

COVID-19 AND RURAL PUBLIC HEALTH SYSTEMS

RECOMMENDATIONS TO IMPROVE HEALTH IN ILLINOIS

*Rural Illinois is in need of sustained, sweeping change to improve the social, economic and environmental factors which determine health outcomes. Illinois' rural communities suffer from "The Five D's:" Rural communities start at a **DISADVANTAGE** due to experiencing food, healthcare, social service and data **DESERTS**, as well as organizational and technological **DISCONNECTION**. Rural regions experience similar **DISPARITIES** to low-income urban areas but experience even fewer **DEVELOPMENT** opportunities than their urban counterparts. These recommendations aim to improve health equity in rural Illinois.*



PREEXISTING CONDITIONS

US public health systems (which include all public, private and voluntary entities that contribute to the delivery of essential public health services) were strained prior to the onset of COVID-19. Challenges included outdated technology, disconnected community health infrastructure and a need for more public health workers.¹ Rural public health departments often faced additional difficulties as rural individuals are generally older and sicker than metropolitan individuals, reside in a vast but sparsely populated geographic region and are more likely to lack adequate resources and access to care.²

Funding cuts and a lack of local individuals with specialized skills made it difficult for America's rural public health departments to acquire and retain a sufficient and quality workforce even before the pandemic.³ State public health departments' spending from 2010 to the start of the pandemic in 2020 dropped by 16% per capita and spending for local public health departments dropped by 18%.⁴ Prior to the pandemic, more than three quarters of Americans lived in states that spent less than \$100 per person annually on public health. Illinois spent an average of \$52 per resident per year from 2016-2019.⁵ Public health departments struggled to find the right candidates to fill funded positions, resulting in public health system staff with limited expertise, training and resources to collect and analyze data.⁶ A study conducted in 2015 stated that staffing challenges, including candidate shortages and high turnover, were reported by rural public health staff across the nation and within epidemiology departments and laboratory facilities.⁷ The Illinois governmental public health workforce, specifically, saw a significant decrease in employee volume in local health departments from 2016-2020.⁸ A workforce development assessment conducted by the Illinois Public Health Association in conjunction with Public Health

RECOMMENDATIONS

- Expand and invest in the rural public health workforce by enhancing opportunities for education and professional growth.
- Modernize rural public health data systems by investing in the technology and training to allow rural communities to have timely, reliable and actionable information.
- Incentivize partnerships between health care providers and public health departments that result in collective impact and avoid duplication of resources and services.



ABOUT THE RURAL HEALTH SUMMIT

[Southern Illinois University \(SIU\) Medicine Department of Population Science and Policy](#), [SIU Paul Simon Public Policy Institute](#), [SIU Medicine Center for Rural Health and Social Service Development](#) and [University of Illinois Chicago School of Public Health](#) continued the work of the 2018 Illinois Rural Health Summit and convened rural stakeholders for 11 discussion forums in late 2020 to better understand and address the COVID-19 pandemic in rural Illinois. Using the [2019 report on the most pressing issues facing rural Illinois](#) as a foundation, 80 leaders from 55 organizations in diverse fields such as public health, health care, academia, industry and government met virtually to discuss how the pandemic is creating new challenges and fostering new innovation. Forums focused on rural economic development, health workforce, children's growth and development, nutrition and fitness, mental health, opioids, public health systems, caring for an aging population and healthy housing. Discussion forums participants were also invited to an additional, overarching session to identify common challenges and synthesize impactful solutions. The information, anecdotes and issues raised in this report come from those conversations.



