relegating hate crimes to a single agency is suboptimal. The Department of Justice should partner with the CDC and other agencies to create a coordinated response to quell the rise in discriminatory speech, hate crimes, and other forms of discrimination.

Third, in consideration of future outbreaks, scientific names should be used to describe pathogens, but it will take time to identify them. In advance, public health officials can create generic templates and talking points that can be provided to the media from which to describe new outbreaks.

Fourth, more basic research should be conducted to understand stigma and medical terminology. It is clear that we should not label people with their diseases, but how medical terms absorb negative or positive connotations and how it shapes behaviors needs further investigation.

Fifth, our research provides a framework from which to study related phenomena. For example, recent reports have surfaced on the *Vespa mandarinia,* more popularly known as the "Asian Giant Hornet" or the "murder hornet," with reports that echo the trope of the "yellow peril" from Asia coming to invade the United States.[32] The lessons learned from COVID-19 could inform how we describe invasive insects, animals, and plants.

Our analyses suggest that the simple descriptor of a disease can carry racial overtones. Everyone—scientists, community members, and politicians—should use neutral, nonjudgmental language to avoid stigmatizing communities and perpetuating discrimination. Our analyses are consistent with recommendations to use neutral terminology.[33] "Chinese virus" was related to more than twice as many hate expressions compared with "COVID-19." However, we caution that even the more neutral term of COVID-19 was associated with anti-Asian sentiment in a fifth of the hashtags. Thus, scientific language alone is not enough to erase prejudicial sentiments. Rather, we need to focus on the broader social determinants that perpetuate structural racism. AJPH

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CONTRIBUTORS

Y. Hswen conceptualized the idea, developed and carried out the analytical methods, interpreted the findings, and wrote the article. X. Xu helped collect the data, and coded and assisted with analysis. A. Hing coded data, helped with the interpretation of the data, and edited the article. J. B. Hawkins and J. S. Brownstein supervised the analytical methods and the data collection and provided critical feedback. G. C. Gee encouraged Y. Hswen to investigate and supervised the findings of the work, interpreted the results, and wrote the article alongside with Y. Hswen.

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CONFLICTS OF INTEREST

None of the authors have any conflicts of interests to disclose.

HUMAN PARTICIPANT PROTECTION

Institutional review board approval was not needed as this was not human participants' research.

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Transitions in "Privatized" Prison Health Systems: Emergency Department Visits and Hospitalizations Among Incarcerated People in Florida, 2011–2018

Jessica L. Adler, PhD, Weiwei Chen, PhD, and Timothy F. Page, PhD

Objectives. To examine rates of emergency department (ED) visits and hospitalizations among incarcerated people in Florida during a period when health care management in the state's prisons underwent transitions.

Methods. We used Florida ED visit and hospital discharge data (2011–2018) to depict the trend in ED visit and hospital discharge rates among incarcerated people. We proxied incarcerated people using individuals admitted from and discharged or transferred to a court or law enforcement agency. We fitted a regression with year indicators to examine the significance of yearly changes.

Results. Among incarcerated people in Florida, ED visit rates quadrupled, and hospitalization rates doubled, between 2015 and 2018, a period when no similar trends were evident in the nonincarcerated population.

Public Health Implications. Increasing the amount and flexibility of payments to contractors overseeing prison health services may foster higher rates of hospital utilization among incarcerated people and higher costs, without addressing major quality of care problems. Hospitals and government agencies should transparently report on health care utilization and outcomes among incarcerated people to ensure better oversight of services for a highly vulnerable population. (*Am J Public Health*. 2021;111:965–968. https://doi.org/10.2105/AJPH.2020.305988)

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Studies suggest that health services offered in jails and prisons are inconsistent and uncoordinated[1] and that incarceration is a "sociostructural driver of health inequities."[2] Limited research that exists on hospital utilization among incarcerated people focuses on the complexities of public financing for services, common diagnoses, and treatment challenges.[3,4] We examined emergency department (ED) visit and hospitalization rates among incarcerated people in Florida in the context of changes in the management of prison medical services that could have influenced access to care.

