Challenges and Opportunities for Strengthening the US Public Health Infrastructure

Findings from the Scan of the Literature

MAY 2021

National Network of Public Health Institutes

ABOUT NNPHI

Mobilizing more than 40 public health institutes throughout 32 states along with ten university-based regional training centers and 40 training affiliates, the National Network of Public Health Institutes (NNPHI) supports national public health system initiatives and strengthens public health institutes to promote multi-sector activities resulting in measurable improvements of public health structures, systems, and outcomes. NNPHI also serves as the National Coordinating Center for Public Health Training – NCCPHT. To learn more about NNPHI, visit www.nnphi.org.

ABOUT THIS REPORT

The US public health system's infrastructure serves as the foundation for planning, delivering, evaluating, and improving public health. Public health services depend on basic infrastructure such as up-to-date information systems, health professionals who are competent in cross-cutting and technical skills, and public health organizations with the capacity to assess and respond to community health needs. This summary report was completed to better understand current weaknesses and challenges that are impacting the US public health system's infrastructure and to identify opportunities for addressing these issues.

ACKNOWLEDGMENTS

This project would not be possible without support from the Kresge Foundation (Grant #R-2008-289837) and the public health experts who participated as key informants and members of the Technical Expert Panel (TEP). NNPHI staff who contribute to this work, include: Randhika Aturaliya, Oscar Espinosa, Vincent Lafronza, Montrece Ransom, and Julia Bleser.

FOREWORD

As COVID-19 continues turning our world upside down, never before in recent history have our public health efforts been more needed, more relevant, and more important. At the same time, we must recognize that we are not only fighting a pathogen – we are also experiencing myriad impacts of systemic racism that increasingly drive health and racial inequalities. History will show that we are indeed living in a time of tremendous social change.

The pandemic is shining a light on the inequities we have known for our lifetimes. And for so many in the US and around the globe, this pandemic has shattered lives, and continues to rip apart families, increase food and housing insecurity, exacerbate behavioral health challenges, and cause many other hardships that impact morbidity and premature mortality.

There are also some positive social changes unfolding in response to our experiences, including a deeper public awareness of how structural racism results in shorter life expectancy and increased violence against people of color.

The lessons we are learning from a global pandemic pose many important questions. What are the strengths and weaknesses of our public health system? How do we build our agencies and communities back better? What are the best roles and functions of governmental public health? How can the private, nonprofit sector best be leveraged to support public health improvements and extend reach of government's impact? How do we achieve a healthy balance between the right to protect health while respecting individual freedoms? What changes in public health law are needed to ensure adequate protections in every community, tribe and territory exist? What innovations in public health policy and practice will best advance health and racial equity? How do we strengthen, support, and grow our public health workforce? How do we support a new generation of public health leaders?

We must also consider that while new funding approved by Congress in 2021 is sorely needed, we simply cannot fund our way out of the conundrum we face as a nation increasingly hostile to public health intervention. We must find new ways of engaging individuals and communities from all walks of life so that we begin to build back better by planting new seeds that will grow in greater of support of healthy human development. ***Government alone cannot do this work; it must be a multisector approach that engages all aspects of society.***

TABLE OF CONTENTS

I. INTRODUCTION

This report summarizes the findings of a scan of peer reviewed and gray literature which was completed to better understand current weaknesses and challenges that are impacting the US public health system's infrastructure and to identify opportunities for addressing these issues. In the report, public health infrastructure is defined as the foundation for planning, delivering, evaluating, and improving public health. We acknowledge that all public health services depend on basic infrastructure given that they require up-to-date information systems, health professionals who are competent in cross-cutting and technical skills, and public health organizations with the capacity to assess and respond to community health needs (Turnock, 2004). Federal agencies, for instance, rely on the presence of solid public health infrastructure at all levels to support the implementation of public health programs and policies and to respond to health threats, including those from other countries. We also acknowledge that while a strong infrastructure depends on many organizations, health departments are considered to be the main players.

The search for publications was initiated by first conducting a total of five interviews with key informants in the public health field to better understand how infrastructure is defined, to identify key challenges, to obtain citations and leads for the search, and to collect recommendations of experts in each of the domains to potentially serve on the Technical Expert Panel (TEP). Appendix A includes the list of key informants who participated in the interviews. From these conversations, we identified eight domains that collectively make up the system's infrastructure. We started with traditional domains such as workforce, financial resources, data, and cross-sector partnerships.

We expanded the domains to accommodate the ever-changing landscape of public health and added laboratories, technology, public health law, and health equity. Exhibit 1 illustrates the eight domains that were identified and used to organize our search for literature.

Within each of the eight infrastructure domains, we searched for national and regional needs assessments that were completed within the last six years (starting with 2015). Our strategy was to identify and review needs assessments that were completed at the national and regional levels first. Subsequently, we searched for local needs assessments and literature that addressed key challenges that were referenced by key informants as well as the needs assessments. The challenges and solutions were then categorized by infrastructure domains.

The findings presented below are not meant to serve as a comprehensive list of challenges or weaknesses and solutions but do represent the most commonly cited and most urgent challenges identified by key informants, the TEP, and the literature.

EXHIBIT 1: Key Domains Representing the US Public Health Infrastructure

II. **FINDINGS**

Public Health Workforce

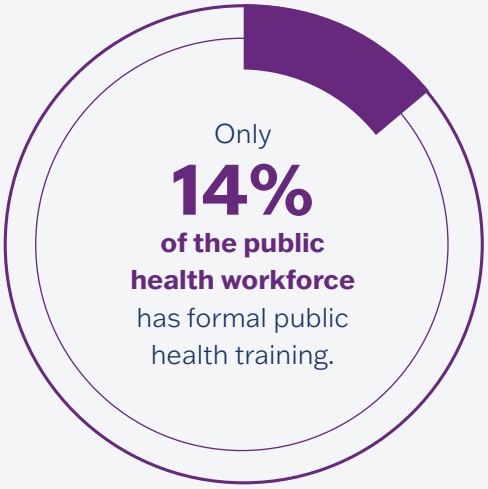
There is a severe and consistent shortage of public health workers and the deficits are growing due to high turnover rates and losing workers to retirement. Nearly half of public health workers are considering leaving their organization within the next five years, including individuals who will retire and individuals who will completely leave the public health field. Since 2014, there has been a 41% increase in public health workers planning on leaving their jobs (de Beaumont Foundation et al., n.d.). The public health sector also faces shortages in several career fields including epidemiologists, public health nurses, public health physicians, laboratory scientists and technicians, and environmental health workers (Perlino, 2006). These shortages are due, in part, to high turnover rates caused by lack of advancement, workplace environment, job satisfaction, lack of support, and inadequate pay (Perlino, 2006). Other reasons for leaving include threats and attacks against workers (Mello et al., 2020) and stress from overwhelming responsibilities (Bogaert et al., 2019).

The most cited reason for leaving is the lack of satisfaction with pay. This is the largest barrier as budget constraints for public health limit the number of positions and opportunities for competitive salaries (Bogaert et al., 2019). Exacerbating these shortages in personnel is that the average age of the public health sector is 47 years old and 45% of the workforce is eligible for retirement (Bogaert et al., 2019).

RELEVANT POLICY

THE PUBLIC HEALTH WORKFORCE LOAN REPAYMENT PROGRAM *established by the Secretary for Health and Human Services promotes the recruitment of public health professionals at local, state, and tribal agencies. $100 million was appropriated for the program in FY2020. This policy encouraged more students to pursue public health by providing loan forgiveness opportunities.*

Many public health professionals lack degrees in public health and have entered the workforce with little or no training specific to public health. Only 14% of the public health workforce has formal public health training and less than 1 in 4 public health managers and executives have formal training. Additionally, 4.2% of employees in local and state health departments have degrees in public health (Erwin et al., 2019). Thus, most employees working in public health entered the field with little experience in the field. The low-level of training and education limits health departments' capacity and capability in conducting public health work (Erwin et al., 2019) and requires time and resources to be redirected to training public health professionals.



Health departments have made efforts to provide training programs for their staff, but health departments, but lack funds to provide professional training and lack coverage for staff members to attend trainings during work hours. Staff members are further discouraged from pursuing training programs due to long travel distances, lack of free time, and limited Internet access to online training. These barriers have discouraged health department leaders from providing professional development and training given the difficulty of managing busy schedules and increasing work demands which show a small return on their investments (*Strengthening New York's Public Health System for the 21st Century: Report of the Public Health Infrastructure Work Group to the Public Health Council, 2004*). With a small percentage of public health staff entering the field with proper training and education in the field, they are at a disadvantage in implementing effective and impactful public health programs.

Staff members are further discouraged from pursuing training programs due to **long travel distances, lack of free time, and limited Internet access to online training.**

HIGHLIGHT

THE MENTAL HEALTH PARITY AND ADDICTION EQUITY ACT OF 2008 is a federal law that prevents group health plans and health insurance plans from imposing limitations on those who seek care for mental health conditions and substance use disorder. This policy improved access to mental health care, but there are still limitations in access to care.

Severe and chronic shortages of public health mental healthcare providers who specialize in the treatment of children has forced parents into long wait lists and to pay out of pocket for mental health care. Most mental health disorders appear during adolescence, but they are often first detected later in life (Patel et al., 2007). Identifying mental health disorders early will ensure that adolescents receive the treatment they need. However, more than half of children in the United States with a treatable mental health disorder do not receive treatment from a medical professional as the need for child psychiatrists has gone unmet due to provider shortages and because many mental health professionals require out of pocket payments. Seventy percent of counties in the United States do not have a single child psychiatrist. The limited supply of child psychiatrists is unable to keep up with the demand for mental healthcare. Historically, there has been a shortage of child psychiatrists among racial and ethnic minorities as well as youth living in impoverished or rural areas (McBain et al., 2019).

The shortage of providers stems from the significant amount of time it takes to train for child and adolescent psychiatry. After medical school, a candidate studies 4 years for general psychiatry and moves onto a 2-year fellowship in child and adolescent psychiatry. Medical students are less motivated to pursue child psychiatry due to the limited funding for fellowships and the exclusion of CAP in loan forgiveness programs (Schaff, 2016).

of counties in the United States do not have a single child psychiatrist.

Community health workers are an underutilized source of medical care for disadvantaged populations who are not properly integrated into the healthcare system, limiting their effectiveness in improving healthcare outcomes at the community level. Community health workers (CHWs) are a valuable asset to the healthcare system. They work in their own communities to combat ethnic and racial disparities in healthcare (Phalen & Paradis, 2015). CHW programs face implementation barriers which decrease the impact CHWs have on the healthcare system. The standards for CHW training vary from state to state and only a few states require CHWs to attend a state-certified training program. Many CHWs receive informal, on the job training while others take CHW courses at community colleges and community-based agencies (American Public Health Association, 2014). The lack of well-defined guidelines and variance in standards across states can result in high rates of turnover. In a Harlem Regional Stroke CHW program, one third of CHW candidates dropped out during the 6-month training (Kangovi et al., 2015).

CHW services are often delivered by community-based programs such as church-based programs which are not integrated within the healthcare system (Kangovi et al., 2015). Without formal connections to clinical providers, community health workers face limitations in their care and their disease-specific interventions. Additionally, community health workers receive unstable categorical grant funding which further limits their work (Kangovi et al., 2015).

Teaching public health in middle and high school can expose students to public health early, increasing the chances that a career in public health is contemplated, understood, and ultimately adopted.

Students in middle and high school are typically not exposed to the field of public health and may be misinformed about the role of it plays in their lives. Adding public health curricula can teach students about the importance of public health so they can begin to form a potential future career option that many do not consider until well into their academic careers (McClamroch & Montgomery, 2009).

A high school summer enrichment program, Telluride Association Sophomore Seminar (TASS) was offered at the University of Michigan and Indiana University. The goal of the program was to strengthen skills for a college environment and the curriculum included infectious disease epidemiology. Of the 16 students that participated in the program, a total of 10 reported adding public health to their future career plans (McClamroch & Montgomery, 2009). Also, the Robert Wood Johnson Foundation (RWJF) implemented a Young Epidemiology Scholars (YES) program for high school students which allowed them to conduct

research projects on public health challenges and then present their research to a panel of judges (Bracken, 2014). The majority of participants (74%) indicated that their experience in the YES program influenced their career plans and were planning on pursuing work in public health (Tsukamaki, 2007).

Additionally, the CDC has created a fellowship aimed at high school STEM teachers to train them to bring public health sciences to middle school and high school classrooms. One of the Science Ambassador fellows partnered with the Broad Institute of Harvard and MIT to pilot a learning module for students called Operation Outbreak (CDC). The learning module was used to create pandemic simulations, which was implemented in middle schools and high schools across the nation (Centers for Disease Control and Prevention, 2019). The learning module helped illustrate key players in pandemics such as the government, military, and the media and taught students' skills used by CDC disease detectives such as rapid decision making, teamwork, and communication (Mecham, 2019). Training teachers in public health would foster engaging initiatives and activities for students, educating and inspiring them to pursue careers in public health.

74%

of high school students
that participated in the Young Epidemiology Scholars (YES) program indicated that their experience influenced their career plans and were planning on pursuing work in public health.

Community colleges offer fertile ground to influence a motivated, racially and ethnically diverse group of students to pursue public health related training and education which could lead to public health work. Community colleges serve recent high school graduates who utilize community college to identify a potential career and 4-year-degree, students who seek associate degrees to prepare for entry level jobs, and individuals of all ages who resume their studies after or while working to enhance their skills through certification programs at more affordable tuition rates than traditional colleges and universities (Riegelman & Wilson, 2014). In addition, community colleges tend to serve a higher percentage of minority students (de los Santos, 2016).

The Society for Public Health Education (SOPHE) partnered with community colleges to create a health education certificate for transfer students with associate degrees to pursue a bachelor's degree program in health education and health administration, and public health and Health Navigator certificate programs for individuals already in the workforce. The certificates provide students with experiential learning experiences at health agencies and health departments which can provide opportunities for students to pursue internship and careers. The certificate makes the transfer process easier for community college students, equipping them with the skills needed for an undergraduate education. Creating public health programs at the community college level encourages more students to pursue the public health field, which can amplify the flow of graduates pursuing public health degrees (Riegelman & Wilson, 2014).