AN AGING
POPULATION



MENTAL
HEALTH



PUBLIC HEALTH
SYSTEMS



NUTRITION
& FITNESS



CHILDREN'S
GROWTH &
DEVELOPMENT



RURAL HEALTH
WORKFORCE



OPIOIDS



HEALTHY
HOUSING



ECONOMIC
DEVELOPMENT

is Stronger Together (PHIST) identified that 70% of local health departments had 30 or fewer employees as a part of their public health workforce.⁹ Illinois only employed 2.8 local public health employees per 10,000 people in 2019 compared to the national average of 4.1 per 10,000 people.¹⁰ The challenges of limited workforce are further compounded with inexperienced leadership as 37% of local health departments are led by individuals with less than five years of experience.¹¹

The lack of a sufficient and experienced workforce makes it difficult for public health departments to build an appropriate data surveillance system and infrastructure. In the March 2016 edition of the Annual Review of Public Health, epidemiologists were cited as one of the specialties that are deficient in rural local health departments.¹² With limited epidemiologists and laboratory personnel support, rural public health departments are unable to gather and analyze the local data necessary to deeply understand the public health challenges in their communities and use that information to create appropriate programs and policies that can improve the health of their populations.

Rural public health departments also face barriers simply accessing quality data, specifically with communities of color or communities that are geographically difficult to reach.¹³ The [Illinois Behavioral Risk Factor Surveillance System](#) expressed similar concerns in regards to data in rural communities. The small population size and lack of diversity in rural communities makes it difficult to obtain enough responses for quality data, especially data by race, gender, sexual orientation, etc.¹⁴ This lack of data complicates tracking and addressing health disparities. Shortages also result in immediate pressures taking precedence over comprehensive monitoring of health issues and disparities and prevent a focus on partnerships and innovation. Public health departments and healthcare systems do not routinely collaborate on community health strategies and implementation plans. In fact, local health departments and hospitals are both asked to perform community needs assessments but have different timelines and target goals in developing their community health

DEFINING "RURAL" IN ILLINOIS

Of Illinois' 102 counties, 62 are considered non-metropolitan. 1.5 million Illinois residents reside in nonmetropolitan and/or rural regions. In an effort to be inclusive, this report uses "rural" to describe non-metropolitan counties.



strategies. Not for profit hospitals are asked to complete Community Health Needs Assessments (CHNAs) and implementation plans every three years. Public health departments are asked to complete an Illinois Project for Local Assessment of Need (I-PLAN) every five years. CHNAs and I-PLANs often produce different results and require different implementation plans even in demographically similar communities. Instead of working together to share expertise and resources to tackle community challenges, hospitals and public health departments often duplicate or offer contradictory services.

THE PANDEMIC'S IMPACT

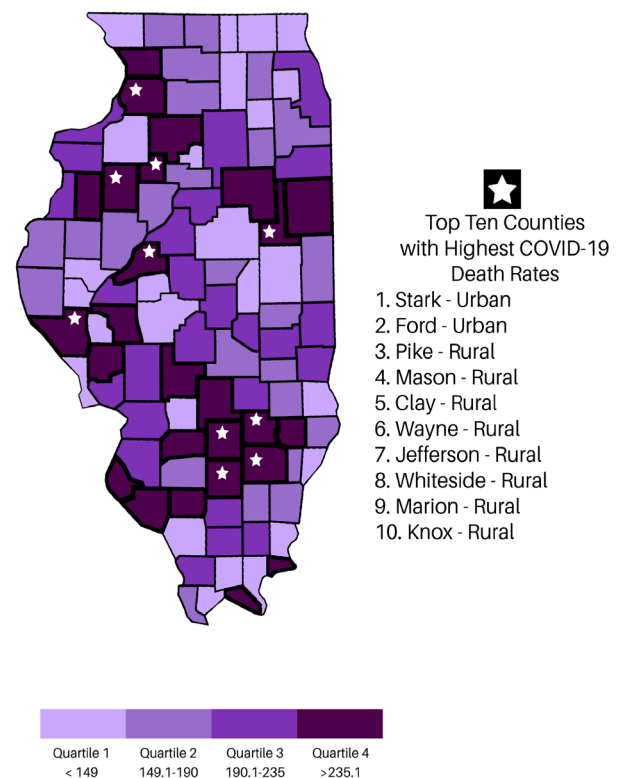
Rural public health systems faced an avalanche as the novel coronavirus laid bare major cracks in public health defenses. Consistently underfunded public health systems limited Illinois' and the nation's ability to effectively communicate public health concerns, conduct contact tracing and cultivate robust surveillance.¹⁵ However, the renewed importance on public health required Illinois to innovate and create programs and policies to bring forward new forms of care delivery and facilitate unique partnerships rarely considered before the pandemic.