METHODS

We used 2011–2018 ED and hospital discharge data from Florida's Agency for Health Care Administration. Although this agency's data lack a classification specifically for incarcerated people, we created a proxy using the source of admission and postvisit destination. We included those referred or admitted to hospitals from incarceration facilities or from court or law enforcement, and discharged or transferred to incarceration facilities or to court or law enforcement. We measured hospital use among incarcerated people by the number of ED visits and hospitalizations. We also computed numbers among nonincarcerated individuals by subtracting the visits and hospitalizations of incarcerated people from total visits and hospitalizations. We then adjusted the visits and hospitalizations for population and presented them as a rate per 1000 people. The incarcerated population included people under the jurisdiction of the Florida Department of Corrections (FDC) and Florida jails (data from Bureau of Justice Statistics and FDC), which represent the most pervasive incarceration facilities in the state.

Quarterly ED visit and hospitalization rates among incarcerated and nonincarcerated people are shown from the first quarter of 2011 to the second quarter of 2018 (Figure 1). We also tested changes by year using a regression model (see the Appendix, available as a supplement to the online version of this article at http://www.ajph.org).

RESULTS

The ED visit rate among incarcerated people, steady between 2012 and 2014, began increasing in 2015 and remained higher through 2018 (Figure 1a). Meanwhile, the hospitalization rate of incarcerated people fell in 2012 and 2013, before beginning to climb in 2015. The rate doubled by 2017 (Figure 1b). We found no similar trends among the nonincarcerated.

DISCUSSION

We show that ED visit and hospitalization rates among incarcerated people in Florida increased significantly between 2015 and 2018. Multiple factors could have contributed to the rise. Given that the trend was sudden and significant in both ED visits and hospitalizations, we focus here on issues related to access to care from jails and state prisons.

Although jail and prison populations are placed together in hospital data, the 2 groups are affected by different bureaucracies. Jails are generally overseen by local governments, and the management of their health care services, including practices surrounding hospital transfers, vary.[5] It is difficult to pinpoint how diverse policies and practices governing jails throughout Florida—which detain approximately 53 000 people—related to changes in statewide hospital visit rates among incarcerated people.

Health services in state prisons are overseen by state departments of corrections, which determine how care will be managed in multiple facilities. As of 2018, Florida was 1 of 20 states that contracted with outside companies to deliver all or most care in its prisons. In Florida and several other states operating under the “privatized” model, vendors coordinate both on-site and off-site care. The FDC and other departments of corrections report that community hospital care constitutes a significant expense—20% or more of health costs.[6(p2)]

The observed increase in ED visit and hospitalization rates occurred when the management of medical care in Florida’s prisons—where approximately 100 000 people are detained—underwent a transition. In 2012, the FDC signed contracts with 2 companies, Corizon and Wexford, to oversee health services in most prisons in the state. Because the companies were paid a capitated rate “per prisoner” to cover all care—on-site and off-site—they had a financial disincentive to providing costly services, such as outside hospitalization, and there was a “decline in the quantity and quality of care.”[7(p14–29)]

In 2016, after Corizon reported that the capitated fee structure was overly “constraining” and terminated its contract with the state,[7(p18)] Florida hired another company, Centurion, stipulating reimbursement for “actual expenses” and an additional administrative fee of 13.5% of those expenses.[8(p97)] The following year, Centurion also assumed control of facilities overseen by Wexford, because of the latter company’s “serious performance issues.”[7(p18–30)] The Centurion contract, like Corizon and Wexford’s, noted: “whenever possible, services will be provided on-site,” but “when hospitalization of an inmate is required, the contractor will be responsible for the arrangement and timely access to care.”[8(p3,8,10)]

From 2012 to 2014, when Corizon and Wexford were paid capitated fees for services, ED visit rates were generally steady, and hospitalization rates decreased. From 2016 to 2018, when Centurion was paid “cost-plus,” ED visit rates were approximately 4 times higher, and hospitalization rates roughly doubled (Figure 1). Although cost savings were achieved under the capitated contracts, according to a state report, they likely spurred a “backlog of medical/mental health issues.”[7(p30)]

The start date of the visit rate increase—early 2015, before Centurion assumed control—underscores that hospital utilization is likely related not only to contract terms but also to oversight. In September 2014, amid an onslaught of press coverage about inhumane conditions in facilities—featuring details about investigations and lawsuits related to wrongful deaths of people like Darren Rainey, a mentally ill man who was burned to death in a scalding shower—the FDC informed Corizon that the state would withhold payment unless conditions improved.[9] In the following quarter, the ED visit rate among incarcerated people almost doubled; soon thereafter, hospitalization rates also increased. Since 2015,