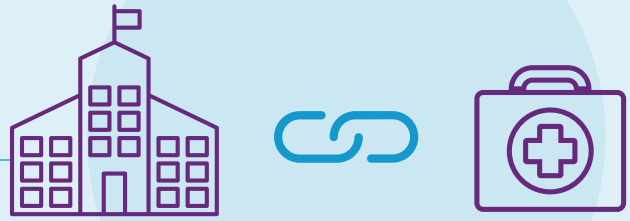
> *Engaging students at the college level through applied experience and mentorship opportunities with local health department workers is vital to creating a public health workforce pipeline and addressing shortages.*

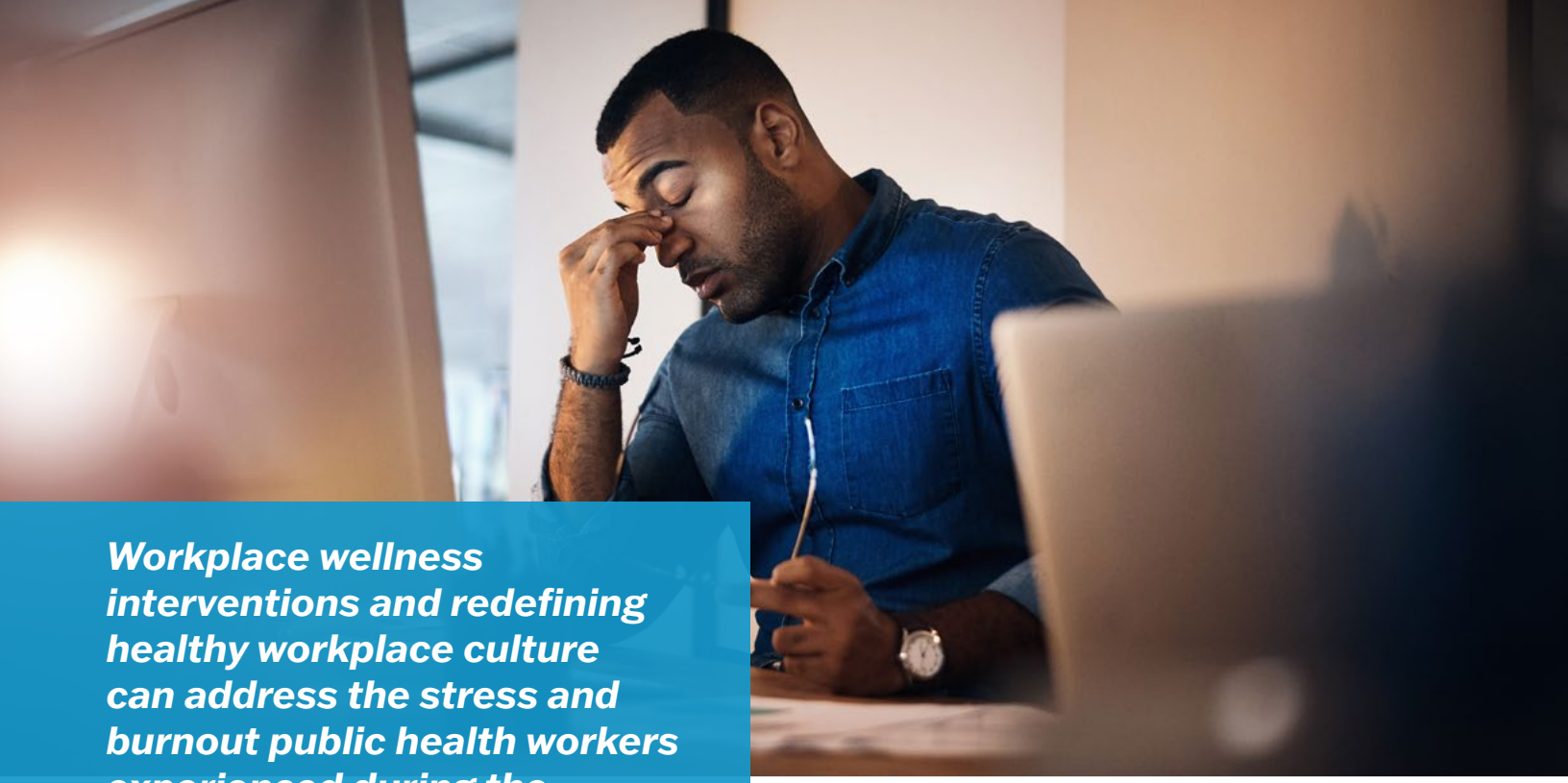
Work practicums and mentorship programs that expose students to careers in public health are effective strategies to create and maintain a strong and stable public health workforce.

Academic institutions have created pipeline programs to encourage students to pursue the epidemiology field. Through partnerships with local and state health departments, students are placed to assist with outbreak investigations and other short term public health projects. Placements provide surge capacity to health departments and provides practical experience for students. Participation in pipeline programs expose students to the benefits of working as an epidemiologist and provides opportunities for networking and mentorship with public health workers in local health departments (Erwin et al., 2019). Engaging students at the college level through applied experience and mentorship opportunities with local health department workers is vital to creating a public health workforce pipeline and addressing shortages.

Establishing partnerships between universities and local health departments could provide the workforce with broader continuing education opportunities (Bouye et al., 2016).

Local health departments and universities have partnered together to support continuing education. The New York Department of Health established a Memorandum of Understanding with the State University of New York at Albany School of Public Health to create education opportunities for their staff. These included a public health course, an environmental health course for sanitarians, and a Surveillance Academy that trains the state public health work force employed to conduct hospital and nursing home surveillance (*Strengthening New York's Public Health System for the 21st Century: Report of the Public Health Infrastructure Work Group to the Public Health Council*, 2004). Expanding these partnerships will allow for more health department staff to return to school and to receive formal public health training and degrees. Collaborating with universities makes these opportunities more readily accessible for health department staff.





Workplace wellness interventions and redefining healthy workplace culture can address the stress and burnout public health workers experienced during the COVID-19 pandemic.

Burnout is a work-related stress syndrome resulting from chronic exposure to job stress. Healthcare workers are at particular risk for burnout due to the increased work that resulted from the COVID-19 pandemic as well as severe public health workforce shortages. This has significant negative personal (substance abuse, broken relationships, and even suicide), but also important professional consequences such as lower patient satisfaction, impaired quality of care, and medical errors (Shanafelt et al., 2010; West et al., 2006). The development of adequate coping personal and organizational strategies is essential in dealing with this important problem in contemporary healthcare and requires intentional redefining a health workplace culture for public health workers. Public health organizations can foster a positive environment for their staff by offering staff the ability to influence their work environment, make decisions, and control their work schedules. Work policies that allow for flexible scheduling, childcare, and remote work options have shown to increase employee wellbeing (De Hert, 2020).

Workplaces that provide support to their workers can help reduce burnout and promote better achieve better work outcomes. Mindfulness in Motion is a mindfulness based intervention (MBI) that has been adopted by an ICU facility to bring awareness and relaxation to the work environment. The intervention had a 97% retention rate and increased the resiliency and engagement in work by staff. Social cohesion programs also serve to improve wellness among workers. The Vanderbilt Medical Student Wellness program pairs students with faculty for mentoring, arranges wellness retreats, and puts students together in committees (Global Forum on Innovation in Health Professional Education et al., 2019). Fostering relationships with colleagues can provide emotional support and shared understanding of experiences. Public health leaders can implement wellness interventions which better support their staff and provide them with resources and tools to help ameliorate the stress they face from their job.

Work policies that allow for **flexible scheduling, childcare, and remote work options** have shown to increase employee wellbeing.

Financial Resources

Public health's invisible role in protecting the nation has resulted in chronic underfunding which has negatively impacted its workforce, data systems, technology, community partnerships, and leadership.

Public health has been underfunded and undervalued at the local, state, and federal levels. Public health cares for the general population by providing clean air and clean water initiatives, sanitation, vaccines, and other methods of controlling against environmental threats and diseases. However, the role that public health plays is hidden compared to the healthcare system that cares for patients individually or advertises new drugs and medical devices. The invisible role public health plays has caused public health to receive little attention, recognition or funding except when there is an urgent public health crisis (Rovner, 2020).

Since 2010, federal funding has dropped to 16% for state health departments and 18% for local health departments. During the last ten years, local health departments have lost 56,260 staff positions due to the constant budget cuts (Weber et al., 2020). Without adequate pay, workers leave the field in search of other opportunities as they struggle to pay back their student loans. Without proper investment, public health will not be able to carry out its core responsibilities to keep the nation safe and healthy.

At the federal level, the Centers for Disease Control and Prevention (CDC) has lacked the funds to adequately support the public health system. The CDC is the nation's leading public health agency. Its mission is to protect Americans from disease outbreaks, disasters, and unsafe food and water, and to reduce the incidence of leading causes of Americans' deaths. To help accomplish its objectives, the CDC supports states, localities, tribes, territories, and community organizations in addressing leading health threats in their communities. Indeed, more than half of its program funding is redistributed to these partners.

The CDC also lacks sufficient dedicated funding to adequately support the cross-cutting, foundational capabilities that form the backbone of comprehensive public health systems at the federal, state, and local levels.

The CDC's budget has not kept pace with the nation's growing public health needs and emerging threats, particularly the rise in substance misuse and weather-related emergencies. The agency has expanded its substance misuse efforts in the past few years, but more resources are needed to address underlying causes. For example, the CDC's State Physical Activity and Nutrition (SPAN) program has been successful in improving nutrition and encouraging physical activity through early care and education. However, the SPAN program only has sufficient funding to be implemented in 16 states (Faberman et al., 2020). The CDC also lacks sufficient dedicated funding to adequately support the cross-cutting, foundational capabilities that form the backbone of comprehensive public health systems at the federal, state, and local levels. Fiscal Year (FY) 2019 program funding for the CDC, as enacted in September 2018, is $7.3 billion. After accounting for interagency transfers and one-time funding, this reflects a $143 million (2 percent) increase over FY2018 — or flat funding in inflation-adjusted dollars (Trust For America's Health, 2020).

It is not just the lack of funding available to public health but the manner in which funds are made available that limits its ability to address new and emerging needs such as updating information systems and policy analysis.

Since 2010 non-defense discretionary funding (NDD) has been declining and in 2019 it reached a record low of 3.1% of the gross domestic product (Center on Budget and Policy Priorities, 2020). NDD funding supports services such as education, public health, medical care for veterans, and medical research. NDD funding has been limited by statutory caps that were set by the Budget Control Act of 2011. Federal appropriations for CDC fell 7% between 2010 and 2021. These reductions have limited CDC's ability to fund state and local health departments (Reich & Windham, 2021). Consistent limited funding from the federal government has left public health chronically underfunded. In addition, categorical funding has led to silos that reduce health department's ability to fund a wide range of needs such as information systems or policy analysis (Committee on Public Health Strategies to Improve Health, 2012).

Federal appropriations for CDC

fell 7 percent

between 2010 and 2021. These reductions have limited CDC's ability to fund state and local health departments.

A common workaround to chronic underfunding has been cross-jurisdictional sharing (CJS) which allows health departments to pool resources in order to offer an expanded array of services.

Several states have established CJS arrangements for public health functions to address health populations in areas with limited financial resources, staff, and equipment. Only 38% of local health departments (LHDs) have an epidemiologist and only 33% of LHDs have an information specialist. Through CJS, LHDs that lack funding to staff these positions are able to access their expertise (Shah et al., 2016). In Kansas, emergency preparedness regions, multicounty health departments, and other CJS arrangements among different counties have been established (Hartsig, 2017). The most commonly shared services among LHDs were all hazards and response, communications and community partnership development, policy development, and health equity and social determinants of health organizational competencies (Hartsig, 2017). CJS offers a way for LHDs to counteract the limited funding they receive by working with other LHDs to gain the resources that they need to do their job.

Improving communication on the value of public health will allow public health workers and their supporters to better advocate for policies and funding. With the general public and different sectors not fully aware of what public health does or achieves, it is increasingly important for public health officials to effectively communicate the value and role public health plays. Leaders in business, housing, and other sectors associate public health with impractical research and bureaucracy (L'Hôte et al., 2019). Public health officials must share stories of the impact their work has and illustrate the value that public health brings to people's lives. Public health has made several achievements in the past 21st century from the creation of new vaccinations, improved sanitation which has led to a sharp decline in infant and child mortality, among many others (Association of State and Territorial Health Officials, 2016). The impact of public health work is not as immediate and evident as new scientific discoveries, but it is important, nonetheless. This is why public health must document and communicate the ways that public health improves lives and communities (Illinois Strategic Communication Leadership Project, 2016). Public Health Reaching Across Sectors (PHRASES), an initiative of the de Beaumont Foundation, has created a toolkit to help public health workers to better communicate about public health with other sectors (*Motivating The Public To Support Public Health: A Toolkit For Communicating With Non-Experts*, 2020). Utilizing toolkits like PHRASES and creating workshops to improve communication will better equip public health officials with the skills needed to advocate for public health. Communicating and publicizing the role of public health will help the federal government see the importance in properly funding public health.

Cross-Sector Partnerships

Public health workers are siloed in their work, culture, and language which prohibits them from strategically interacting with other sectors to prevent and solve social problems that result in poor health outcomes. Public health workers often do not work (and do not know how to communicate with) with partners in sectors other than public health (Rudolph et al., 2013). Although public health has an important role in hospitals and private clinics, criminal justice, public schools, and emergency services most health professionals do not have a clear understanding of their counterpart's roles and responsibilities. Open communication, collaboration, information exchange, and consultation between the sectors are of utmost importance in creating effective and trusting relationships.

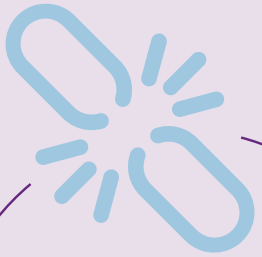
Public health and criminal justice have often acted independently of one another. However, public health issues are inherent in various aspects of the criminal justice system (Gideon, 2013). Prisoners face a myriad of health problems including elevated rates of mental disorders, substance abuse, as well as airborne and bloodborne viruses (Kinner & Young, 2018). Public health operates on a prevention approach which could be applied to criminal justice research and policy. Early identification of health issues in prisoners and outbreaks and treatment in prison can improve health outcomes and reduce harm to communities when prisoners are released. Working alongside criminal justice to provide services would greatly improve the health status of the populations at-risk and can prevent health issues from spreading to the larger community (Kinner & Young, 2018).

