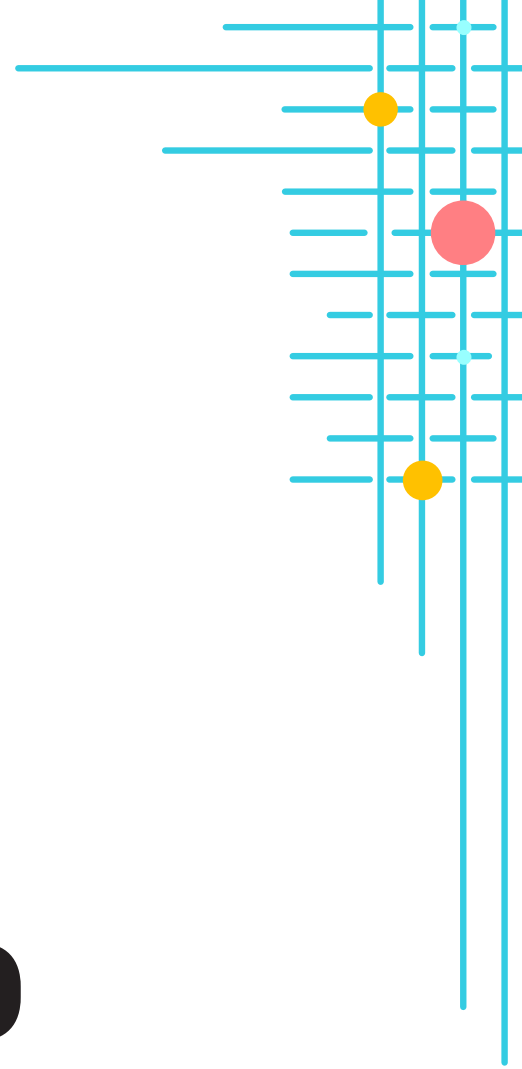


TEC resilience

# Linking Community Resilience to Health and Wellness

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## ABSTRACT

Community Resilience (CR) is a topic on many people's minds these days, and represents a community's and an individual's ability to weather adversity, as well as to adapt and recover. It also represents a community's strength and readiness to respond to changes and capitalize on opportunities. Adaptation and recovery are intrinsically linked to the health and wellness of a community or individual, and measuring the link between CR and a community's health is a point of key importance. Community resilience is complex, so scholars and stakeholders have developed a variety of models and metrics to measure and identify it. Many of these are linked to health and wellness outcomes within the community, providing a foundation for the link between the resilience of a community and the health of the people. Further research is required as the nature of CR is better defined, but current results provide support for using the measurement of CR to identify key points of intervention to improve the health and wellbeing of communities.

# INTRODUCTION

Community Resilience (CR) is the sustained ability of communities to withstand, adapt to, and recover from adversity; and the capacity of individuals and households within a community to absorb external stresses as a result of social, political, and environmental change (Patel, et al., 2017; National Institute of Standards and Technology, 2016; Morton & Lurie 2013). The definition can also extend to the strengths a resilient community displays, including the ability to adapt to changing circumstances and capitalize on new possibilities (Paton & Johnston, 2006). There is emerging consensus among US policy leaders that CR is fundamental to public health and wellness. Building resilience is one of the two major focuses of the National Health Security Strategy of the US Department of Health and Human Services. According to the National Health Security Strategy, resilient communities are “healthy individuals, families, and communities with access to health care and the knowledge and resources to know what to do and care for others in both routine and emergency situations” (Morton & Lurie, 2013).

While there are many ways to define a resilient community, there are certain key elements that are widely proposed as important. A systematic literature review from Patel et al., identified nine core elements of CR: local knowledge, community networks and relationships, communication, health, governance and leadership, resources, economic investment, preparedness, and mental outlook (Patel, et al., 2017). Areas where a community is vulnerable show particularly clearly during catastrophic events, as do the communities’ strengths. Resilience is also important in everyday life as increasing the resilience of the systems we rely on and being able to meet needs at the local level benefits everyone, creating healthier, more connected communities (Community Resilience Organizations, 2023).