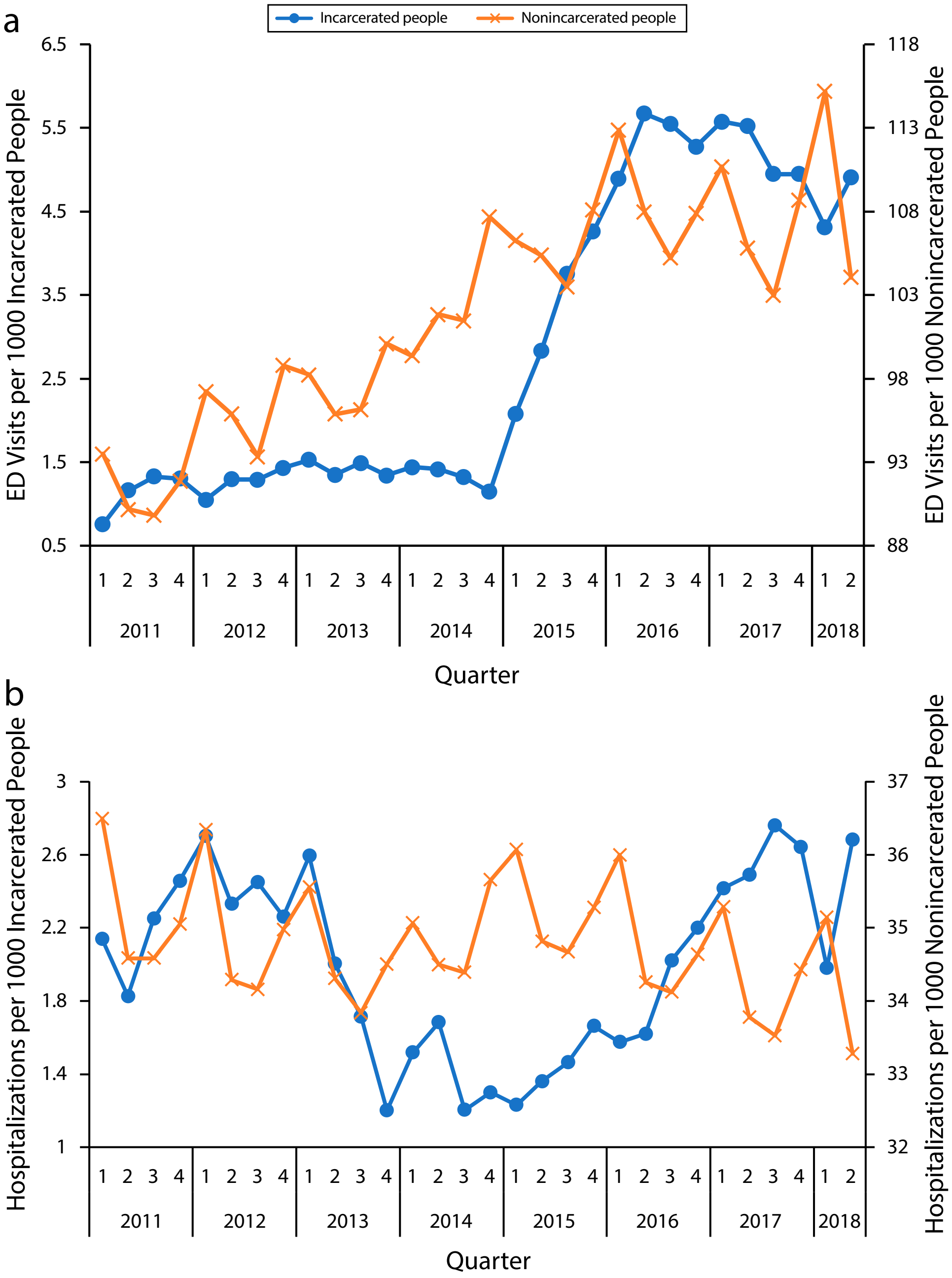

FIGURE 1— **Rates per 1000 Incarcerated and Nonincarcerated People of (a) Emergency Department (ED) Visits and (b) Hospitalization: Florida, 2011 Quarter 1–2018 Quarter 2**

multiple consent decrees and judgments resulting from health care–related litigation likely contributed to higher ED visit and hospitalization rates.[7(p31)]