School settings have a great impact on child and adolescent health. Schools provide regular physical activity required for children and adolescents, promote healthy nutrition, and provide health education for risky behaviors. School nurses and counselors also prevent, detect, and treat physical and mental health problems. Schools are already overwhelmed with the breadth of responsibilities that they must take on and require the help of public health workers to increase the effectiveness of school programs to promote health in children and adolescents. The public health workforce must conduct school health research and development and provide professional services to sustain and improve school health programs within their own districts (Kolbe, 2019).

Local health departments struggle to establish and maintain cross-sector partnerships. Health departments lack the staff, resources, and funding to maintain cross-sector partnerships. Health department staff members are often overworked with the overwhelming needs of serving the local population and struggle to find the adequate time to establish meaningful relationships. Staff members are met with competing priorities and are not able to fully commit to partnership development and maintenance. Public health leaders have noted that they struggled to find the time to build relationships and struggle to participate in community meetings or calls necessary for the development and maintenance of partnerships. High staff turnover is a barrier to maintain long-term partnerships. When organizational points of contact change, organizational priorities soon follow (Ransom et al., 2019). Public health leaders are then left with a loosely defined partnership that requires rebuilding and redefining relationships (Carlin & Peterman, 2019).

Resource limitations were the most commonly cited barrier to cross-sector partnerships. Without sufficient funding, services and programs are not adequately supported and partnerships cannot be sustained over a long period of time. Siloed funding for public health also prevents organizations from investing in cross-sector partnerships as they will focus on maintaining their funding mechanism (Center for Sharing Public Health Services & Public Health National Center for Innovations, 2019).

Health departments lack the staff, resources, and funding to maintain cross-sector partnerships.



RESOURCE LIMITATIONS were the most cited barrier to cross-sector partnerships.

Training public health staff on the development of community partnerships could increase their efficacy in establishing partnerships and expand the occurrence of cross-sector partnerships. Expanding training programs for community partnerships would provide public health workers with the skills needed to establish and maintain partnerships. One of the barriers to increasing partnerships between public health and other sectors of society is that there are communication challenges and gaps in knowledge between public health experts and leaders in other sectors. Leaders in other sectors do not fully understand the role of public health and define health differently than public health professionals (L'Hôte et al., 2019). To bridge the gaps between the sectors, training public health workers in effective communication would enable them to forge these partnerships. The de Beaumont Foundation has created a toolkit, Public Health Reaching Across Sectors (PHRASES), which provides best practices for communication, to help public health experts better describe their work to leaders in other sectors (*Motivating The Public To Support Public Health: A Toolkit For Communicating With Non-Experts*, 2020)

Embracing non-traditional partnerships will allow public health to gain resources, experts, and champions. Collaborations with non-traditional partners such as businesses, faith institutions, universities, hospitals, nonprofits, philanthropy, and schools create opportunities for public health to further their impact in the community and to promote better health outcomes. Partnerships with business provides public health with financial resources, products, staff time, knowledge exports, and property. Additionally, businesses can provide funding towards public health goals and help support community initiatives (Bipartisan Policy Center & de Beaumont Foundation, 2019). Universities and hospitals are anchor institutions which have significant influence and economic and social impacts in their surrounding communities. They are uniquely positioned to use their knowledge and resources to improve the quality of life in their surrounding communities. Partnerships with these institutions provide an array of funding sources which greatly expands community-based efforts. Faith institutions are another key partner that are deeply embedded in the community and can be mobilized to advocate for health care services (Weinstein et al., 2017).

Collaborations with non-traditional partners such as businesses, faith institutions, universities, hospitals, nonprofits, philanthropy, and schools **create opportunities for public health to further their impact in the community and to promote better health outcomes.**

Data

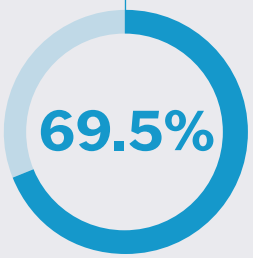
The lack of harmonization between public health information systems and healthcare has led to silos of electronic health data which hinders public health surveillance efforts. Public health agencies house data registries from healthcare providers like childhood immunization, birth defects, and death registries. Additionally, public health agencies collect information from healthcare providers for disease surveillance (Office of the National Coordinator for Health Information Technology, 2017). However, more than 4 in 10 US hospitals report that public health agencies are unable to receive full electronic data sets but only a select number of data elements from some electronic health record (EHR) systems (Holmgren et al., 2020). The lack of full data exchange results in siloed health data that must be manually exchanged for surveillance. Epidemiologists often make requests for data over the phone or through email to medical examiners or coroners and the information is then faxed to health departments for manual input (Hagan et al., 2019). Health providers are often unclear on which data elements need to be sent to health departments and the level of detail needed for proper disease surveillance (Birkhead et al., 2015), and are often not able to submit risk factors such as smoking, blood pressure, diet, exercise, and occupation which limits the scope of surveillance (Hagan et al., 2019). Finally, there is a lack of harmonization of messaging standards between public health and healthcare. Healthcare and public health use different vocabulary in data exchange (Birkhead et al., 2015), limiting real time data exchange which ultimately hinders public health's ability to track emerging threats and conduct proper disease surveillance in a timely fashion.

Lack of data standardization limits public health officials' ability to analyze data received from other systems which leads to inconsistencies in surveillance efforts. There is a significant disconnect in data standards between public health and healthcare. Healthcare systems use multiple information systems, applications, and hardware each with different data dictionaries and data transfer procedures. This complexity in systems leaves health departments with a minefield of potential error which can lead to incorrect data interpretation and an inability to make cross-system comparisons (Birkhead et al., 2015).

State and local health departments lack the capacity to analyze and provide real time data necessary to conduct surveillance work. Local and state health departments have limited capacity to manage and analyze data received from healthcare to inform policy. This is due to reduced public health budgets, outdated informatics systems and technology, and lack of informatics expertise. It has been reported that 30% of health departments do not have inoperable systems and they lack control over the hardware and software they use. Also, only 22% of health departments have implemented EHRs, only 13% conduct health information exchanges, and 69.5% have the ability to extract data from information systems. These tasks are necessary for surveillance, the documentation of immunization records, and understanding of community health. With many health departments unable to complete these tasks, the effectiveness and reach of their efforts are minimized (Drezner et al., 2016). Many of these challenges are due to health departments' lack of informatics expertise and data literacy. Only 20% of local health departments have information systems specialists on staff and many smaller health departments do not have that expertise on staff.

of health departments have implemented EHRs.

conduct health information exchanges.



have the ability to extract data from information systems.

Only
20%
of local health departments have information systems specialists on staff and many smaller departments do not have that expertise on staff.

Health providers and researchers do not consistently collect data on sexual orientation and gender identity (SOGI) which leads to limited understanding of the health needs and disparities of the LGBTQ community. Researchers have struggled to operationalize the different dimensions of sexual orientation including behavior and attraction as well as gender identity (IOM Committee on Lesbian, Gay, Bisexual, and Transgender Health Issues and Research Gaps and Opportunities, 2011). Gender identity is a diverse spectrum that is difficult to categorize in surveys with a broad range of identities such as genderqueer, gender nonconforming, transgender, and agender. These identities may prefer neutral pronouns such as they/them or zie/hir (Deutsch & Buchholz, 2015). Providers often possess limited competency on LGBTQ identities and provider discomfort has been cited as a common reason for low SOGI data collection in hospitals (Streed et al., 2020).

At the federal level, most governmental data collection efforts do not include SOGI measures. In the past, the Census Bureau edited census responses for LGBTQ married couples. However, the Census has decided that "same-sex husband/wife/spouse/partner" will be included which is a step for the LGBTQ community (Velte, 2020). The federal government has also collected limited SOGI data during the COVID-19 pandemic. Few states have taken steps to collect SOGI data in the COVID-19 pandemic, with only Pennsylvania, Washington DC, Massachusetts, and Rhode Island making strides in collecting SOGI data (Cahill et al., 2020).

An underrepresented population of the LGBT are two-spirited people. Two-spirited people have often been grouped with LGBTQ identities which equates two-spirit identities to Western identities. To engage these populations in research, Indigenous only options could be listed alongside Western terms so Two-Spirit and Indigenous people can see themselves in data collection (Pruden & Salway, 2020).

The continued lack of consistent SOGI data hinders the implementation of public health interventions for vulnerable populations, limits epidemiological understanding of the LGBTQ community, and minimizes the understanding of the health disparities the LGBTQ community faces. Without proper data, researchers, public health officials, and the government will not understand what the LGBTQ community needs.

Efforts to scale up novel programs like the Digital Bridge could unify information exchange between public health and healthcare. The Digital Bridge is a partnership between the CDC and healthcare, public health, and health information technology to create a bidirectional exchange of data and to improve electronic case reporting of health data. Digital Bridge has built a national framework for electronic case reporting (eCR) to standardize tools and reporting from public health and healthcare and to make data extraction from EHRs faster and easier. The framework flags potential disease cases from data in a patient's EHR and creates a report that is electronically sent to public health. This process reduces the manual, paper-based process for healthcare providers and public health professionals, increasing the response to outbreaks (Office of Public Health Scientific Services, 2018). The Digital Bridge has been tested at seven sites in California, Houston, Kansas, Massachusetts, New York City, and Utah (Office of Public Health Scientific Services, 2018). Greater expansion would make public health surveillance seamless and more effective.

Public Health Law

There is an overall lack of awareness of the legal basis in public health work among the general population that reduces public health's power, influence, and effectiveness. Law creates the framework for public health interventions and is the basis of every solution to public health challenges. Thus, public health officials must understand the intersection of law and public health and recognize their specific legal power to address health inequity. Laws, for instance, mandate disclosure of calories on restaurant menus; promote automobile safety; influence how public health practitioners distribute and enforce vaccination efforts, affect isolation, and quarantine orders; and are used to prohibit smoking in buildings (Leider et al., 2015).

Public health law remains one of the largest knowledge gaps in the public health workforce. Law has not been integrated into public health and as a result has left many public health officials unsure about legal capacity and left them with little legal efficacy (Burris et al., 2016). The top two self-identified areas of need for training among the workforce are how to influence law and policy development and how to understand the effects of law and policy on health. Most public health professionals receive little, if any, legal or advocacy training (Berman et al., 2019). These skills are rarely taught in law or public health schools and professionals enter the workforce unsure of how to advocate for effective policies (Berman et al., 2019).

The top two self-identified areas of need
for training among the workforce are
how to influence law and policy development
and
how to understand the effects of law and policy on health.

The value and need for essential public health law services need to be better communicated at the local and national levels.

Public health officials play an important role in providing legal counsel for elected officials. Public health officials develop policy solutions and work with elected officials to build public support for these solutions. To develop these policy solutions, public health must establish relationships with legislative liaisons, city attorneys, and local boards of health to push these solutions forward. The 5 essential public health law services include ensuring access to evidence and expertise, designing legal solutions to address health problems, engaging communities, and building political will, enforcing and defending legal interventions, and monitoring and evaluating policy (Burris et al., 2016).

5

The 5 essential public health law services include ensuring access to evidence and expertise, designing legal solutions to address health problems, engaging communities, and building political will, enforcing and defending legal interventions, and monitoring and evaluating policy.

Establishing public health law training programs and mentorship programs will allow public health workers to enforce and apply laws to their work.

To address the deficit in law knowledge in public health professionals, trainings have been created to teach the basics of law and the intersection between policy and public health. The Public Health Law Academy was established by ChangeLab Solutions and the CDC's Public Health Law Program (PHLP) to help public health professionals better understand law and incorporate it into their job. The Academy incorporates online tools and training and a facilitator toolkit to prepare mentors. The Public Health Law Academy provides basic courses on topics such as Introduction to Public Health Law, Hot Topics in Public Health Law, and Legal Epidemiology Overview (Ransom et al., 2019). Expanding training programs and courses will teach public health professionals the basics of public health law so they can use policies and the law to improve health outcomes.

RELEVANT POLICY

THE PUBLIC HEALTH SERVICE ACT *provides legal authority for the Department of Health and Human Services to respond to public health emergencies.*

Providing public health workers with political advocacy training and courses will help them strengthen policies and laws to improve public health outcomes and reduce disparities. Many public health workers lack opportunities to build policy and advocacy skills and do not understand the role they play in developing health policy solutions. Providing political advocacy courses in public health college curriculum and creating training workshops could increase the efficacy of the workforce. The Johns Hopkins Bloomberg School of Public Health offers a course designed to prepare public health students from different disciplines to analyze policy solutions and to determine advocacy strategies. The course offers community-based practice, classroom discussions, and opportunities for students to practice their advocacy skills to solve public health problems. Expanding political advocacy courses and making these courses mandatory will ensure that students possess policy and advocacy skills when they enter the workforce (Hearne, 2008).

The University of South Florida College of Public Health offers an educational workshop on policy aimed at building advocacy skills in public health professionals. The objectives of the workshop were to understand the relationship of federal and state governments in public health law, understanding common good vs. individual freedoms in public health law, and summarize the steps in policy development. Participants in the workshop are provided examples of how public health problems are identified and how to integrate these issues in a health policy agenda (Blenner et al., 2017).

Laboratories

Public health laboratories (PHLs) are not able to keep up with the capacity of public health surveillance due to budget cuts, staffing vacancies, and outdated technology. PHLs are on the front lines protecting people from disease by providing diagnostic testing, disease surveillance, and research (Association of State and Territorial Health Officials, 2004). PHLs have faced numerous budget cuts which have resulted in the closure of public health labs in states such as Georgia, California, and Michigan. PHLs that are still operating have been forced to cut down on their staff and salaries (Strain & Sullivan, 2019) and have been unable to keep up with equipment upgrades (Association of State and Territorial Health Officials, 2004). Improvements have been made in the volume of testing at PHLs, but the biggest challenge faced is the dearth of laboratory specialists and staff. Thirteen states reported no doctoral-level molecular scientist on staff, and 23 states reported only one. States report that at least two doctoral-level molecular scientists are needed on staff to ensure emergency readiness and proper disease surveillance. The shortage of technology specialists hinders the state's ability to respond to emergencies and to communicate testing results (Scheck & Hing, 2020).

> *PHLs are on the front lines protecting people from disease by providing diagnostic testing, disease surveillance, and research ... [and] have faced numerous budget cuts which have resulted in the closure of public health labs in states such as Georgia, California, and Michigan.*

PHLs struggle to recruit staff because most trained personnel prefer to work in the private sector where they can make more money rather than work in the public sector. There is also a low level of awareness of the potential for careers in clinical laboratory science. Most science, technology, engineering, and mathematics programs geared towards adolescents focus on more common professions such as physicians and do not address clinical laboratory positions. Additionally, there are challenges in retaining trained laboratorians. About 15% of the workforce are expected to leave the workforce by 2023. The most frequently cited reasons for leaving include low salaries, limited career mobility, and lack of satisfaction with work environment.