## MEASURING COMMUNITY RESILIENCE

Measuring CR requires a multidisciplinary approach, drawing on expertise from fields such as social science, public health, engineering, and economics. There are various methods for measuring community resilience, ranging from qualitative assessments to quantitative metrics. Qualitative methods involve gathering input from community members through surveys, interviews, and focus groups to understand their perceptions of resilience and identifying areas for improvement. Quantitative methods involve using

data-driven approaches to quantify resilience, such as analyzing economic indicators, infrastructure capacity, and emergency response capabilities. By understanding the factors that contribute to resilience and assessing a community's capacity to manage and recover from adversity, individuals and organizations can better support community resilience-building efforts and promote long-term sustainability. Although measuring CR can be complex, common tools and practices have been identified in recent years.

## Metrics of Community Resilience

A systematic review of existing CR methods and tools outlined a set of metrics that can be used to evaluate CR in three main categories: community-level, sector-specific, or sociological (Johansen, et al. 2017). Community-level resilience metrics are intended to be comprehensive and specific to a particular geographical location, covering all aspects of a community's recovery from an adverse event. Community-level resilience metrics often serve as a model for the resources needed for a community to improve resilience. Sector-specific metrics are more detailed plans for the specific sector they address, rather than providing an overall view of the resilience of a community. Sociological resilience metrics focus on economic, social, and demographic factors that affect the ability of a community to recover from disaster. However, they serve primarily as resilience assessment tools rather than providing more tangible, actionable plans.

The CR metrics examined in this review can be additionally categorized based on what they are measuring. Metrics related to the physical infrastructure and built environment include the strength and durability of buildings and infrastructure, access to basic needs like food and water, transportation systems, and healthcare facilities (Johansen et al., 2017). Community and social capital metrics focus on networks that support social cohesion, trust, and communication (Johansen et al., 2017). Metrics related to the effectiveness and responsiveness of local government (i.e., city, county, state-wide health departments) and other leadership structures (e.g., local businesses, academic institutions, charitable foundations) during and after a crisis has also been known as a common measure of CR (Bucher, et al., 2022; Johansen et al., 2017). County-wide metrics include emergency preparedness planning, resource allocation, and decision-making processes (Bucher, et al., 2022; Johansen, et al., 2017). The metrics can be used to evaluate CR both before and after a disaster to identify the community's existing strengths and weaknesses and guide future planning and intervention efforts (Johansen et al., 2017). Building networks across different partners and systems has been

established as a comprehensive and effective approach to CR. A further breakdown of community determinants and factors can be found below.

***Built Environment Factors:*** The built environment is a community's developed infrastructure, such as street design, public transportation, and permitted uses of buildings. Built environment factors that influence health-related behaviors and outcomes include whether or not there are safe places for recreational activity; the availability of safe, affordable, healthy food; safe, affordable housing; safe and accessible transportation; clean air, water, and soil; limited availability of harmful products, such as alcohol and tobacco; and a welcoming and culturally appropriate environment where people want to be (Davis et al., 2005). The effects of the built environment on health can be direct, for example, by influencing environmental quality, or indirect by influencing behaviors that impact disease transmission and prevention (Pinter-Wollman, et al., 2018; Davis, et al., 2005)

***Social Capital Factors:*** Social capital includes connections among social networks and social norms (Davis et al., 2005). These standards, or behavioral and gender norms, strongly influence behavioral choices about alcohol consumption, tobacco use, and sexual activity (Wandersman & Nation, 1998). Further, elements of social capital are associated with significant increases in mental health and lower rates of homicide, suicide, and alcohol and drug use (Wandersman & Nation, 1998). When individuals come together, communities have allocated and distributed their resources and efforts to reduce levels of violence and improve food access (Pothukuchi, 2005; Wandersman & Nation, 1998; Sampson, et al., 1997). Social capital factors include trust and cohesion; willingness to take action for the community's benefit; community engagement, such as voting or volunteering; behavior norms; and gender norms (Davis et al., 2005).

***Services and Institutions:*** Public and private services and institutions include the presence, perceptions, and capacity of local government, public health and health care, social services, education, public safety, community groups and coalitions, community-based organizations, faith institutions, businesses, and arts institutions (Davis et al., 2005).