Reports from Florida's Correctional Medical Authority offer insight into deficiencies in prison medical services that may contribute to community hospital utilization. During fiscal year 2017–2018, the Correctional Medical Authority identified 612 findings—shortfalls related to access to and clinical adequacy of care—in 17 surveyed FDC institutions. Between July 1, 2017 and June 30, 2018, systemwide "areas of concern" included lack of timely care, referrals to specialists, proper implementation of physicians' orders, mental health screenings, and counseling.[10(p20–21)] As ED visit and hospitalization rates increased—and costs accelerated[7(p30)]—the FDC's mortality rate rose from 357 per 100 000 in 2015 to 2016 to 481 per 100 000 in fiscal year 2017–2018.[11]

Limitations

Reflecting the larger problem that incarcerated people are excluded from "most national public health data collection systems,"[12] Florida hospital data do not offer precise measures of hospital visits among incarcerated people. We created a proxy by restricting our population on the basis of admission source and discharge destination—incarceration facilities, courts, and police or law enforcement. Within that population, however, it is not possible to examine admission to or discharge from only incarceration facilities, or to determine which type of facility undertook transfers. We maintain that the timing and suddenness of the change in both ED and inpatient visit rates suggest that the trends are related to changes in the management of prison medical services. Further research into hospital utilization among incarcerated people, including circumstances that affect their access to care, is warranted.

Public Health Implications

The nature of health services available to incarcerated people in "privatized" prison health systems relates to extent of public oversight and the terms of government contracts. Contractors paid capitated rates are likely to limit the availability of services; those paid "cost-plus" are likely to make them somewhat more accessible. Although increasing the quantity of services may satisfy the compliance requirements of state contracts and the mandates stemming from litigation, it does not address systemic quality of care problems—even as it drives up costs. Hospitals and government agencies, such as departments of corrections, should transparently report on health care utilization and outcomes of incarcerated people to ensure better oversight of services for a highly vulnerable population.

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CONTRIBUTORS

J. L. Adler led the conceptualization and writing of the article. W. Chen led quantitative analyses of data and assisted with conceptualization and writing. T. F. Page assisted with conceptualization, writing, and quantitative analyses.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

The Health Sciences Institutional Review Board of Florida International University has approved this study for the use of human participants via the Full Board Review process (approval no. IRB-20-0047).

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Use of Cannabis for Harm Reduction Among People at High Risk for Overdose in Vancouver, Canada (2016–2018)

Janice Mok, BHSc, M.-J. Milloy, PhD, Cameron Grant, BSc, Stephanie Lake, PhD, Kora DeBeck, PhD, Kanna Hayashi, PhD, and M. Eugenia Socías, MD, MSC

Objectives. To characterize the prevalence and reasons for the use of cannabis as a strategy to reduce the harms arising from other substances.

Methods. We drew data about recent cannabis use and intentions from 3 prospective cohort studies of marginalized people who use drugs based in Vancouver, Canada, from June 2016 to May 2018. The primary outcome was "use of cannabis for harm reduction," defined as using cannabis for substitution for licit or illicit substances such as heroin or other opioids, cocaine, methamphetamine, or alcohol; treating withdrawal; or coming down off other drugs.

Results. Approximately 1 in 4 participants reported using cannabis for harm reduction at least once during the study period. The most frequent reasons included substituting for stimulants (50%) and substituting for illicit opioids (31%).

Conclusions. The use of cannabis for harm reduction is a common strategy among people who use drugs in our setting. Further research into the factors associated with this strategy is needed. Better characterization of the risks and benefits of substitution strategies, including for opioids and stimulants, may prompt new treatment options for PWUD. (*Am J Public Health*. 2021;111:969–972. https://doi.org/10.2105/AJPH.2021.306168)

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Globally, cannabis is the most commonly used drug, with 192 million people using it in 2018.[1] Research surrounding cannabis has predominantly focused on its potential harms.[2] Recently, interest in the therapeutic potential of cannabis has emerged, including its utility as a harm-reduction strategy, by using cannabis to reduce, eliminate, or substitute for other psychoactive substances.[3]

Previous studies have examined the therapeutic potential of cannabis substitution for specific substances[4,5]; this study aimed to evaluate the prevalence of and reasons for using cannabis as a harm-reduction strategy among the broader population of people who use drugs (PWUD) during a community-wide opioid crisis.