As COVID-19 raced across the United States in early 2020, death rates initially spiked in large metro areas. But as the virus started spreading in rural communities, existing health challenges and limited healthcare infrastructure led to catastrophic results. Rural residents account for 14 percent of the total US population but were 16 percent of all COVID-19 deaths through February 2021.¹⁶ In fact, rural counties experienced the highest death rates in Illinois. As Figure 1 shows, eight of the ten counties with the highest COVID death rates in Illinois are rural.¹⁷

Rural public health departments were the first line of defense when the outbreak began, working to control the spread in their communities and creating their own operations plans. However, most public health departments simply were not prepared. A 2020 study conducted by Southern Illinois University School of Medicine Department of Population Science and Policy gauged rural public health departments' preparedness at the onset of COVID-19. Rural nonmetropolitan local health departments reported high barriers to adequate preparation in identifying critical resources, coordinating with emergency management, coordinating with organizations to provide fatality management, meeting the needs of patients during a medical surge and engagement of volunteers to assist in emergency response.¹⁸

This lack of preparedness was intensified by rural public health departments dealing with outdated and often limited technology platforms. Technological limits resulted in an inability to acquire more sensitive and specific data, including accurately measuring the true extent of the disparities of certain communities of color or those most geographically isolated. The use of outdated infrastructure, coupled with lack of integration of new healthcare technologies, slowed the pandemic response and often hurt the credibility of public health officials. Illinois implemented a data collecting tool called Salesforce, but the ability of local health departments to fully use this data platform varied based on staffing, capability and

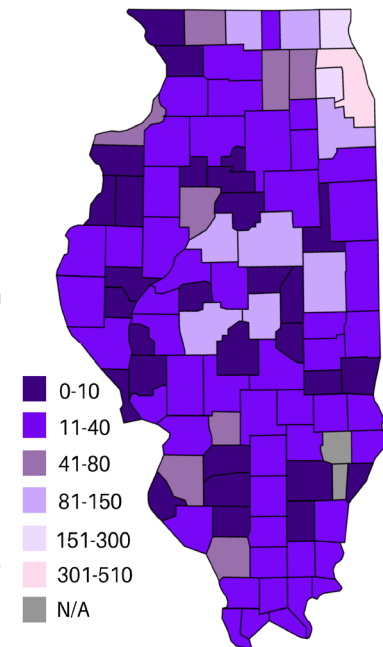
FIGURE 1: Illinois COVID-19 Death Rate/100k Persons by County



expertise. Despite these preparedness challenges, rural public health departments offered an admirable response to community need.

Public health administrators dealt with insufficient funds, faulty infrastructure and unreliable partners.¹⁹ The pandemic worsened many pre-pandemic rural response issues, such as understaffed teams, limited to no training on how to handle infectious disease, lack of ample personal protection equipment and rural health clinics' inability to take on a surge of patients.²⁰ Based on a 2018 report released by the [Illinois Public Health Association](#), Figure 2 demonstrates the severe lack of public health workers in rural Illinois. COVID-19's unique ability to spread asymptotically led to a scale and speed of transmission unseen in modern history. The result was a need for substantial expansion in assessment and surveillance capabilities and a modern data infrastructure. Illinois invested \$16.6 million for COVID-19 recovery-related temporary jobs to help mitigate COVID-19 in communities, including hiring new contact tracers in 2020.²¹ Yet, contact tracing efforts struggled because a sufficient, capable, trusted and local workforce simply did not exist.

FIGURE 2: Number of Full Time Public Health Workers by County



Additionally, pandemic-related stress and burnout caused a significant loss of public health workers.²² According to public health experts, the US is currently experiencing the most significant departure of public health leaders in history. More than 180 higher-level state and local public health department officials have taken leave since April 1, 2020.²³ A significant number of lower-level staffers have also been a part of this great exodus.