There are testing inequities across public health departments due to testing deserts and disparities between high and low income communities.

The COVID-19 pandemic has highlighted the inequities between higher and lower income communities and more urban and more rural locations. Median travel time to COVID-19 testing sites was longer in counties with lower population density and longer in counties with a higher percent of minority and uninsured individuals, compounding the health disparities these communities face. These inequities were recently addressed an additional $2.25 billion made available to underserved communities through the American Rescue Plan, which has the additionally benefit of increasing asymptomatic testing and surveillance. Also, public health laboratory staff have lower median salary than state health agency staff, further contributing to the potential for staff dissatisfaction and turnover (Association of Public Health Laboratories, 2018).

Memorandums of Understanding (MOUs) between public health laboratories and university laboratories allow university laboratories to share human, financial, and technological resources.

In order to strengthen public health laboratories, partnering with university laboratories would provide them with the resources they need. Academic collaborations improve the data quality of public health laboratories increasing the reach, core competencies and scientific basis of public health laboratories (Erwin et al., 2019). In Hawai'i, the State Laboratories Division recognized its staff shortfalls and piloted a successful internship with local universities to support Clinical Laboratory Improvement Amendments activities (Whelen & Kitagawa, 2013). The program provided valuable insights for future iterations including offering credit through the universities and increasing the intensiveness of the internship to expand the laboratory activities students can participate in.

Technology

Access to broadband by public health organizations is not widespread and lack of connectivity limits the scope and quality of services delivered by health departments across the country. An estimated 24 million people in the US live in "digital deserts." Areas of the country that do not have access to broadband. This includes approximately 19 million rural Americans and 1.4 million American Indian/Alaska Natives (Baurely, McCord, Hulkower, & Pepin, 2019). Health departments need consistent access to broadband to conduct their surveillance work and to provide timely and consistent services to communities. Lack of connection or low quality connection limits health departments to interact with healthcare, laboratories, registries, and hinders their ability to provide telehealth services.

An estimated

24 million

people in the US live in "digital deserts."

This includes approximately

19 million

rural Americans and

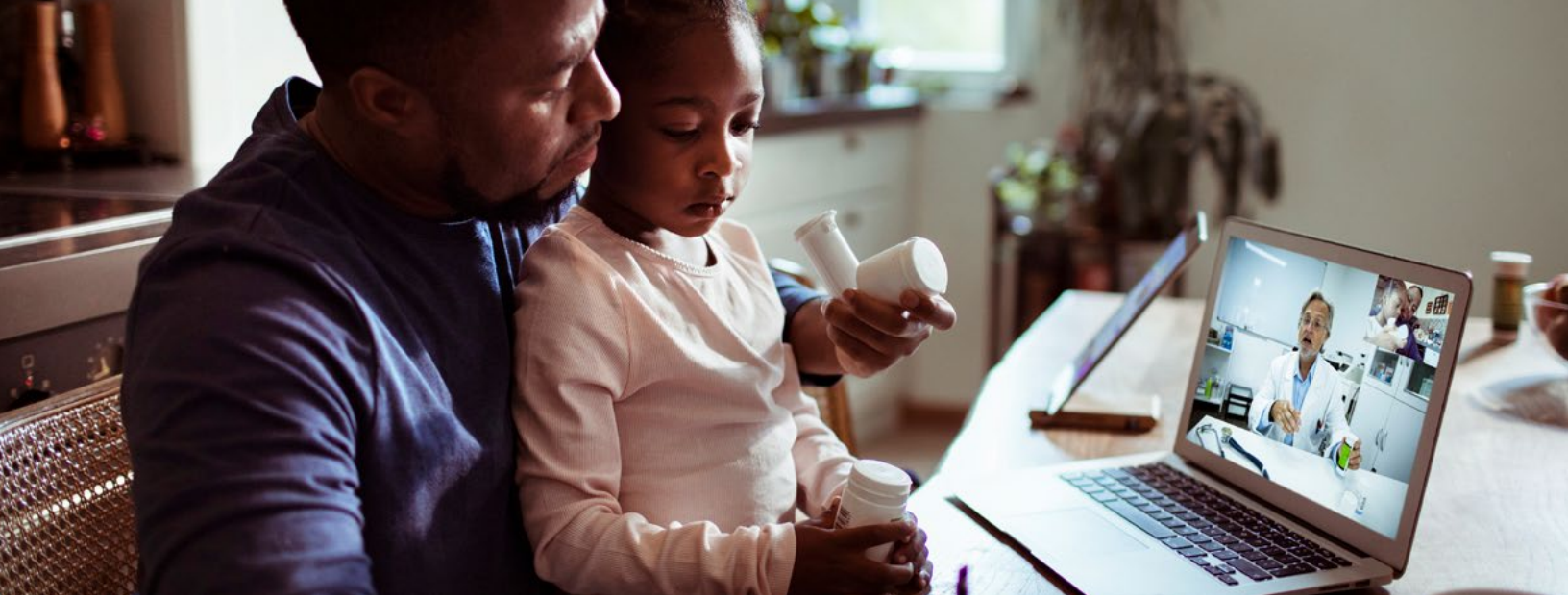
1.4 million

American Indian/Alaska Natives.

Health misinformation on social media platforms spreads quickly and severely impacts the effectiveness of public health messaging and health behaviors.

The Internet and social media have become a growing resource for health information with 72% of US adults using the Internet to search for health information (Swire-Thompson & Lazer, 2020). The Internet allows public health officials to share information quickly and for individuals to access information at their own leisure. However, false and misleading health information has been reported to spread more quickly than scientific knowledge, negatively affecting decision-making and health behaviors in the general public (Suarez-Lledo & Alvarez-Galvez, 2021). Health misinformation leads to the adoption of inaccurate health beliefs. This can be seen with the misconception that the measles, mumps, rubella (MMR) vaccine causes autism. This misconception has created a negative societal impact, creating distrust in public health and vaccines (Swire-Thompson & Lazer, 2020). In addition, public health officials are not receiving adequate training on health literacy and how to properly communicate with and educate the general public. Without proper health literacy and effective response by public health officials, the general public is at increased risk of believing and acting on false information.

> *False and misleading health information has been reported to spread more quickly than scientific knowledge, negatively affecting decision-making and health behaviors in the general public.*



Telemedicine improves access to care for disadvantaged populations and is a flexible option for healthcare.

Telemedicine has seen a 50% increase in use due to the COVID-19 pandemic. Telemedicine connects patients with healthcare information and communication at a low cost in the comfort of their home. It has been shown to help patients better manage chronic conditions, increase the accuracy of patient records, and enhance access to services. By reducing the amount of travel for patients and providers telemedicine encourages the use of health services by vulnerable populations who may live in a healthcare desert. It also reduces the barriers for psychiatry and increases access to services for clients who may not have been able to access before (Alvandi, 2017).

+50%

Telemedicine has seen a 50% increase in use due to the COVID-19 pandemic.

Promatores(as) de salud are an underutilized source of accurate health information for members of Spanish-speaking communities who have the tools to combat misinformation.

Promatores de salud are trusted community health workers who reside in Hispanic/Latino communities and provide health resources to community members. Their peer-to-peer approach gives them the unique advantage of addressing misinformation in a timely and personal way. *Promatores de salud* have been on the forefront of combatting misinformation on COVID-19 after noticing that the Internet and social media have been key sources for information for Hispanic/Latino communities. *Promatores* programs are demonstrating to be successful because they are able to facilitate open discussions with community members where they are not afraid to ask questions (Zamuido, 2021). Also, the discussions are not hindered by language or cultural barriers and promatoras are able to disseminate important health information in print format to residents that lack internet access (Logan & Castañeda, 2020). Expanding the *promatore* model to other vulnerable populations can serve as an effective way to combat misinformation by working with established workers who are trusted by their communities.

Health Equity

For public health to deliver its promise to protect and improve the health of people and their communities, equity must be infused into all aspects of public health planning and delivery of services. The ultimate goal of public health is to protect and improve the health of people and their communities by promoting healthy lifestyles, researching disease and injury prevention, and detecting, preventing and responding to infectious diseases. Achieving these goals is not possible without applying an equity lens to the work. Health equity is defined as the state in which everyone has the opportunity to achieve their full health potential. Black/African Americans, American Indians/Alaska Natives, Hispanic/Latino, and Asian/Pacific Islanders face disparities in life expectancy, infant mortality rates, and chronic diseases. Health inequity in the United States results in wasteful healthcare spending, a less productive workforce, and reduces the nation's overall health status (Weinstein et al., 2017).

Public health has a responsibility to help address these disparities by creating a framework for equity. Addressing public health issues such as violence prevention, the HIV and opioid epidemics, and ending the burden of preventable chronic diseases requires public health to take a societal and collaborative approach and to understand the impact of inequity (Weinstein et al., 2017). Consistent with this approach, the American Public Health Association depicts ten essential public health services to address inequities such as racism, oppression, and poverty (Weinstein et al., 2017) and more recently centered equity as part of their overall framework.

Lack of access to the Internet limits minority groups' ability to receive quality care as well as other social services which now makes it a meta social determinant of health. Lack of access to broadband primarily affects minority populations due to financial and geographical barriers. There is a wide disparity in pricing between metropolitan and rural areas, which results in a lower adoption rate of broadband by rural communities. Additionally, rural broadband development is more challenging because of higher investment needs and certain areas are skipped over by broadband network owners through a process called "digital redlining" (Tomer et al., 2020). With minority populations having limited access to broadband, they are at a disadvantage in receiving social services that impact every social determinant of health such as economic stability, social support, and access to healthcare (Tomer et al., 2020).

HIGHLIGHT

Further expanding the implementation of mobile health units has the potential to increase access to health services for disadvantaged populations and reduce health disparities.

Mobile health clinics offer a variety of services ranging from primary care, prevention screenings, and dental services. Underserved populations face barriers to healthcare access such as transportation, financial costs, discomfort with healthcare providers, and cultural barriers. Mobile health clinics address these barriers by providing care at a client's doorstep in their community. Mobile units are able to foster trusting relationships since they provide services in environments clients feel most comfortable in (Yu, Hill, Ricks, Bennet, & Oriol, 2017). Mobile health units have been shown to increase screening rates, assist with chronic disease management, and increase self-efficacy in managing health conditions (Yu, Hill, Ricks, Bennet, & Oriol, 2017). These positive outcomes illustrate the need to further invest in mobile health units to improve healthcare outcomes for vulnerable populations.

The public health workforce lacks diversity and is ill equipped to address the future needs of a racially and ethnically evolving nation. A diverse public health workforce is needed to adequately handle the needs of a demographically changing nation. Currently, the public health workforce is not reflective of the general population. An estimated 63% of the public health workforce is white and 28% are male (Bogaert et al., 2019). Nonwhite students accounted for 47% of public health degrees awarded. From 1992 to 2016, the percentage of Asian/Pacific Islander students awarded degrees increased from 6% to 14%, Black/African American students from 6% to 11%, and Hispanic/Latino students from 8% to 10%. The workforce is made up primarily of women with 70-73% of women receiving public health graduate degrees (Bogaert et al., 2019). The underrepresentation of certain groups in public health may be due to the financial costs of higher education. In public health, there is a scarcity of available scholarships in comparison to other fields (Leider et al., 2015). Additionally, costs associated with degree programs in the United States, particularly for graduate school, are generally high and can pose a barrier for students and disproportionately affect racial and ethnic minorities (Mays et al., 2008).

An estimated

63%

of the public health workforce is white and

28%

are male.

From 1992 to 2016, the percentage of Asian/Pacific Islander students awarded degrees increased from

6% to 14%,

Black/African American students from

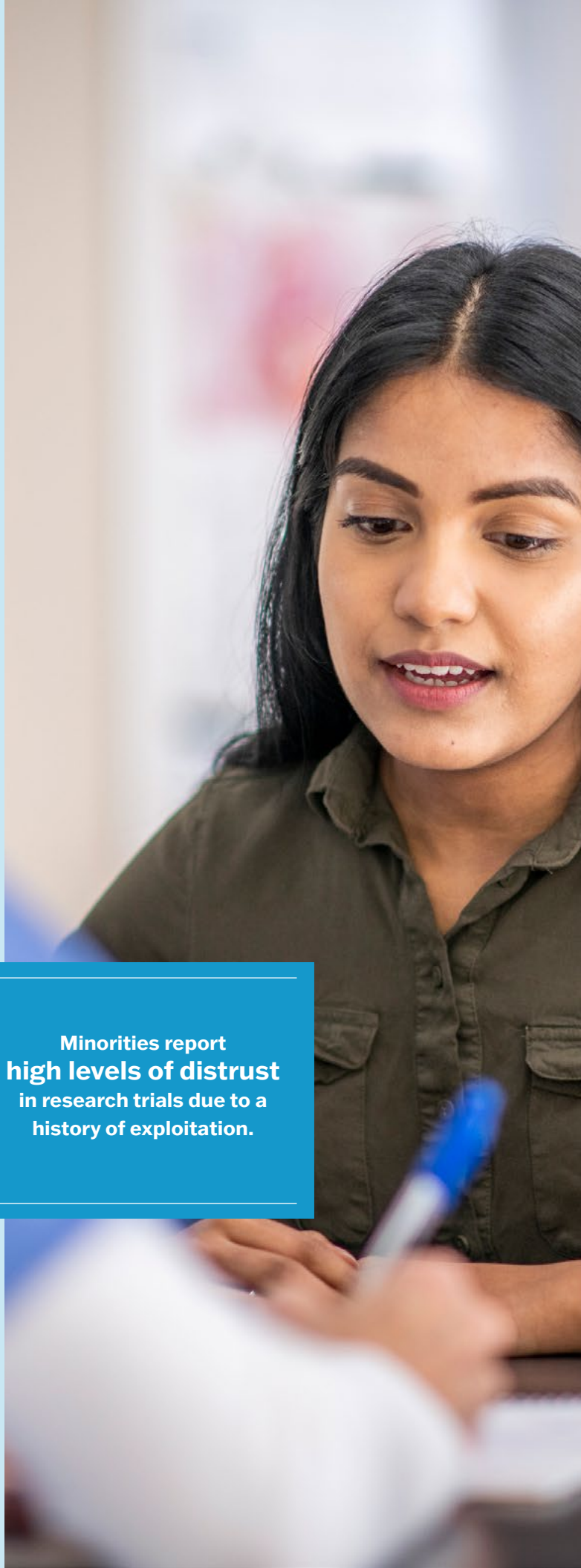
6% to 11%,

and Hispanic/Latino students from

8% to 10%.