METHODS

We drew data from 3 ongoing prospective cohort studies involving PWUD in Vancouver, Canada.[5] The Vancouver Injection Drug Users Study (VIDUS) consists of HIV-negative adults (aged ≥ 18 years) who injected drugs in the month before enrollment; the AIDS Care Cohort to Evaluate exposure to Survival Services (ACCESS) includes HIV-positive adults who used illicit drugs; and the At-Risk Youth Study (ARYS), includes street-involved youths aged 14 to 26 years who used illicit drugs. Participants were recruited through community-based outreach, including in Vancouver's Downtown Eastside and Downtown South—areas with prevalent polysubstance use, marginalization, and an ongoing community-wide opioid overdose crisis.

After participants provide written informed consent, they complete interview-administered questionnaires at baseline and at follow-up visits every

6 months. These questionnaires gather data on demographics, patterns of drug use, use of health care and social services, and other health-related factors. Nurses also conduct testing for HIV and hepatitis C serostatus, as appropriate. Participants receive a $40 honorarium at each study visit.

We restricted the study sample to participants with at least 1 follow-up interview between June 2016 and May 2018, as questions about specific uses of cannabis were added in June 2016.

Measures

Participants who reported using cannabis within the last 6 months were asked the reason for its use, including intoxication, pain management, nausea, mental health, or substance-use related challenges. Use of cannabis for harm reduction was defined by self-reported use of cannabis for substitution for licit or illicit substances, such as opioids, stimulants, or alcohol; treating withdrawal; or coming down off other drugs. While "harm reduction" is broad and can include formal policies and programs, in this study, the term describes self-directed practices to moderate the use of other substances. Participants reporting no cannabis use in the 6 months before the study visit were categorized as not having used cannabis for harm reduction. This measure was developed and refined by investigators in consultation with study participants and front-line research staff.[6]

Analyses

We characterized the analytic sample using descriptive statistics based on baseline data. We analyzed frequencies of the reasons for using cannabis for harm reduction. Participants could give more than 1 reason for using cannabis for harm reduction, resulting in more observations than participants.

RESULTS

The analysis included 1936 participants who contributed a median of 3 observations (interquartile range [IQR] = 2–4), for a total of 5706 observations. The median age at the earliest interview was 42 (IQR = 29–53) years; 1201 participants (62%) reported male gender; and 945 (49%) reported White race. The most common illicit drug used daily was cannabis (n = 547; 28%), followed by heroin via injection (n = 404; 21%) and crystal methamphetamine via any route (n = 331; 17%). Nearly half of the study sample (n = 838; 43%) were not enrolled in any form of treatment of substance use disorders.

Over the study period, 1281 (66%) participants used cannabis at least once. There were 425 participants who reported using cannabis for harm reduction (22% of total participants and 33% among participants who used cannabis at least once). There were 551 observations recording cannabis use for harm reduction, representing 10% of all interviews and 17% of interviews among people who used cannabis at least once.

As shown in Figure 1, the most frequent uses of cannabis for harm reduction were substituting for stimulants (e.g., cocaine, methamphetamine; n = 274; 50%) and for illicit opioids (n = 171; 31%). Other reasons included coming off of other drugs (n = 137; 25%), substitution for licit substances (n = 85; 15%), and treatment of withdrawal (n = 84; 15%).

DISCUSSION

Among our sample of PWUD in Vancouver, use of cannabis for harm reduction was a common strategy, reported by approximately 1 in 4 respondents at least once during the study period. The most frequent reasons included substitution for stimulants or for illicit opioids.

Treatments for stimulant-use disorders have been found to be of limited efficacy.[7] This may partially explain the high prevalence of cannabis substitution for stimulants in our study. Substitution may directly decrease substance use, as suggested by an observational study in our setting demonstrating that intentional cannabis use preceded reduced frequency of crack cocaine use.[5] While substitution may not always be an intentional attempt to lessen stimulant use, it may have indirect positive effects, including reduced cravings and less aggressive behavior.[8] Further exploration of cannabis substitution among people who use stimulants may help inform harm-reduction strategies in this population, who are at high risk of health complications, and also prompt the evaluation of new treatment options for stimulant-use disorders.

In light of ongoing opioid overdose crises, substitution of cannabis for opioids is an area under much research and debate.[3] A recent clinical trial demonstrated that cannabidiol, a nonintoxicating component in some cannabis preparations, decreased opioid cravings and drug-related anxiety.[4] Similarly, initial population-based research showed a negative association between jurisdictions with access to medical or recreational cannabis and opioid-related mortality.[9] However, these findings were contested by a more recent study,[10] illustrating the need for further research to understand whether cannabis may have a role in addressing the opioid crisis.