The COVID-19 pandemic and its incredible effect on Illinois' rural communities spurred innovation and the application of big ideas. Several successful cross-sector partnerships were established and made meaningful impacts for rural residents. One innovation was the [Pandemic Health Worker program](#) funded by the [Department of Healthcare and Family Services](#), [Southern Illinois University \(SIU\) School of Medicine](#) and [OSF Healthcare](#), in partnership with several local health departments including Menard, Adams and Sangamon counties, supported thousands of community members who were impacted directly and/or indirectly by the pandemic. Throughout the course of the pandemic, these entities worked hand in hand to connect families to resources, deliver supplies (such as food, PPE and cleaning items) to quarantined individuals and provided regular virtual check-ins for individuals with high risk medical conditions or in need of behavioral health support.²⁴ These partnerships help contribute to a care continuum, or a system with a comprehensive set of services that can evolve with the patient over time. The Pandemic Health Worker program was a valuable example of the community health worker model in action, showing the vital nature of partnerships between public health departments and health care centers in ensuring rural communities' best health outcomes.

The lessons learned from the pandemic, specifically around health disparities, also led to the Illinois General Assembly working to create a more equitable health system with the passage of the Illinois Health Care and Human Services Reform Act, the fourth pillar of the Illinois Legislative Black Caucus agenda in April 2021. Members of the Illinois Legislative Black Caucus participated in Rural Health Summit discussion forums. The Act aims to address inequalities within health care systems across the State of Illinois. The Act begins to address some public health issues specifically by creating a certification for community health workers to act as a liaison between communities and health care and social service programs as well



as coordinating the prioritization of funding and programs to address underlying causes of violence.

2021 RURAL HEALTH SUMMIT RECOMMENDATIONS:

The pandemic has created an opportunity to re-examine how to best improve the functionality and service delivery of rural public health systems and the communities they serve. The following recommendations offer an opportunity to begin acting to build brighter futures for rural Illinois residents.



Expand and invest in the rural public health workforce by enhancing opportunities for education and professional growth.

Rural public health workers have operated under unprecedented pressure during the pandemic. The challenges of the current crisis combined with existing problems of recruitment, persistently uncompetitive salaries and limited opportunities for professional growth necessitate significant investments to expand the rural public health workforce.

An increase in diverse educational and training opportunities is vital for the expansion of the rural public health workforce. The majority of health professional training (undergraduate and graduate) is currently conducted in hospitals and settings that do not accurately represent the conditions, barriers and scope of rural geographies and populations.²⁵ The result is a health workforce ill-equipped to understand and meet the needs of rural communities.²⁶

As Table 1 shows, Illinois is fortunate to have a number of Master of Public Health programs. However, the vast majority of these educational entities are located in and/or focused on urban and metropolitan areas.

One national example of an innovative rural public education model is the [School of Community and Rural Health at The University of Texas Health Science Center](#). Their generalized

Master of Public Health (MPH) program specializes in rural community health and the unique needs posed by these vulnerable populations.²⁷ Several universities, including University of Arizona and Texas A&M University,

have intentionally utilized online programs to facilitate easier access for geographically challenged students with the goal of providing students an education to serve rural communities.²⁸

In Illinois, lessons can also be learned from the [Illinois Area Health Education Centers \(AHEC\) Network Program](#), which serves both non-metro and metro underserved residents through access to health practitioners, education, health careers development and community and public health promotion activities.²⁹ AHEC has nine regional centers throughout the state, including South Central Illinois AHEC in Centralia, South East Illinois AHEC in Fairfield and Central Illinois AHEC in Normal. This program prepares

TABLE 1: Master of Public Health Programs in Illinois

Master of Public Health Programs in Illinois	
School	Location
Benedictine University	Lisle, IL
De Paul University	Chicago, IL
Loyola University (Chicago)	Maywood, IL
Northern Illinois University	DeKalb, IL
Northwestern Illinois University	Chicago, IL
Southern Illinois University Edwardsville	Edwardsville, IL
Southern Illinois University Carbondale	Carbondale, IL
University of Illinois Chicago*	Chicago, IL
University of Illinois Springfield**	Springfield, IL
University of Illinois Urbana-Champaign	Champaign, IL
* The only Council on Education for Public Health (CEPH) accredited school in Illinois	
** This program is not CEPH accredited	



scholars with everyday insight and expertise that will prepare them to serve as leaders in their health care field.