Minority populations are underrepresented in research studies which limits the generalizability of research to the general population. While Black/African Americans and Hispanic/Latino make 12.4% and 15.8% of the US population, only a small percentage participate in clinical trials sponsored by the National Institutes of Health (NIH). One report has estimated that Hispanics make up 7.6% of all research participants in NIH studies. Increasing the participation of all minorities in clinical trials is critical for the production of knowledge about new therapies because having diverse research participants can improve the generalizability of medicine. Additionally, minority participation in clinical trials is an important topic in public health discussions because this representation touches on issues of equality and the elimination of disparities, which are core values of the field.

Also, there are no databases aggregating demographic data from all clinical trials—neither those sponsored by NIH nor those sponsored by the pharmaceutical industry. Examining the entire spectrum of clinical research is important because the goals of clinical trials—as well as the benefits and risks—differ according to a novel therapy's stage of development (Fisher & Kalbaugh, 2011). The low rates of participation can be a result of distrust, provider bias, and low-quality translated research materials. Minorities report high levels of distrust in research trials due to a history of exploitation. Black/African Americans are more likely to believe that physicians would not fully explain details of research participation, fear that physicians would allow them to participate in a study even if serious harm was involved, and generally mistrust physicians/researchers (Fisher & Kalbaugh, 2011). On the part of physicians, research has shown that providers are likely to be affected by biases towards minority populations which can affect the treatment minority populations receive in clinical trials (Fisher &



Minorities report
high levels of distrust
in research trials due to a history of exploitation.

Kalbaugh, 2011). Lastly, the translations of research materials such as informed consent forms often have errors. Translations do not take into account regional colloquialisms in languages such as Hindi, Chinese, and Spanish (Brelsford et al., 2018). Translations incorporate complex and long-winded language and the omission of phrases such as please and other clarifying language. There have also been a number of translation cases where words were imprecisely translated which resulted in altered meaning of words (Brelsford et al., 2018).

In response to the underrepresentation of minority populations, the US Department of Health and Human Service's Office of Minority Health (OMH) released fourteen national standards for culturally and linguistically appropriate services (CLAS) in 2000. These standards were issued to clinicians, organization, accreditation bodies, and state agencies. The standards encouraged services to be compatible with patient cultural beliefs and languages, a diverse workforce, and ongoing self-assessments for cultural competency. In 2016, OMH found that 32 states undertook CLAS activities and incorporated CLAS standards into their strategic planning. And only 9 states adopted CLAS-specific policies, and procedures. Despite the establishment of these standards in 2000, there has not been widespread adoption of these policies (Aggarwal et al., 2017). Implementing CLAS standards into minority recruitment practices will improve the chances that minority populations participate in clinical trials.

Cultural competency training programs for public health workers should be co-produced with community members to improve its effectiveness. In order for public health workers to effectively serve diverse populations they must be trained in cultural competency. Cultural competence training often includes understanding the role of culture in our lives and how it shapes behavior, acceptance of cultural difference, learning to utilize culturally specific practices, and the continuous development and reflection of one's personal prejudices and biases (Jongen et al., 2018). Cultural competency should not just be a onetime training, cultural competency must be fostered and reflected on during the course of a person's life. Constant reflection of cultural competency skills will build a strong workforce with a commitment to eliminating health disparities. Additionally, cultural competency should not just focus on education and knowledge, trainings should prioritize practical skills, application of skills, and assessment of skills. To make cultural competency trainings even more effective, incorporating priority populations will ensure that public health workers are able to understand the communities they work with on a deeper level.

The Health Disparities Field Experience (HDFE) is a partnership between New Mexico State University and the Fred Hutchinson Cancer Research Center to help students understand the unique disparities that exist in the US-Mexico Border area and in Native American tribal lands. Students in the program met with community members, health care providers, and visited rural health clinics and hospitals (Moralez et al., 2020). Direct engagement with the community provides deeper knowledge of cultural competency as public health workers will have greater insight on the disparities and lack of resources priority populations face.

Increasing diversity of the workforce through training programs will enable public health to better meet the needs of the nation. There are many federal agencies that have partnered with universities to offer training programs to recruit underrepresented students and to provide them with skills to enter the workforce. These training programs provide students with leadership training, professional development, and public health research and work experience. At the end of programs, students deliver oral presentations of their work and prepare final papers with the opportunity to submit papers to journals. Students additionally gain the opportunity to network and find mentors who will guide them to public health careers suitable for them and assistance with preparing for graduate programs (Horney et al., 2014). Programs have been established in Historically Black Colleges and Universities (HBCUs) to increase the presence and retention of underrepresented racial/ethnic groups in nursing and to assist students in achieving nursing certification pass rates. Programs include mentoring and academic support and help with career planning and professional development (Mayo, 2019). Training programs are an effort to recruit racial/ethnic minorities and to provide them with opportunities they would not have had before.

Expanding the promatores(as) de salud model can help better reach medically underserved minority populations and reduce health disparities.

Promatores(as) de salud communicate health information in a linguistic and culturally relevant way which increases the adoption and effectiveness of health interventions (Sosa et al., 2013). *Promatores* have been shown to effectively reach minority populations which resulted in increased immunization rates and cancer screening rates (Cupertino et al., 2013).

The "Mujeres Interesadas en Cambios por la Salud" is a diabetes prevention program that has been culturally tailored for Mexican American women, led by *promatoras* and aimed at promoting physical activity and healthy eating to reduce the risk of type 2 diabetes in low income populations. The work of *promatoras* helped strengthen communication among participants in the program, increased trust, knowledge, and access to community resources to help with behavior change (Sosa et al., 2013). The *promatore* model can be scaled and implemented to support public health programs in minority communities across the country.

Health equity zones (HEZ) address social determinants of health on a community scale and can help reduce health disparities.

Health equity zones are an initiative implemented by the Rhode Island Department of Health. HEZ's are community collaboratives that receive funding through a "braided" funding model (ChangeLab Solutions & Rhode Island Department of Health, 2021). The braided funding stream pools multiple funding streams from the federal, local, and state government, investor, and foundation funding. HEZ's establish programs that address social determinants of health such as community gardens to increase access to healthy food and creating a program to help kids walk safely to school (Newman, 2020). A HEZ is usually implemented in economically disadvantaged areas with documented health disparities (Patriarca & Ausura, 2016). These place-based initiatives target where people live and work, improving their overall circumstances which in turn reduces the effects of social determinants of health. Addressing these disparities requires a community based effort such as HEZ community members having a say in the immediate impacts that these programs have.

III. CONCLUSION

The development of this environmental scan afforded us the opportunity to hear from many public health experts in the field who have well-formed historical and experiential perspectives of working within the confines of the public health infrastructure. Through their feedback and confirmed by the literature we learned that the chronic underfunding of public health is only the tip of the literal iceberg in terms of what has produced and is currently fueling the challenges. The role of public health has been undermined for years resulting in little investment and funding for public health to carry out its necessary duties. This has severely impacted public health workforce pipeline and health department's ability to modernize labs, informatics, and data systems to identify disease threats. To create a new future for public health, the laws that are needed to support public health departments need to be identified, strengthened and enforced.

The politicization of public health and public health mandates has weakened the public health infrastructure and minimized public health effectiveness.

The political polarization of the COVID-19 pandemic and mask mandates has undermined the authority of public health officials and experts and their ability to keep the country safe (International Federation of Red Cross and Red Crescent Societies & United Nations Children's Fund, 2020). Political polarization of public health has been driven by income inequality, marginalization, and misinformation driven by different forms of media (Gallup, 2019). Public health interventions and public health mandates have been met with controversies due to the limitations on personal autonomy and liberty (Brown, 2010). Public health measures give public health agencies the power to regulate actions and choices in order to protect the nation's health during public health emergencies. Public health officials and governors invoke police powers to order physical distancing measures, stay-at-homes orders, business and school closures, public gathering limits, and other measures to protect the nation's health (Hall et al., 2020). However, the legal authority of public health has been challenged and limited in the courts. Cases have alleged that stay-at-home orders violate freedom and individual rights. In Wisconsin Legislature v. Palm, the Wisconsin Supreme Court struck down the states' renewed stay-at-home order, ruling that the state secretary of health had imposed it improperly. Courts in Ohio and Oregon have followed suit (Hall et al., 2020). Trust and coordination between public health professionals and public authorities is necessary in order to protect the nation's health. Missing from the national dialogue on personal freedom and individual rights is the argument that individuals have a paramount right not lose their lives by being infected by others who put their own desires ahead of others. Infectious disease is not the same as chronic disease, and the entire frame of personal freedom needs to be reconstructed so that we do not repeat the unimaginable number of preventable deaths that are still occurring.

In conclusion, we learned that the challenges go far beyond the material, brick and mortar neglect that public health has been subjected to for the last few decades.

The physical challenges extend deep into our collective psyche. Public health has been losing a credibility battle that has been fueled by lack of awareness of public health's charge and legal duty. What is needed beyond funding is for the U.S. public to envision a new public health system for the 21st century and beyond that addresses all the challenges and weaknesses that have been brought to public view by the Pandemic of 2019. Another conclusion is that to change the public health infrastructure requires changing the way that public health is taught, and at what critical time it is communicated to young citizens. There are a number of programs described in this document that focus on raising awareness of public health among young students and making opportunities for them to contribute to the solutions that will ultimately address all the challenges that are impacting the stability of our public health system. These programs (most of which were discontinued even after showing that they were effective) have the potential to be replicated and scaled. Another ray of hope is national legislation like the reintroduction of the Public Health Infrastructure Saves Lives Act by Patty Murray. This legislation would establish a core public health infrastructure program at the CDC. The program would award grants to state, local, and territorial departments to ensure health departments have the tools and workforce to target emerging health threats. State, tribal and territorial, and local health departments would receive sustained funding to support their work. Policies and programs like the Public Health Infrastructure Saves Lives Act would pave the way for a strengthened and sustainable public health infrastructure.

REFERENCES

Aggarwal, N. K., Cedeno, K., John, D., & Lewis-Fernandez, R. (2017). Adoption of the National CLAS Standards by State Mental Health Agencies: A Nationwide Policy Analysis. *Psychiatric Services*, 68(8), 856–858. https://doi.org/10.1176/appi.ps.201600407

American Public Health Association. (2014). *Support for Community Health Worker Leadership in Determining Workforce Standards for Training and Credentialing* (Policy Statement No. 201414). American Public Health Association. https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/01/28/14/15/support-for-community-health-worker-leadership

Association of Public Health Laboratories. (2018). *Focus on Public Health Laboratories: A Workforce Survey Report*. Association of Public Health Laboratories. https://www.aphl.org/aboutAPHL/publications/Documents/IR-2018May-2016-Workforce-Survey-Report.pdf

Association of State and Territorial Health Officials. (2004). *State Public Health Employee Worker Shortage Report: A Civil Service Recruitment and Retention Crisis*. Association of State and Territorial Health Officials. https://commed.vcu.edu/IntroPH/Introduction/Workforce-Survey-Report.pdf

Association of State and Territorial Health Officials. (2016). *Public Health and Its Impacts*. Association of State and Territorial Health Officials. https://www.astho.org/Public-Policy/Federal-Government-Relations/Documents/Public-Health-and-Its-Impacts/

Berman, M. L., Tobin-Tyler, E., & Parmet, W. E. (2019). The Role of Advocacy in Public Health Law. *Journal of Law, Medicine & Ethics*, 47(S2), 15–18. https://doi.org/10.1177/1073110519857308

Bipartisan Policy Center & de Beaumont Foundation. (2019). *Good Health Is Good Business: The Value Proposition of Partnerships Between Businesses and Governmental Public Health Agencies to Improve Community Health*. Bipartisan Policy Center, & de Beaumont Foundation. https://debeaumont.org/wp-content/uploads/2019/06/Good-Health-Is-Good-Business.pdf

Birkhead, G. S., Klompas, M., & Shah, N. R. (2015). Uses of Electronic Health Records for Public Health Surveillance to Advance Public Health. *Annual Review of Public Health, 36*(1), 345–359. https://doi.org/10.1146/annurev-publhealth-031914-122747

Blenner, S. R., Lang, C. M., & Prelip, M. L. (2017). Shifting the Culture Around Public Health Advocacy: Training Future Public Health Professionals to Be Effective Agents of Change. *Health Promotion Practice*, 18(6), 785–788. https://doi.org/10.1177/1524839917726764

Bogaert, K., Leider, J. P., Castrucci, B. C., Sellers, K., & Whang, C. (2019). Considering Leaving, But Deciding to Stay: A Longitudinal Analysis of Intent to Leave in Public Health. *Journal of Public Health Management and Practice*, 25(2), S78–S86. https://doi.org/10.1097/PHH.0000000000000928

Bouye, K. E., McCleary, K. J., & Williams, K. B. (2016). Increasing Diversity in the Health Professions: Reflections on Student Pipeline Programs. *Journal of Healthcare, Science and the Humanities*, 6(1), 67–79.