***Structural Factors:*** Structural factors are overarching and rooted in broader systems that have an impact on people and communities everywhere (Davis et al., 2005). Structural factors include racial relations, employment and economic opportunities, and marketing and advertising practices (Davis et al., 2005). Some examples to measure structural factors are through the presence/absence of active citizens dedicated to social mobilization for healthy living or racial justice, presence/absence of policies for affirmative action, or the presence/absence of physical spaces and environments in the local community (Bloch et al., 2014)

CR can also be measured using risk and vulnerability assessment methods, which involves assessing a community's exposure to potential adversities, such as natural disasters, economic downturns, or social unrest (Ellis et al., 2022; Nirupama, 2012; UNC Institute for the Environment [UNCIE] & MDC, 2009). This helps to identify the areas where the community is most vulnerable and where intervention is most needed. The assessment typically involves analyzing a range of factors, including the physical and social characteristics of the community, the demographics and resources of the population, and the existing infrastructure and services available (Ellis et al., 2022; Nirupama, 2012; UNCIE & MDC, 2009). By identifying areas of vulnerability and risk, the assessment can help to guide efforts to build resilience in the community (Ellis et al., 2022; Patel et al., 2017; Nirupama, 2012; UNCIE & MDC, 2009). For example, in 2020 the City of Seattle conducted a COVID-19 risk assessment to identify vulnerable populations and guide its response to the pandemic (King County, 2022). The assessment looked at a range of factors, including demographic data, health outcomes, and social determinants of health (Bucher, et al., 2022). It identified vulnerable populations such as older adults, people with disabilities, and low-income households, and recommended interventions such as providing access to food and supplies, expanding testing and contact tracing, providing financial assistance to small businesses, and supporting mental health services, all elements that build this community's resilience to further impacts of COVID-19 (Bucher, et al., 2022).

# COMMUNITY–LEVEL TOOLS AND MODELS

In order to describe the complex elements of community resilience, many tools and models have been developed and implemented to great success and insight. Four key models that allow insight both into CR and its relationship to health and wellness are described here, as well as some of their applications for community advancement.

## Community Resilience: A Dynamic Model for Public Health 3.0

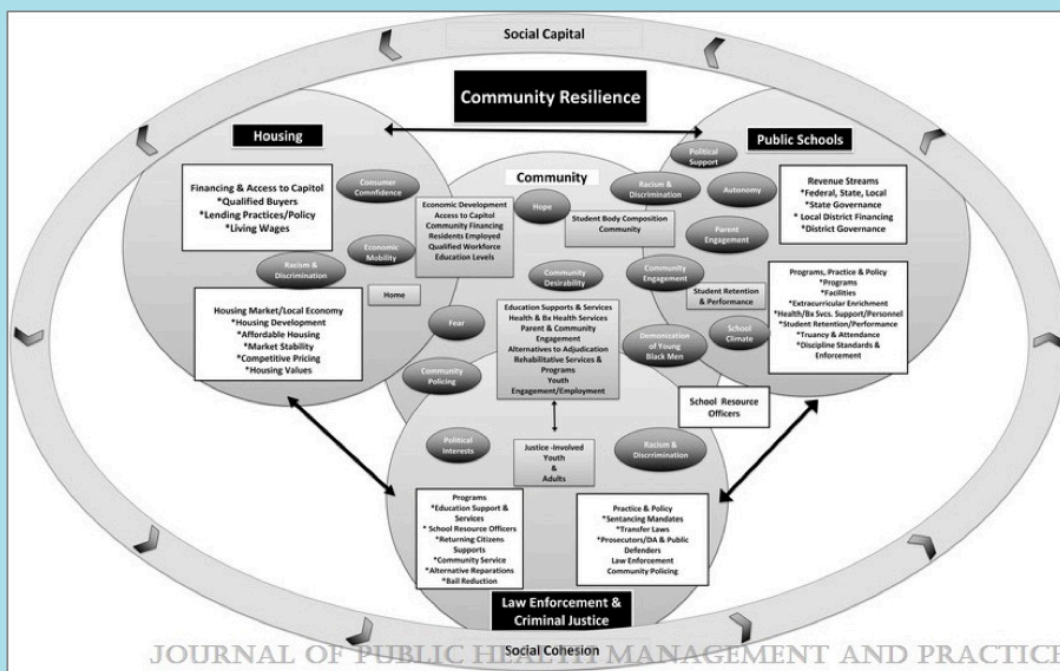
The CR model provides a framework for communities to monitor and evaluate its practice and lead initiatives aimed at addressing systemic inequities (Ellis et al., 2022). CR is relational and varies depending on the community’s demographic makeup of residents, historical patterns of racism and discrimination, policies, and investment priorities (Ellis et al., 2022; Patel et al., 2017; Nirupama, 2012; UNCIE & MDC, 2009). Ellis et al., sought out to model CR as a method to measure equity, address structural racism, and improve population health. Existing models of CR lack a clear role for preventive public health strategies. The CR model (Figure 1) focuses on community and population health outcomes associated with the policies and practices of the housing, public education, law enforcement, and criminal justice sectors as CR measures (Ellis et al., 2022). The model demonstrates how behaviors of these systems interact and produce outcome measures such as employment, homelessness, educational attainment, incarceration, and mental and physical health. An analysis of this model demonstrated that policies and practices within housing, public schools, law enforcement, and criminal justice can suppress resilience for families and communities because they are shaped by structural racism and influence the character and nature of resources that promote community health and well-being. The CR model shows how economic and social policies and practices of one domain heavily influence the amount of economic capital and resources supplied by another domain, which, in turn, are directly associated with the amount of additional capital and programs provided to and by other domains (Ellis et al., 2022).