The Illinois Health Care and Human Services Reform Act is moving the State of Illinois in the right direction but more can be done. One of the Act's provisions expanded public health work opportunities by certifying a Community Health Worker (CHW) as a class of medical professional.³⁰ However, more opportunities need to be created for similar certification programs that meet the needs of rural communities. The Act also created a consortium of universities and other stakeholders to develop and implement a strategic plan to recruit, educate and retain a behavioral health workforce. A similar consortium is critical to recruit, educate and retain a diverse public health workforce.

The creation of an effective rural public health workforce needs to address the issues that were prominent before the pandemic. Low pay continues to be a leading factor in undermining public health retention and reasonable salaries need to be incorporated to recruit and retain public health talent. Outside of the academic community, engaging private industry is important as well to build fellowships and support leadership development that is essential to professional growth and enhancing the multi-dimensional skills necessary for rural public health leadership. Finally, as more unique and proficient skill sets are needed to solve public health challenges, a focus on building more partnerships between community, academic and business overall are necessary to supplement the skills that might not be available in individual rural public health departments.



Modernize rural public health data systems by investing in the technology and training to allow rural communities to have timely, reliable and actionable information.

The pandemic emphasized the crucial need to advance our public health data collection and surveillance systems. Effective health surveillance needs to be an ongoing and systemic collection, analysis and interpretation of health-related data essential to plan, implement and evaluate public health practice and ultimately impact the efficacy and value of public health systems.³¹ When modernized and linked to policy and program units, surveillance information improves health services by targeting interventions and documenting effect on the population.³²

Ideally, all health departments would not only have the capacity to provide baseline data that is timely and locally relevant but would also be able to scale in times of crisis. Rural communities simply do not have the technology, broadband connectivity, personnel or skills to make this data infrastructure a reality. Investment in all of these areas is crucial to accomplish this goal.

The Federal government has taken an important first step in acknowledging the need for a modern public health data infrastructure. The [CDC Data Modernization Initiative: A Roadmap of Activities and Expected Outcomes](#) includes both short term and long term activities and outcomes, such as coordination of people and systems and increased support for strategic innovation.³³ Federal efforts could be expanded by establishing national standards to enhance public health data operability. Additionally, national standards could also be established to better disaggregate data by race, ethnicity and other key social demographic characteristics. Innovative applications need to be tested to ensure and protect anonymity at the local level while still creating the type of information necessary to make equitable and actionable decisions.

Illinois has also taken efforts to acknowledge the needs of investing in public health infrastructure.³⁴ [The Healthy Illinois 2021 Plan Update](#) released in December 2020 demonstrated a strong need to focus on improving public health infrastructure. The Plan Update aims to improve data use, provision and sharing as well as increasing data collection and the use of actionable data.



In order to achieve this goal, Illinois needs to learn from efforts already happening in our state and across the country. [Data Across Sectors for Health](#), a national organization, has worked with communities across the country to shape local capacity for multi-sector data-sharing while concurrently building the evidence base to inform a national movement. One of these collaborations can be found in the [All In: Data for Community Health](#) network led by the [Illinois Public Health Institute \(IPHI\)](#) in partnership with the [Michigan Public Health Institute \(MPHI\)](#). This network shares lessons learned from awardees to generate a body of knowledge and advance the evolving field. The network encourages peer-to-peer support opportunities, which foster a space of sharing original approaches that address the root causes of negative health outcomes and disproportionate results for underserved communities. Additionally, the state of Oregon is a statewide leader in modernizing public health data and its approach suggests that a quality data system can only occur with the development and maintenance of system-wide technological resources that align with local government and examine the interoperability that supports current and future public health needs.