Bracken, M. B. (2014). *Epidemiology as a Liberal Art: From Graduate School to Middle School, an Unfulfilled Agenda*. 24, 171–173. https://www.sciencedirect.com/science/article/abs/pii/S1047279713004766

Brelsford, K. M., Ruiz, E., & Beskow, L. (2018). Developing Informed Consent Materials for Non-English-speaking Participants: An Analysis of Four Professional Firm Translations from English to Spanish. *Clinical Trials (London, England)*, 15(6), 557–566. https://doi.org/10.1177/1740774518801591

Brown, L. D. (2010). The Political Face of Public Health. *Public Health Reviews*, 32(1), 155–173. https://doi.org/10.1007/BF03391596

Burris, S., Ashe, M., Blanke, D., Ibrahim, J., Levin, D. E., Matthews, G., Penn, M., & Katz, M. (2016). Better Health Faster: The 5 Essential Public Health Law Services. *Public Health Reports, 131*(6), 747–753. https://doi.org/10.1177/0033354916667496

Cahill, S., Grasso, C., Keuroghlian, A., Sciortino, C., & Mayer, K. (2020). Sexual and Gender Minority Health in the COVID-19 Pandemic: Why Data Collection and Combatting Discrimination Matter Now More Than Ever. *American Journal of Public Health, 110*(9), 1360–1361. https://doi.org/10.2105/AJPH.2020.305829

Carlin, M., & Peterman, E. (2019). Infrastructure for Cross-Sector Collaboration: The State Health Leader Perspective. *Journal of Public Health Management and Practice, 25*(4), 405–407. https://doi.org/10.1097/PHH.0000000000001038

Center for Sharing Public Health Services & Public Health National Center for Innovations. (2019). *Cross-Sector Innovation Initiative: Environmental Scan Full Report*. Center for Sharing Public Health Services, and Public Health National Center for Innovations. https://phsharing.org/wp-content/uploads/2019/07/CSII-Environmental-Scan-Full-Report-July-2019-1.pdf

Center on Budget and Policy Priorities. (2020, April 13). Policy Basics: Non-Defense Discretionary Programs. *Center on Budget and Policy Priorities*. https://www.cbpp.org/research/federal-budget/non-defense-discretionary-programs

Centers for Disease Control and Prevention. (2019, October 23). *Overview: Science Ambassador Fellowship*. https://www.cdc.gov/careerpaths/scienceambassador/overview/index.html

ChangeLab Solutions & Rhode Island Department of Health. (2021). *Health Equity Zones: A Toolkit for Building Healthy and Resilient Communities*. https://health.ri.gov/publications/toolkits/health-equity-zones.pdf

Committee on Public Health Strategies to Improve Health; Institute of Medicine. (2012). *Reforming Public Health and Its Financing. In For the Public's Health: Investing in a Healthier Future*. National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK201015/

Cupertino, A. P., Suarez, N., Cox, L. S., Fernández, C., Jaramillo, M. L., Morgan, A., Garrett, S., Mendoza, I., & Ellerbeck, E. F. (2013). Empowering Promotores de Salud to Engage in Community-Based Participatory Research. *Journal of Immigrant & Refugee Studies, 11*(1), 24–43. https://doi.org/10.1080/15562948.2013.759034

de Beaumont Foundation, Association of State and Territorial Health Officials, National Association of County and City Health Officials, & Big Cities Health Coalition. (n.d.). *2017 National Findings: Public Health Workforce Interests and Needs Survey (PH WINS). de Beaumont Foundation*. https://debeaumont.org/wp-content/uploads/2019/04/PH-WINS-2017.pdf

De Hert, S. (2020). Burnout in Healthcare Workers: Prevalence, Impact and Preventative Strategies. *Local and Regional Anesthesia*, 13, 171–183. https://doi.org/10.2147/LRA.S240564

de los Santos, G. E. (2016). Joining the Public Health Education Continuum: America's Community Colleges. *Pedagogy in Health Promotion, 2*(1), 10–12. https://doi.org/10.1177/2373379915608140

Deutsch, M. B., & Buchholz, D. (2015). Electronic Health Records and Transgender Patients—Practical Recommendations for the Collection of Gender Identity Data. *Journal of General Internal Medicine, 30*(6), 843–847. https://doi.org/10.1007/s11606-014-3148-7

Drezner, K., McKeown, L., & Shah, G. H. (2016). Assessing Skills and Capacity for Informatics: Activities Most Commonly Performed by or for Local Health Departments. *Journal of Public Health Management and Practice, 22*(6), S51–S57. https://doi.org/10.1097/PHH.0000000000000459

Erwin, P. C., Beck, A. J., Yeager, V. A., & Leider, J. P. (2019). Public Health Undergraduates in the Workforce: A Trickle, Soon a Wave? *American Journal of Public Health, 109*(5), 685–687. https://doi.org/10.2105/AJPH.2019.305004

Faberman, R. K., McKillop, M., Alpert Lieberman, D., Delgado, D., Thomas, C., Cunningham, J., & McIntyre, K. (2020). *The Impact of Chronic Underfunding on America's Public Health System: Trends, Risks, and Recommendations, 2020*. Trust for America's Health. https://www.tfah.org/wp-content/uploads/2020/04/TFAH2020PublicHealthFunding.pdf

Fisher, J. A., & Kalbaugh, C. A. (2011). Challenging Assumptions About Minority Participation in US Clinical Research. *American Journal of Public Health, 101*(12), 2217–2222. https://doi.org/10.2105/AJPH.2011.300279

Gallup. (2019). *Wellcome Global Monitor 2018 – First Wave Findings*. Wellcome Trust. https://wellcome.org/sites/default/files/wellcome-global-monitor-2018.pdf

Gideon, L. (2013). Bridging the Gap Between Health and Justice. *Health and Justice, 1*(1), 4. https://doi.org/10.1186/2194-7899-1-4

Global Forum on Innovation in Health Professional Education, Board on Global Health, Health and Medicine Division, & National Academies of Sciences, Engineering, and Medicine. (2019). *A Design Thinking, Systems Approach to Well-Being Within Education and Practice: Proceedings of a Workshop* (P. A. Cuff & E. H. Forstag, Eds.; p. 25151). National Academies Press. https://doi.org/10.17226/25151

Hagan, C. N., Holubowich, E. J., & Criss, T. (2019). *Driving Public Health in the Fast Lane: The Urgent Need for a 21st Century Data Superhighway. Council of State and Territorial Epidemiologists.* https://debeaumont.org/wp-content/uploads/2019/09/DSI-White-Paper_v15-Spreads.pdf

Hall, M. A., Mello, M. M., & Studdert, D. M. (2020). The Legal Authority for States' Stay-at-Home Orders. *New England Journal of Medicine*, 383(5), e29. https://doi.org/10.1056/NEJMp2019662

Hartsig, S. M. (2017). *Cross-Jurisdictional Sharing Workgroup Activities: Final Report 2014-2017* (KHI/17-34). Kansas Health Institute. https://www.khi.org/assets/uploads/news/14777/final-cjs-workgroup-activities.pdf

Hearne, S. A. (2008). Practice-Based Teaching for Health Policy Action and Advocacy. *Public Health Reports, 123*(Supplement 2), 65–70.

Holmgren, A. J., Apathy, N. C., & Adler-Milstein, J. (2020). Barriers to Hospital Electronic Public Health Reporting and Implications for the COVID-19 Pandemic. *Journal of the American Medical Informatics Association, 27*(8), 1306–1309. https://doi.org/10.1093/jamia/ocaa112

Horney, J. A., Davis, M. K., Ricchetti-Masterson, K. L., & MacDonald, P. D. M. (2014). Fueling the Public Health Workforce Pipeline Through Student Surge Capacity Response Teams. *Journal of Community Health, 39*(1), 35–39. https://doi.org/10.1007/s10900-013-9750-5

Illinois Strategic Communication Leadership Project. (2016). *Communicating the Value of Public Health Building Capacity to Share Stories and Speak with One Voice.* https://www.dph.illinois.gov/sites/default/files/publications/publicationsdodemonstrating-value-public-health.pdf

International Federation of Red Cross and Red Crescent Societies & United Nations Children's Fund. (2020). *Building Trust Within and Across Communities for Health Emergency Preparedness.* International Federation of Red Cross and Red Crescent Societies & United Nations Children's Fund. https://apps.who.int/gpmb/assets/thematic_papers_2020/tp_2020_3.pdf

IOM Committee on Lesbian, Gay, Bisexual, and Transgender Health Issues and Research Gaps and Opportunities. (2011). *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding.* National Academies Press (US). http://www.ncbi.nlm.nih.gov/books/NBK64806/

Jongen, C., McCalman, J., & Bainbridge, R. (2018). Health Workforce Cultural Competency Interventions: A Systematic Scoping Review. *BMC Health Services Research, 18*(1), 232. https://doi.org/10.1186/s12913-018-3001-5

Kangovi, S., Grande, D., & Trinh-Shevrin, C. (2015). From Rhetoric to Reality—Community Health Workers in Post-Reform U.S. Health Care. *New England Journal of Medicine, 372*(24), 2277–2279. https://doi.org/10.1056/NEJMp1502569

Kinner, S. A., & Young, J. T. (2018). Understanding and Improving the Health of People Who Experience Incarceration: An Overview and Synthesis. *Epidemiologic Reviews, 40*(1), 4–11. https://doi.org/10.1093/epirev/mxx018

Kolbe, L. J. (2019). School Health as a Strategy to Improve Both Public Health and Education. *Annual Review of Public Health, 40*(1), 443–463. https://doi.org/10.1146/annurev-publhealth-040218-043727

Leider, J. P., Harper, E., Bharthapudi, K., & Castrucci, B. C. (2015). Educational Attainment of the Public Health Workforce and Its Implications for Workforce Development. *Journal of Public Health Management and Practice, 21*(Supplement 6), S56–S68. https://doi.org/10.1097/PHH.0000000000000306

L'Hôte, E., Volmert, A., Davis, C., & Down, L. (2019). *Public Health Reaching Across Sectors: Mapping the Gaps between How Public Health Experts and Leaders in Other Sectors View Public Health and Cross-Sector Collaboration.* FrameWorks Institute. https://www.phrases.org/wp-content/uploads/2020/07/Aspen-PHRASES-MTG-Report-2019.pdf

Logan, R. I., & Castañeda, H. (2020). Addressing Health Disparities in the Rural United States: Advocacy as Caregiving among Community Health Workers and Promotores de Salud. *International Journal of Environmental Research and Public Health, 17*(24). https://doi.org/10.3390/ijerph17249223

Mayo, R. (2019, September 10). Mentoring for Student Retention and NCLEX Success at Historically Black Colleges & Universities Training. *Diversifying the Nursing Workforce*. https://campaignforaction.org/diversifying-the-nursing-workforce/

Mays, D., Klaiman, T., Kumanyika, S., & Bernhardt, J. M. (2008). A Call to Action to Address Diversity in Public Health Professional Preparation. *Diversity & Equality in Health and Care, 5*(3). https://diversityhealthcare.imedpub.com/abstract/a-call-to-action-to-address-diversity-in-public-health-professional-preparation-2133.html

McBain, R. K., Kofner, A., Stein, B. D., Cantor, J. H., Vogt, W. B., & Yu, H. (2019). Growth and Distribution of Child Psychiatrists in the United States: 2007-2016. *Pediatrics, 144*(6). https://doi.org/10.1542/peds.2019-1576

McClamroch, K. J., & Montgomery, J. P. (2009). Epidemiology for High School Students: Improving the Public Health Pipeline. *Public Health Reports (Washington, D.C.: 1974), 124*(6), 898–904. https://doi.org/10.1177/003335490912400620

Mecham, B. (2019, December 12). Sarasota Military Academy Students Survive Pandemic Simulation. *YourObserver.Com*. https://www.yourobserver.com/article/sarasota-military-academy-students-survive-pandemic-simulation

Mello, M. M., Greene, J. A., & Sharfstein, J. M. (2020). Attacks on Public Health Officials During COVID-19. *Journal of the American Medical Association, 324*(8), 741–742. https://doi.org/10.1001/jama.2020.14423

Moralez, E. A., Thompson, B., Englund, K., Drennan, M., Mandall, N., & Loest, H. (2020). The Health Disparities Field Experience: College students and community health workers in the field. *Journal of Education and Health Promotion, 9*, 323. https://doi.org/10.4103/jehp.jehp_510_20

Motivating The Public To Support Public Health: A Toolkit For Communicating With Non-Experts. (2020). Public Health Reaching Across Sectors. https://www.phrases.org/wp-content/uploads/2020/07/Public-Health-Communications-Toolkit-Final_.pdf

Newman, K. (2020, February 18). Health Equity Zones Offer Rhode Island Residents a Voice. *U.S. News*. https://www.usnews.com/news/healthiest-communities/articles/2020-02-18/health-equity-zones-offer-rhode-island-residents-a-voice

Office of Public Health Scientific Services. (2018). *Public Health Surveillance: Preparing for the Future*. Centers for Disease Control and Prevention. https://www.cdc.gov/surveillance/pdfs/Surveillance-Series-Bookleth.pdf

Office of the National Coordinator for Health Information Technology. (2017). *Connecting Public Health Information Systems and Health Information Exchange Organizations: Lessons From the Field*. Office of the National Coordinator for Health Information Technology. https://www.healthit.gov/sites/default/files/FINAL_ONC_PH_HIE_090122017.pdf

Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental Health of Young People: A Global Public-Health Challenge. *The Lancet*, 369(9569), 1302–1313. https://doi.org/10.1016/S0140-6736(07)60368-7

Patriarca, M., & Ausura, C. J. (2016). Introducing Rhode Island's Health Equity Zones. *Rhode Island Medical Journal, 99*(11). http://www.rimed.org/rimedicaljournal/2016/11/2016-11-47-health-patriarca.pdf

Perlino, C. M. (2006). *The Public Health Workforce Shortage: Left Unchecked, Will We Be Protected?* [Issue brief]. American Public Health Association. https://www.apha.org/-/media/files/pdf/factsheets/publichealthworkforceissuebrief.ashx

Phalen, J., & Paradis, R. (2015, January 16). How Community Health Workers Can Reinvent Health Care Delivery In The US. *Health Affairs Blog*. https://www.healthaffairs.org/do/10.1377/hblog20150116.043851/full/

Pruden, H., & Salway, T. (2020, October 28). *Meet the Methods Series: "What and Who is Two-Spirit?" in Health Research*. Canadian Institutes of Health Research. https://cihr-irsc.gc.ca/e/52214.html

Ransom, M. M., Johnson, R., Ashe, M., Penn, M., Ferrell, F. A., & Baffour, K. (2019). Building the Legal Capacity of the Public Health Workforce: Introducing the Public Health Law Academy. *Journal of Law, Medicine & Ethics, 47*(S2), 80–82. https://doi.org/10.1177/1073110519857324

Reich, D., & Windham, K. (2021, March 25). *Boosts in Non-Defense Appropriations Needed Due to Decade of Cuts, Unmet Needs. Center on Budget and Policy Priorities*. https://www.cbpp.org/research/federal-budget/boosts-in-non-defense-appropriations-needed-due-to-decade-of-cuts-unmet

Riegelman, R. K., & Wilson, C. (2014). Community Colleges and Public Health: An Integral Part of the Continuum of Education for Public Health. *Frontiers in Public Health, 2*, 226. https://doi.org/10.3389/fpubh.2014.00226

Rovner, J. (2020, May 1). *Opinion: Always The Bridesmaid, Public Health Rarely Spotlighted Until It's Too Late*. NPR.Org. https://www.npr.org/sections/health-shots/2020/05/01/848628724/opinion-always-the-bridesmaid-public-health-rarely-spotlighted-until-its-too-lat

Rudolph, L., Caplan, J., Ben-Moshe, K., & Dillon, L. (2013). *Health In All Policies: A Guide for State and Local Governments.* American Public Health Association and Public Health Institute. http://www.phi.org/uploads/application/files/udt4vq0y712qpb1o4p62dexjlgxlnogpq15gr8pti3y7ckzysi.pdf

Schaaff, S. V. (2016, October 30). *There's a Shortage of Child Psychiatrists, and Kids are Hurting*. Washington Post. https://www.washingtonpost.com/national/health-science/theres-a-shortage-of-child-psychiatrists-and-kids-are-hurting/2016/10/28/37fd19f0-63b6-11e6-be4e-23fc4d4d12b4_story.html

Scheck, T., & Hing, G. (2020, April 28). Public Health Labs Suffered Budget Cuts Prior to the Coronavirus Pandemic. *In Morning Edition*. NPR. https://www.npr.org/2020/04/28/845484900/public-health-labs-suffered-budget-cuts-prior-to-the-coronavirus-pandemic

Shah, G. H., Badana, A. N. S., Robb, C., & Livingood, W. C. (2016). Cross-Jurisdictional Resource Sharing in Changing Public Health Landscape: Contributory Factors and Theoretical Explanations. *Journal of Public Health Management and Practice, 22*(2), 110–119. https://doi.org/10.1097/PHH.0000000000000368

Shanafelt, T. D., Balch, C. M., Bechamps, G., Russell, T., Dyrbye, L., Satele, D., Collicott, P., Novotny, P. J., Sloan, J., & Freischlag, J. (2010). Burnout and Medical Errors Among American Surgeons. *Annals of Surgery, 251*(6), 995–1000. https://doi.org/10.1097/SLA.0b013e3181bfdab3

Sosa, E. T., Biediger-Friedman, L., & Yin, Z. (2013). Lessons Learned from Training of Promotores de Salud for Obesity and Diabetes Prevention. *Journal of Health Disparities Research and Practice, 6*(1), 1–13.