Conversely, outcomes of one system can act as mediators or stocks in another. For example, high school graduation rates are an outcome of the public school system but accumulate as a stock for a community (Ellis et al., 2022). Likewise, the effect of graduation rates on employment can mediate within a housing system by contributing to increased home ownership rates (Ellis et al., 2022). Some residents may be more

likely to choose to stay in the community after graduating from secondary or higher education because of increased opportunities afforded to them by their education while increased graduation rates at local schools may also attract more stably employed individuals to a neighborhood to buy homes and raise families (Ellis et al., 2022).

Using this model can lead efforts to change community environments through program, policy, and practice to improve public health; building resilience through equity. As of 2023, the CR model is being used by local public health departments to develop equity measures and monitor change over time in systems-driven community outcomes that drive disparity (Ellis et al., 2022). As part of the CDC-funded Resilience Catalysts in Public Health network, 9 local health jurisdictions across the country are implementing this model: Alameda County Public Health (California); Baltimore City Health Department (Maryland); Florida Department of Health-Leon County; Shelby County Health (Tennessee), Tacoma-Pierce County Health (Washington); AppHealthCare (North Carolina); Cambridge Public Health (Massachusetts); Louisville Metro Department of Public Health and Wellness (LMDPHW) (Kentucky); and Mesa County Public Health (Colorado) (Ellis et al., 2022).

**Figure 1. The Community Resilience Model**



*Community Resilience: A Dynamic Model for Public Health 3.0, Journal of Public Health Management and Practice 28(Supplement 1):S18-S26, January/February 2022.*



To design this model, the author's developed pathways between systems that influence CR, otherwise known as **system dynamic modeling**. These systems are called **domains**. The domains of housing, law enforcement and criminal justice, public schools, and community are shown in Figure 1 as the boxes with dark backgrounds. Each domain has a defined set of relationships and measures that are unique to processes and policies that guide how information, assets, resources, and people move (**flow**) within, enter, or exit the domain. How a flow enters or exits a domain depends upon interactions with other domains and how a host of factors may influence accumulation of a stock. **Stocks** are shown in the boxes with clear backgrounds and can be facilitators or barriers that influence community and population outcomes associated with the model. The **community outcomes** (boxes with gray backgrounds) produced by domains of the CR can be qualitative or quantitative and typically represent values, resources, and outputs of the system, such as economic development, student performance, and incarceration rates.

## US Census Bureau Community Resilience Estimates Dashboard

The US Census Bureau produced the 2019 CR Estimates (CRE) to create an easily understood metric for CR in the US. To provide context to the estimates and add to the discussion of equity, the CRE program created the CR Estimates Equity Supplement or CRE for Equity. The CRE for Equity dataset provides information about the country, states, counties, and census tracts from three different data sources: CR Estimates, the American Community Survey, and the Census Bureau's Planning Database.

The main measures of CRE are social vulnerability and equity. Modeled estimates are based on 10 resilience-related risk factors. These estimates are modeled using 2019 ACS 1-year microdata, the Census Bureau's Population Estimates Program (PEP), and small area modeling techniques and displays the number and percentage of residents living with 0 risk factors (Low Risk), 1-2 risk factors (Moderate Risk), and 3 or more risk factors (High Risk).