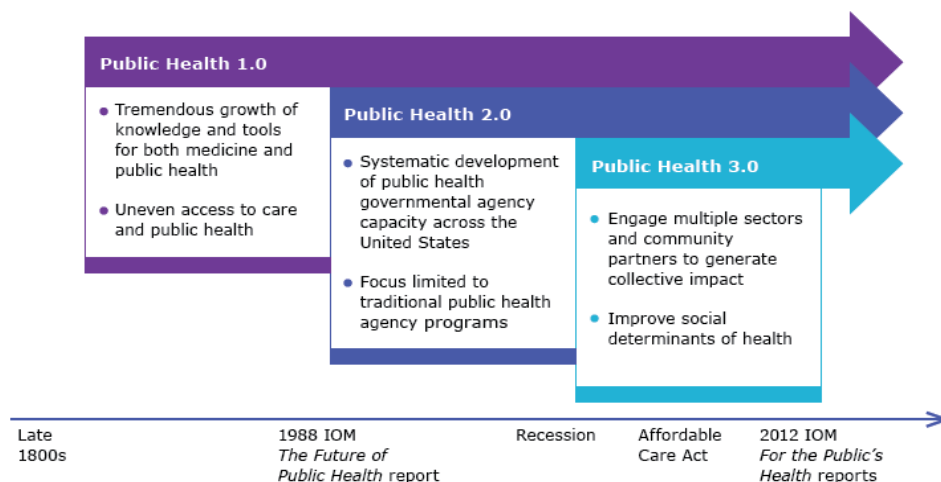
Rural public health systems will only be able to respond to community needs with the appropriate statewide investment in data technology, infrastructure, personnel and skill development. The return on that investment will be a powerful driver for improved rural communities.



Incentivize partnerships between health care providers and public health departments that result in collective impact and avoid duplication of resources and services.

The pandemic highlighted severe gaps in the public health system and re-stressed the importance of cross sector partnerships. These partnership are at the core of reimagining the role of public health departments in the modern age. Launched by the US Department of Healthcare and Family Services as [Public Health 3.0](#), this initiative, shown in Figure 3, describes a new public health model where departments serve as “Chief Health Strategists,” partnering across multiple sectors and leveraging data and resources to address social, environmental and economic conditions that affect health.³⁵

FIGURE 3: Public Health 3.0



Rural public health departments are uniquely situated to be a chief health strategist in rural communities. Public health departments are acutely aware of the issues across multiple sectors of society and, more than urban areas, often have close relationships with leaders in those fields. Partnerships should start between public health departments and local hospitals to assess community needs together and develop community-wide implementation plans that

can improve health outcomes. These efforts would require greater incentives to link the community health needs assessment not for profit hospitals are asked to complete every three years to the I-PLANs that local public health departments are asked to complete. Rural regions of the state would also benefit from more strategic regional plans with multiple hospitals and multiple health departments acknowledging the lack of resources and the need to work together for regional solutions.



Examples of these types of collaborations and partnerships are growing. Central and southern Illinois have seen these types of cross-sector partnerships emerge before and during the COVID-19 pandemic. A Partnership between [Genesis Health System](#) and [Mercer County Health Department](#) is an example of an Illinois hospital and public health department working together to create community health strategies. The Maryland Primary Care Program (MDPCP) is a national example that Illinois could strive to emulate. The ["Maryland Total Cost of Care Model"](#) contract, launched in 2019 between the state of Maryland and the Centers for Medicare & Medicaid Services, constructed an interrelated system of cross-sector primary care.³⁶ The MDPCP system has a three pronged approach: It provides funds and technical assistance to practices working to expand access to health services; it ensures funds and technical assistance are provided to practices working to expand access to health services; and it facilitates a space for public health experts and leaders to support primary care clinicians.

The COVID-19 pandemic has demonstrated an opportunity for public health and healthcare leaders to competently and successfully work together to innovate and improve the health of communities. These partnerships need to continue to make rural communities healthier for all residents. A 2020 Report from the [Center for Health Systems Effectiveness](#) recommended that creation of funding models for both public health and health care sectors that address the upfront costs of developing coordinated service models for both health and social services organizations. The report also encouraged the alignment of population and community health benefit definitions across health and human services policies, funding mechanisms and performance measures to reduce risks of noncompliance, and leveraging social needs screening data to guide decision making and increase accountability regarding regional population health investments.³⁷ The [Illinois Healthcare Transformation Collaboratives](#) program, administered by the Department of Healthcare and Family Services, is an opportunity to pilot new funding structures that will support these coordinated service models.