Strain, A. K., & Sullivan, M. M. (2019). Strengthening Laboratory Partnerships, Enhancing Recruitment, and Improving Retention Through Training and Outreach Activities: The Minnesota Experience. *Public Health Reports (Washington, D.C.: 1974), 134*(Supplement 2), 11S-15S. https://doi.org/10.1177/0033354919874085

Streed, C. G., Grasso, C., Reisner, S. L., & Mayer, K. H. (2020). Sexual Orientation and Gender Identity Data Collection: Clinical and Public Health Importance. *American Journal of Public Health, 110*(7), 991–993. https://doi.org/10.2105/AJPH.2020.305722

Strengthening New York's Public Health System for the 21st Century: Report of the Public Health Infrastructure Work Group to the Public Health Council. (2004). New York State Department of Health. https://www.health.ny.gov/press/reports/century/phc_nyssystem.htm

Suarez-Lledo, V., & Alvarez-Galvez, J. (2021). Prevalence of Health Misinformation on Social Media: Systematic Review. *Journal of Medical Internet Research, 23*(1), e17187. https://doi.org/10.2196/17187

Swire-Thompson, B., & Lazer, D. (2020). Public Health and Online Misinformation: Challenges and Recommendations. *Annual Review of Public Health, 41*(1), 433–451. https://doi.org/10.1146/annurev-publhealth-040119-094127

Tomer, A., Fishbane, L., Siefer, A., & Callahan, B. (2020). *Digital Prosperity: How Broadband Can Delivery Health and Equity to All Communities.* Metropolitan Policy Programs at Brookings. https://www.brookings.edu/wp-content/uploads/2020/02/20200227_BrookingsMetro_Digital-Prosperity-Report-final.pdf

Trust For America's Health. (2020). *The Impact of Chronic Underfunding on America's Public Health System: Trends, Risks, and Recommendations, 2020*. Trust for America's Health. https://www.tfah.org/wp-content/uploads/2020/04/TFAH2020PublicHealthFunding.pdf

Tsukamaki, D. (2007, November 5). *Young Epidemiology Scholars (YES) Competition: Inspiring the Next Generation of Public Health Professionals*. 135st APHA Annual Meeting and Exposition, Washington, DC.

Velte, K. (2020). *Straightwashing the Census. Boston College Law Review, 61*(1), 69.

Weber, L., Ungar, L., Smith, M. R., Recht, H., & Barry-Jester, A. M. (2020, July 1). Hollowed-Out Public Health System Faces More Cuts Amid Virus. *Kaiser Health News*. https://khn.org/news/us-public-health-system-underfunded-under-threat-faces-more-cuts-amid-covid-pandemic/

Weinstein, J. N., Geller, A., Negussie, Y., & Baciu, A. (Eds.). (2017). The Need to Promote Health Equity. *In Communities in Action: Pathways to Health Equity* (p. 24624). National Academies Press. https://doi.org/10.17226/24624

West, C. P., Huschka, M. M., Novotny, P. J., Sloan, J. A., Kolars, J. C., Habermann, T. M., & Shanafelt, T. D. (2006). Association of Perceived Medical Errors With Resident Distress and Empathy: A Prospective Longitudinal Study. *JAMA, 296*(9), 1071. https://doi.org/10.1001/jama.296.9.1071

Whelen, A. C., & Kitagawa, K. (2013). Public Health Laboratory Workforce Outreach in Hawai'i: CLIA-Focused Student Internship Pilot Program at the State Laboratories. *Hawai'i Journal of Medicine & Public Health, 72*(1), 27–30.

Zamuido, M. I. (2021, January 20). *How Promotoras De Salud Are Fighting Vaccine Conspiracies In Chicago's Latino Communities.* In WBEZ Chicago. https://www.wbez.org/stories/how-promotoras-de-salud-are-fighting-vaccine-conspiracies-in-chicagos-latino-communities/675155b6-60d8-4924-b0f6-c2e965fee88d

APPENDIX A

Key Informants Interviewed

Gloria Addo-Ayensu, MD

Gloria Addo-Ayensu is the Director of Health at the Fairfax County Health Department in Virginia. In this capacity, she provides overall leadership and direction for public health programs in the county and serves as the official health advisor to Fairfax Board of Supervisors, Health Care Advisory Board and the Human Services Council. She has led a number of regional and state public health initiatives in the areas of health literacy, emergency preparedness, obesity prevention and health equity, as well as served on a number of national committees, including NACCHO's Public Health Preparedness Essential Services Committee and two Institute of Medicine committees on personal protective equipment for healthcare workers to prevent transmission of pandemic influenza or other viral respiratory infections. In 2016 Dr. Addo-Ayensu was a recipient of the A. Heath Onthank Memorial Award, the highest honor the county bestows upon its employees.

Georges Benjamin, MD

Georges Benjamin is the executive director of the American Public Health Association. He came to APHA from his position as secretary of the Maryland Department of Health and Mental Hygiene. Dr. Benjamin became secretary of health in Maryland in April 1999, following four years as its deputy secretary for public health services. As secretary, Dr. Benjamin oversaw the expansion and improvement of the state's Medicaid program. He is board-certified in internal medicine and a fellow of the American College of Physicians, a fellow of the National Academy of Public Administration, a fellow emeritus of the American College of Emergency Physicians and an honorary fellow of the Royal Society of Public Health. In April 2016, President Obama appointed Dr. Benjamin to the National Infrastructure Advisory Council, a council that advises the president on how best to assure the security of the nation's critical infrastructure.

Michelle Carvalho, MPH, MCHES

Michelle Carvalho is the team Lead for the Education and Training Services Branch at the Centers for Disease Control and Prevention. Michelle has over 18 years of domestic and global community health experience. Ms. Carvalho spent 10 years as the Team Lead for the Cancer Prevention and Control Research Network (CPCRN) of the Emory Prevention Research Center. Her past work includes infectious disease research at the Centers for Disease Control and Prevention (CDC) and faith-based community work in Sao Paulo, Rio de Janeiro, and Recife, Brazil. Since 2004, she has worked on the dissemination of evidence-based approaches through national and state workgroups and local mini-grants programs to translate evidence into practice in Georgia.

Claude-Alix Jacob, MPH

Claude-Alix Jacob is the Chief Public Health Officer for the city of Cambridge, Massachusetts. He has over 20 years experience in public health and has led the operations of the Cambridge Public Health Department (CPHD) since 2007. Most recently, Mr. Jacob served as the Deputy Director of the Office of Health Promotion at the Illinois Department of Public Health. In this position, he oversaw health promotion activities related to chronic disease prevention, oral health education, children's health, and injury prevention. Previously, Mr. Jacob served as the Chief of the Bureau of Disease Prevention and Control at the Baltimore City Health Department and as the Director of Community Affairs at the Sinai Community Institute in Chicago. He has participated on a number of advisory boards including the Baltimore Schweitzer Fellows Program, the National Association of Health Services Executives (Chicago/Baltimore chapters), and Public Allies–Chicago (AmeriCorps). He is the current national chair of the Black Caucus of Health Workers of the American Public Health Association.

Montrece Ransom, JD, MPH

Montrece McNeill Ransom is the Director of the National Coordinating Center for Public Health Training. Ms. Ransom was appointed as a Presidential Management Fellow and worked at CDC for almost 20 years. For the last 10 years of her service, Ms. Ransom led CDC's public health law related training and workforce development efforts. Ms. Ransom is the ABA Health Law Section's 2019 Champion of Diversity and Inclusion Awardee, and the 2017 recipient of the American Public Health Association Jennifer Robbins Award for the Practice of Public Health Law. She is the President-Elect of the American Society for Law, Medicine, and Ethics and serves on the Advisory Committee for the Georgia Campaign for Adolescent Power and Potential.

APPENDIX B

Technical Expert Panel (TEP) Members

Julia Adler-Milstein, PhD

Julia Adler-Milstein is an Associate Professor of Medicine and the inaugural Director of the Center for Clinical Informatics and Improvement Research (CLIIR) at the University of California – San Francisco. Her research focuses on health IT policy with an emphasis on electronic health records and interoperability. Dr. Adler-Milstein previously was on the faculty at the University of Michigan. She has testified before the US Senate Health, Education, Labor and Pensions Committee, is a member of the National Academy of Medicine, been named one of the top 10 influential women in health IT, and won numerous awards, including the New Investigator Award from the American Medical Informatics Association and the Alice S. Hersh New Investigator Award from AcademyHealth. She has served on an array of committees and boards, including the NHS National Advisory Group on Health Information Technology, the Health Care Advisory Board for Politico, and the Interoperability Committee of the National Quality Forum.

Kathleen Amos, MLIS

Kathleen Amos serves as the Director, Academic/Practice Linkages for the Public Health Foundation (PHF). Ms. Amos coordinates the Council on Linkages Between Academia and Public Health Practice and its initiatives, including the Academic Health Department Learning Community and the Core Competencies for Public Health Professionals; manages performance improvement and competency development and implementation activities; and helps to coordinate Maryland's Mid-Shore Rural Health Collaborative. Ms. Amos joined PHF in 2010 as a Learning Partnership Librarian through the Grace and Harold Sewell Memorial Fund. Prior to coming to PHF, she completed the National Library of Medicine Associate Fellowship Program, gaining specialized training in health sciences information services; engaging in research related to biomedical publishing; and supporting consumer health, health literacy, and public health informatics projects.

Scott Becker, MS

Scott Becker is the Chief Executive Officer of the Association of Public Health Laboratories (APHL), serving in that capacity since 1997. Currently he is leading development of new plans and a funding strategy for APHL's state-of-the-art AIMS platform, which provides data management and messaging services to public health and

other data exchange partners, and also is pursuing national solutions to transfer electronic health data through extensive participation in the public-private forum Digital Bridge and the "Data: Elemental to Health" Campaign. Earlier in his career, Mr. Becker served as deputy executive director for the Association of Schools & Programs of Public Health (ASPPH). During a sabbatical from ASPPH, he directed a WHO project to integrate HIV/AIDS into health profession curricula. He chairs the Governance Working Group for the Global Laboratory Leadership Program (GLLP), a collaboration with the World Health Organization (WHO), the US CDC and others to develop a competency-based curriculum for laboratory leaders. Additionally, he is a member of the Affiliate Council of ASTHO which he formerly chaired.

Betty Bekemeier, PhD, MPH, MSN, RN, FAAN

Betty Bekemeier is the Director of the Northwest Center for Public Health Practice, where she , leads training activities, serves as content reviewer for the center's nursing trainings, and writes for the Northwest Public Health magazine, among other duties. She is the Kirby & Ellery Cramer Endowed Professor at the University of Washington School of Nursing and Adjunct Professor in the School of Public Health. She is Primary Investigator of the Public Health Activities and Services Tracking (PHAST) Study and conducts practice-based research in collaboration with state and local public health practice partners. Much of her research and leadership in advancing public health systems has been conducted through state Public Health Practice-based Research Networks (PBRN), working directly with public health leaders to provide the evidence needed to most effectively and equitably promote health in communities. Dr. Bekemeier is a Robert Wood Johnson Foundation Nurse Faculty Scholar and an active member and founding member of the Washington State Public Health Practice-Based Research Network and its Executive Committee. She is also a committee member on the Public Health Accreditation Board of Directors Research Advisory Council.

Samantha Cinnick, MPH, CPH, CHES

Samantha Cinnick is a Program Officer at the de Beaumont Foundation, providing program coordination for workforce development initiatives to equip public health professionals with the knowledge, skills, and tools to make their communities healthier. Before joining the Foundation, she was the center coordinator of the Region 2 Public Health Training Center at the Columbia University Mailman School of Public Health. Ms. Cinnick gained experience in city and local governmental public health by interning for the New York City Department of Health and Mental Hygiene's Brooklyn Breastfeeding Empowerment Zone and designing a public health workforce development plan for the US Virgin Islands Department of Health.

Nafisa Cisse Egbuonye, PhD, MPH

Nafisa Cisse Egbuonye is the director of the Black Hawk County Health Department in Iowa. She is a certified infectious disease and surveillance control specialist, who has experience in infectious disease surveillance domestically and globally. Dr. Egbuonye serves on the boards of Allen College, Delta Dental of Iowa Foundation and Grow Cedar Valley, as well as Iowa Public Health Association's Public Health Advocacy Group. She received a National Research Service Award from the National Institutes of Health and a Diversity Fellowship from the Texas A & M University. She received a 20 under 40 award from the Cedar Valley Courier. Dr. Egbuonye is a member of the third cohort of The Kresge Foundation's Emerging Leaders in Public Health initiative.