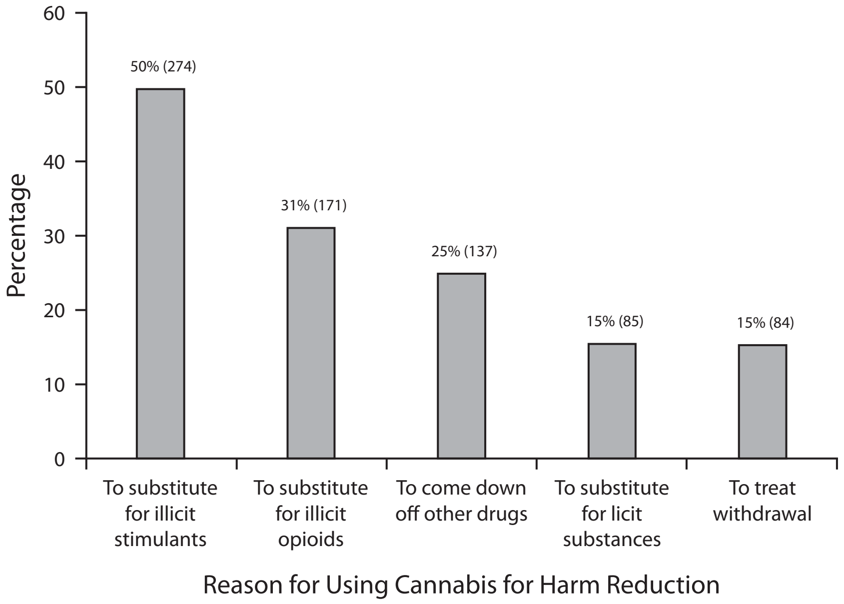

FIGURE 1— Reported Reasons for Using Cannabis for Harm Reduction: Vancouver, British Columbia, Canada, June 2016 to May 2018

Note. The sample size was 551 observations. Participants (n = 425) were permitted to provide more than 1 reason for using cannabis for harm reduction, resulting in a greater number of observations than participants.

This study had a number of limitations. Our sample of PWUD may not be representative of PWUD in other settings, thus limiting generalizability. This study also relied on self-report, which may affect data collected on illicit drug use, though previous studies have found that survey data from PWUD are reliable and valid.[11] In addition, this study did not explicitly incorporate participants' voices or examine factors associated with using cannabis for harm reduction. However, previous quantitative and qualitative studies in our setting indicate that some people who use cannabis with therapeutic intent (including for harm reduction), intentionally incorporate cannabis into daily routines and obtain cannabis from reliable sources.[6,12] As described by 1 individual,

> I don't wanna [inject meth and heroin] anymore. As soon as I think about it—like, right now, I'm kind of getting a craving for it. But right after [this interview], I'm not gonna go out and pick any up, I'm gonna go to my dispensary and pick up a joint and I'll be all fine.[12]

PUBLIC HEALTH IMPLICATIONS

Findings from this study suggest that self-medication with cannabis may be an intentional and common strategy by which some PWUD manage their substance use. In particular, individuals may use cannabis to substitute for opioids or stimulants. Further research may allow for a better understanding of circumstances under which individuals choose this harm-reduction strategy. These insights may contribute to public health–based strategies to address drug-related harms or regulate licit medical and recreational cannabis systems.

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CONTRIBUTORS

M. E. Socías and M.-J. Milloy conceptualized the study. J. Mok contributed to study design, interpretation of the analysis, and writing of the first draft of the article, with supervision from M. E. Socías. C. Grant performed the statistical analyses. M.-J. Milloy, S. Lake, K. Hayashi, and K. DeBeck contributed to the interpretation of the analysis and provided key revisions for the article.

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CONFLICTS OF INTEREST

M.-J. Milloy is the Canopy Growth professor of cannabis science at the University of British Columbia, a position created by unstructured gifts to the university from Canopy Growth, a licensed producer of cannabis, and the Government of British Columbia's Ministry of Mental Health and

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HUMAN PARTICIPANT PROTECTION

Ethics approvals for the Vancouver Injection Drug Users Study, the AIDS Care Cohort to Evaluate exposure to Survival Services, and the At-Risk Youth Study studies are granted by the University of British Columbia and Providence Health Care Research Ethics Board.

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