The future of rural public health requires and investment in Public Health 3.0, allowing public health departments to be the community's chief health strategist, building the types of connections that will lead to healthy and more equitable outcomes for rural residents across the State of Illinois.

ENDNOTES

- 1 Centers for Disease Control and Prevention. (2020). Original essential public health services framework. <https://www.cdc.gov/publichealthgateway/publichealthservices/originalessentialhealthservices.html>
- 2 Barker, A., McBride, T., & Mueller, K. (2019, January 9). Can the market deliver affordable health insurance options in rural areas? Health Affairs. <https://www.healthaffairs.org/doi/10.1377/hlthaff.2019.0104.559904/full>
- 3 Weber, L., Ungar, L., Smith, M., The Associated Press, Recht, H., & Barry-Jester, A.M. (2020, July 1). Hol- lowed-out public health system faces more cuts amid virus. KHN. <https://khn.org/news/us-public-health-system-underfunded-under-threat-faces-more-cuts-amid-covid-pandemic/>
- 4 Faberman, R., & Pepper, R. (2019, April 24). New TFAH report: Persistent underfunding of America's public health system makes the nation vulnerable and puts lives at risk. Trust for America's Health. <https://khn.org/news/us-public-health-system-underfunded-under-threat-faces-more-cuts-amid-covid-pandemic/>
- 5 Weber, L., Ungar, L., Smith, M., The Associated Press, Recht, H., & Barry-Jester, A.M. (2020, July 1). Hol- lowed-out public health system faces more cuts amid virus. KHN. <https://khn.org/news/us-public-health-system-underfunded-under-threat-faces-more-cuts-amid-covid-pandemic/>
- 6 Martin, E.G., & Kronstadt, J. (2020, April 16). No longer invisible: The critical role of local health departments in responding to COVID-19. Health Affairs. <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.0408.106373/full>
- 7 Weber, L., Ungar, L., Smith, M., The Associated Press, Recht, H., & Barry-Jester, A.M. (2020, July 1). Hol- lowed-out public health system faces more cuts amid virus. KHN. <https://khn.org/news/us-public-health-system-underfunded-under-threat-faces-more-cuts-amid-covid-pandemic/>
- 8 Illinois Public Health Association. (2018). Illinois workforce development plan 2018-2019. <https://ipha.com/content/uploads/illinois%20Workforce%20Development%20Plan%202018-2021.pdf>
- 9 Ibid
- 10 Grenadier, A. (2020, July 10). NACCHO new analysis: Changes in local health department workforce and finance capacity since 2008. NACCHO. <https://www.naccho.org/blog/articles/naccho-new-analysis-changes-in-local-health-department-workforce-and-finance-capacity-since-2008>
- 11 Ibid
- 12 Harris, J. K., Beatty, K., Leider, J. P., Knudson, A., Anderson, B. L., & Meit, M. (2016). The double disparity facing rural local health departments. Annual Review of Public Health, 37(1), 167-184. <https://doi.org/10.1146/annurev-publhealth-031914-122755>
- 13 Illinois Department of Public Health. (n.d.). Illinois Behavioral Risk Factor Surveillance System. <http://www.idph.state.il.us/brrfs/default.asp>
- 14 Illinois Behavioral Risk Factor Surveillance System. Personal communication, May 18, 2020.
- 15 Ibid
- 16 Ibid
- 17 Western Illinois University. (n.d.). Illinois COVID-19 awareness dashboard. <https://wiu-gis-center.maps.arcgis.com/apps/opsdashboard/index.html#f8e833c7ed254fd48fe07266f96e0f70>
- 18 Ibid
- 19 Kirzinger, A., Sparks, G., & Brodie, M. (2021, April 9). KFF COVID-19 vaccine monitor - rural america. Kaiser Family Foundation. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-rural-america/>
- 20 Bosman, J., & Fausset, R. (2020, March 14). The coronavirus swamps local health departments already crippled by cuts. The New York Times. <https://www.nytimes.com/2020/3/14/us/coronavirus-health-departments.html>
- 21 Illinois Department of Commerce & Economic Opportunity. (2020, September 10). Gov. Pritzker announces \$16 million investment to connect out of work Illinoisans with 1,300 COVID-19 response jobs. [https://www2.illinois.gov/dco/Media/PressReleases/Pages/Gov.-Pritzker-Announces-\\$16-Million-Investment-to-Connect-Out-of-Work-Illinoisans-with-1,300-COVID-19-Response-Jobs.aspx](https://www2.illinois.gov/dco/Media/PressReleases/Pages/Gov.-Pritzker-Announces-$16-Million-Investment-to-Connect-Out-of-Work-Illinoisans-with-1,300-COVID-19-Response-Jobs.aspx)
- 22 King, A. (2020, November 25). Embattled public health workers leaving at a 'steady and alarming' rate. NPR. <https://www.npr.org/2020/11/25/938873547/embattled-public-health-workers-leaving-at-steady-and-alarming-rate>
- 23 Ibid
- 24 Health News Illinois. (2020, May 8). Pandemic Health Worker Program rooted in community health. <https://healthnewsillinois.com/2020/5/08/pandemic-health-worker-program-rooted-in-communi-ty-health/>