Sarah de Guia, JD

Sarah de Guia is the Chief Executive Officer at ChangeLab Solutions. Before joining ChangeLab Solutions, Sarah worked at the California Pan-Ethnic Health Network (CPEHN), first as director of government affairs and then as executive director. Sarah's accomplishments during her tenure at CPEHN include passage of more than a dozen legislative bills to further health equity; critical administrative policy wins to incorporate health equity into land use and planning regulations; and improving the quality of health care for immigrants, patients with limited English proficiency, and communities of color. Prior to working at CPEHN, Sarah was a health program director at Latino Issues Forum and a legislative analyst at the Mexican American Legal Defense and Educational Fund. Sarah sits on the advisory committee for the Office of Health Equity at the California Department of Public Health, the advisory council of the Healthiest Cities and Counties Challenge, the editorial committee of Public Health Watch, the principles alliance stewardship council of Raising the Bar: Health Care's Transforming Role, and the board of directors of the CARESTAR Foundation.

Julian Drix, MPH

Julian Drix the co-lead of the Health Equity Institute at the Rhode Island Department of Health. He previously served as its Asthma Program Manager, where he developed, implemented and evaluated comprehensive asthma interventions that connect public health with the health care system. Mr. Drix is an alumni of the Bloomberg American Health Initiative fellowship program, in which he analyzed complex social and environmental determinants and establish initiatives to advance health equity. He is a member of the Environment Section and Environmental Justice Subcommittee of APHA and was elected by the Section as an APHA Governing Councilor. He is a member of the 2019 class of the 40 Under 40 in Public Health list by the de Beaumont Foundation. Mr. Drix is a member of the second cohort of The Kresge Foundation's Emerging Leaders in Public Health initiative.

Venus Ginés, MA, P/CHWI

Venus Ginés is a 27-year breast cancer survivor who survived cancer for the second time in 2017 after 25 years of survivorship. Ms. Ginés retired as a faculty member at Baylor College of Medicine in Houston, Texas, having taught cultural competence and health literacy as well as conducted research on Latino medical mistrust. From her personal experience with cancer and her sister's untimely death from cervical cancer 9 months after diagnosis, Ms. Ginés founded Día de la Mujer Latina (DML), Inc., in 1997, as a national non-profit organization that celebrates its signature Health Fiestas in 40 states, Puerto Rico, and the Dominican Republic and provides the medically underserved Latina community with culturally and linguistically proficient health education and early detection screening for chronic diseases.

Dawn Hunter, JD, MPH, CPH

Dawn Hunter is the is the Deputy Director of the Southeastern Region Office of the Network for Public Health law. Ms. Hunter has worked in state public health at the New Mexico Department of Health, where she started as a Robert Wood Johnson Foundation Visiting Attorney in Public Health Law through the Network. She is also experienced in training and compliance, organizational policy management, and workforce development. Ms. Hunter started her career in child protective services in Hillsborough County, Florida. She later transitioned into research and development as a microbiologist at the University of South Florida, Center for Biological Defense, with a focus on rapid detection methods for food and waterborne pathogens. She also served as the Senior Director of Policy, Strategy and Legal Services for the Foundation for a Healthy St. Petersburg.

Peter Holtgrave, MPH, MA

Peter Holtgrave is the Senior Director of Public Health Infrastructure and Systems at the NACCHO, where he oversees the organization's Performance Improvement, Workforce Development, Public Health Transformation, and Health Equity and Social Justice portfolios. He previously served as NACCHO's Director of Accreditation and Quality Improvement. Mr. Holtgrave has served as the National Health Manager at the OASIS Institute, a national nonprofit focused on healthy and productive aging, and managed the evaluation of the Healthy Kids, Healthy Communities national initiative, funded by the Robert Wood Johnson Foundation. He held multiple positions at the Boston Public Health Commission, including the Co-Director of Health Education for the Division of Child and Adolescent Health, the Director of the Boston Area Health Education Center, and the Associate Director of the Youth to Health Careers program.

Erika Miller, JD

Erika Miller is the Senior Vice President and Counsel at the Coalition for Health Funding. Ms. Miller has expertise in the intricacies of physician reimbursement and provides guidance to clients as they navigate the evolving area of alternative payment models and health care quality initiatives. She advocates before the legislative and executive branches to innovate within the health workforce programs, like Title VII, and the Medicare graduate medical education program to ensure that there is a physician workforce available to meet the health needs of Americans. Prior to CHF, Ms. Miller also worked in the HHS Office on Women's Health, where she monitored grant awards., and the office of Congressman Steve Rothman of New Jersey, a member of the House Appropriations Committee, where she handled immigration issues.

Denise Octavia-Smith, MBA, CHW, PN

Denise Octavia-Smith is the founding Executive Director of the National Association of Community Health Workers. Prior to NACHW, she was the led the development of the Equal Coverage to Care Coalition at the UConn Health Disparities Institute, served as the Director of Career and Education Initiatives for Central Area Health Education Center, Inc. and was the Training Coordinator for Access Health CT where she developed the statewide training, certification, consumer engagement strategies and continuing education opportunities for 400 culturally and linguistically diverse Navigators, In-Person Assisters and Certified Application Counselors during Connecticut's first open enrollment. Mrs. Smith is a 2018 Robert Wood Johnson Culture of Health Leadership Fellow and a 2016 Universal Health Care Foundation "Leaders in Action" Fellow. Her advisory appointments include the American Board of Internal Medicine, the Connecticut Office of Health Strategy and the University of Pennsylvania Perelman School of Medicine Department of Medical Ethics and Health Policy.

Myra Parker, JD, PhD, MPH

Myra Parker is the Executive Director of Seven Directions, A Center for Indigenous Public Health. She is an assistant professor in the Center for the Studies of Health and Risk Behavior in the Department of Psychiatry and Behavioral Sciences, in the University of Washington School of Medicine. She also serves as Co-Director of the Indigenous Wellness Research Institute's Tribal Protocols and Ethics Division. She is an enrolled member of the Mandan and Hidatsa tribes and has worked on tribal public health program implementation, coordination, and research with tribal communities in Arizona, Idaho, and Washington. Prior to her work in research, she worked for five years in the policy arena within Arizona state government, in tribal governments, and with tribal working groups at the state and national level. Dr. Parker serves as Co-Investigator on an ETHICS project to culturally adapt a human subjects curriculum for tribal communities; a national epidemiology research study grounded in CBPR involving twenty-five tribal colleges and universities; and a NIAAA R01 research study investigating the effectiveness of a culturally-adapted version of the BASICS intervention and a policy intervention.

Gianfranco Pezzino, MD, MPH

Gianfranco Pezzino is a Senior Fellow at the Kansas Health Institute where he directs the Center for Sharing Public Health Services, a multi-year dollar national initiative funded by the Robert Wood Johnson Foundation. The Center provides access to tools, techniques, expertise and resources that support better collaboration across boundaries by public health departments, allowing them to do more together than they could do alone. Dr. Franco previously served as the Shawnee County, Kansas, health officer. Prior to joining KHI, he most recently served as state epidemiologist and medical director for the bioterrorism program within the Kansas Department of Health and Environment. He is a Fellow of the American College of Preventive Medicine, is board-certified in preventive medicine and public health and is certified in evaluation practice.

Larry Polsky, MD, MPH, FACOG

Larry Polsky is the Health Officer and Director of the Calvert County Health Department in Maryland. Dr. Polsky directs the health department as an agent of the Maryland State Government. With over 30 years of practice, he is a fellow of the American Congress of Obstetricians and Gynecologists. He serves on the board of directors for Calvert Healthcare Solutions, which provides primary care to uninsured Calvert County adults, care coordination for residents being treated for diabetes and high blood pressure, and direct education and enrollment efforts for expanded Medicaid and Qualified Health Products in 3 Maryland counties. Dr. Polsky is a member of the first cohort of The Kresge Foundation's Emerging Leaders in Public Health initiative.

Julie Pryde, MPH, MSW

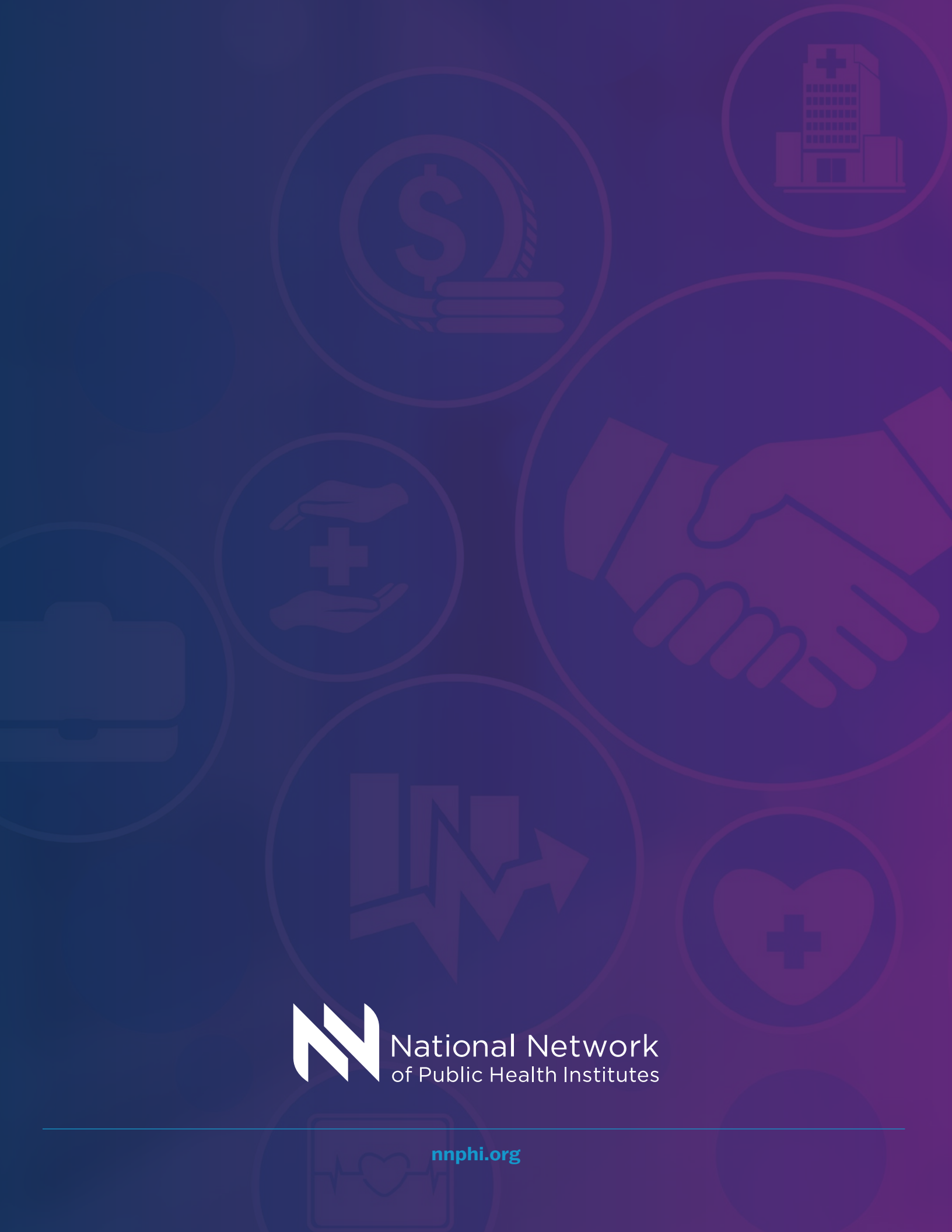
Julie Pryde is a public health administrator for the Champaign-Urbana Public Health District (CUPHD) in Illinois. She joined CUPHD in 1995 as a Program Consultant in the Division of Social Services and as the Project Director for the IL Region 6 HIV Prevention Implementation Group. In 2001 she became the Director of the Division of HIV/STD/TB Prevention and Management. In 2008, Ms. Pryde was appointed as the first female Public Health Administrator in CUPHD's 70+ year history. CUPHD was created in 1937. Ms. Pryde served as an Investigator for the Home Access' FDA Post-Marketing Surveillance Study. Ms. Pryde has won awards from the Illinois Department of Public Health, The University of Illinois School of Social Work, The Greater Community AIDS Project, IL Public Health Association, and the IL Association of Agencies and Community Organizations for Migrant Advocacy. She currently serves on the NACCHO's Zika Advisory Council, Illinois Immunization Advisory Committee, the University of Illinois, School of Social Work's Field Advisory Committee, and the UIUC Department of Human Development and Family Studies External Advisory Committee. Ms. Pryde is a member of the third cohort of The Kresge Foundation's Emerging Leaders in Public Health initiative.

Monica Valdes Lupi, JD, MPH

Monica Valdes Lupi is the Managing Director of Health for The Kresge Foundation. Ms. Valdes Lupi most recently served as senior fellow at the de Beaumont Foundation, where she advised and led its efforts to amplify and accelerate policy initiatives aimed at developing and advancing a health agenda on critical public health issues such as tobacco control, racial justice and health equity. Ms. Valdes Lupi was also a senior advisor to the CDC Foundation in its COVID-19 efforts. In this role, she guided activities aimed at quickly identifying and supporting critical gaps and needs among state and local health departments in their response and recovery activities. Previously, she served as the executive director of the Boston Public Health Commission, the deputy commissioner for the Massachusetts Department of Public Health and was the first chief program officer for Health Systems Transformation at ASTHO. Ms. Valdes Lupi led ASTHO's work on health equity, Medicaid and public health partnerships, government relations, state health policy, and public health informatics.

Katherine Wells, MPH

Katherine Wells is the Director of Public Health for the Department of Public Health for the City of Lubbock, Texas. Ms. Wells previously worked at the Department of Health Services for the State of Texas, serving as a communicable disease program manager, manager of the Texas HIV State Pharmacy Assistance Program, and a data analyst for the Texas AIDS Drug Assistance Program. She also worked at the National Institute of Health assisting on the Surgeon General's Report on oral health in America. Ms. Wells moved to Lubbock to look at rebuilding Lubbock's public health system, which had been significantly cut back in 2012. Ms. Wells is a member of the third cohort of The Kresge Foundation's Emerging Leaders in Public Health initiative.



National Network
of Public Health Institutes

nnphi.org