- 25 Strasser, R., Kam, S. M., & Regalado, S. M. (2016). Rural health care access and policy in developing countries. Annual Review of Public Health, 37(1), 395-412. <https://doi.org/10.1146/annurev-publhealth-032315-021507>
- 26 Ibid
- 27 UTHealth. (n.d.). School of community & rural health. <https://www.uthct.edu/school-of-community-rural-health/>
- 28 The University of Arizona. (n.d.). Graduate program: Public health (MPH) - applied epidemiology. <https://grad.arizona.edu/catalog/programinfo/PHLMPEPI>
- 29 AHEC. (n.d.). Illinois health education centers. <https://ilahec.uic.edu/>
- 30 Kirsininkas, T., & Troncoso, R. (2021, April 28). Pritzker signs health care reform measure backed by black caucus. Illinois Newsroom. <https://illinoisnewsroom.org/pritzker-signs-health-care-reform-measure-backed-by-black-caucus/>
- 31 Groseclose, S. L., & Buckridge, D. L. (2017). Public health surveillance systems: Recent advances in their use and evaluation. Annual Review of Public Health, 38(1), 57-79. <https://doi.org/10.1146/annurev-publhealth-031816-044348>
- 32 LaRow, M. (2020, May 19). Why gaps in patient data leave us exposed during a pandemic. MedCity News. <https://medcitynews.com/2020/5/why-gaps-in-patient-data-leave-us-exposed-during-a-pandemic/>
- 33 Centers for Disease Control and Prevention. (2021). Data modernization initiative. <https://www.cdc.gov/surveillance/surveillance-data-strategies/data-IT-transformation.html>
- 34 Illinois Department of Public Health. (2021). State health improvement plan. <http://www.idph.state.il.us/ship/icc/documents/SHIP-FINAL.pdf>
- 35 Med Magazine. (2019, March 1). Public Health 3.0: A new opportunity to address health in rural America. Midwest Medical Edition. <https://www.midwestmedicaledition.com/2019/03/01/189820/public-health-3-0-a-new-opportunity-to-address-health-in-rural-america>
- 36 Milbank Memorial Fund. (2020). Maryland's innovative primary care program: Building a foundation for health and well-being. <https://www.milbank.org/publications/marylands-innovative-primary-care-program-building-a-foundation-for-health-and-well-being/>
- 37 Petchel, S., Gelmon, S., & Goldberg, B. (2020). The organizational risks of cross-sector partnerships: A comparison of health and human services perspectives. Health Affairs, 39(4), 574-581. <https://doi.org/10.1377/hlthaff.2019.01553>