The 10 indicators of poor CR include:

- Income to Poverty Ratio
- Single or Zero Caregiver Household
- Crowding
- Communication Barrier
- Households without Full-time, Year-round Employment
- Disability
- No Health Insurance
- Age 65+
- No Vehicle Access
- No Broadband Internet Access

## Community Resilience Assessment

The Community Resilience Assessment was designed by the Community Resilience Organizations, a Vermont-based, grassroots climate justice movement (Community Resilience Organizations, 2023). This survey was designed to identify potential areas of vulnerability and strengths to minimize negative impacts from natural disasters, pandemics, climate change, and other disruptive events in the future (Community Resilience Organizations, 2023). The survey is divided into five main topics: basic needs and services, environment and natural systems, physical infrastructure, and community connections and capacity (Community Resilience Organizations, 2023). Respondents must rate their community on a scale of 1-5, with a 1 being low resilience (or high vulnerability), and a 5 being very resilient and meeting or exceeding the description based on the assessment’s given definition of a “very resilient system” (Community Resilience Organizations, 2023). A sample of this assessment can be found in Figure 2.

Figure 2. Excerpt from the Community Resilience Assessment

## BASIC NEEDS & SERVICES

Meeting baseline physical needs for surviving and thriving communities

**Food Supply (1= not very resilient, 5= very resilient) \***  
Food is primarily sourced locally; many residents grow and store food; thriving community gardens and farms; region grows enough food to sustain all residents; produced with methods that cultivate healthy soils; food systems actively adapting to climate change

1    2    3    4    5    Not Sure

**Food Equity (1= not very resilient, 5= very resilient) \***  
High level of food security at neighborhood level, in wider community, and in region; robust dietary and culturally appropriate food options; local, healthy food is accessible and affordable for all

1    2    3    4    5    Not Sure

**Clean Water Sources (1= not very resilient, 5= very resilient) \***  
Residents get water in many ways (wells, rain collection, springs); residents, businesses and town are working on improving water quality and preparing for droughts and floods; ground water inventory is updated annually and there are conservation measures to protect groundwater

1    2    3    4    5    Not Sure

**Energy Independence & Stability (1= not very resilient, 5= very resilient) \***  
Community meets energy needs locally and with low negative environmental and social impact; energy production and storage are diversified and well-sited; efficient and reliable infrastructure; all have energy needs met; local electric grid has the ability to disconnect from wider grid

1    2    3    4    5    Not Sure

**Health Services (1= not very resilient, 5= very resilient) \***  
Robust, trusted network for holistic health and access to full spectrum healthcare for all; strong knowledge/use of local natural medicines; all residents have access to well-stocked pharmacy with emergency supply of medicines; addressing climate-related health impacts with coordinated public and private efforts

1    2    3    4    5    Not Sure

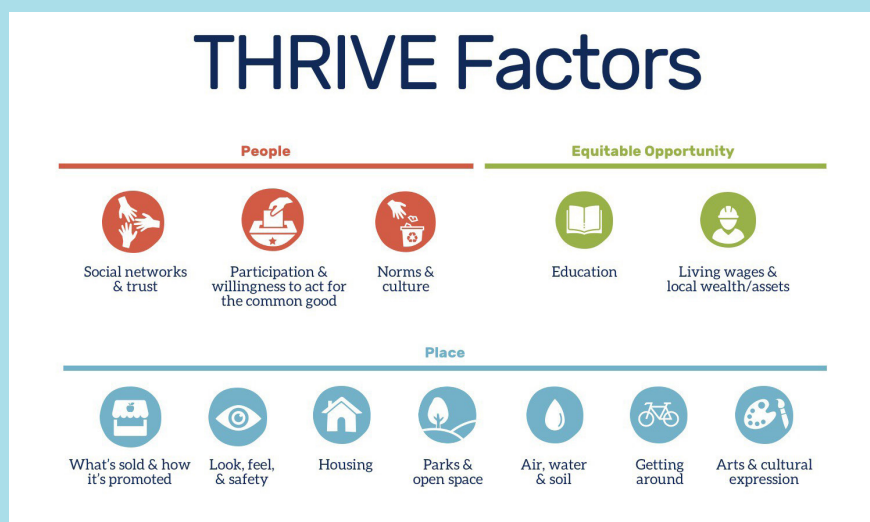
*Community Resilience Assessment, ©2023 Community Resilience Organizations; <https://gocros.org/community-resilience-assessment>*

## THRIVE

The Prevention Institute, a national nonprofit organization developed the Toolkit for Health and Resilience in Vulnerable Environments (THRIVE). THRIVE is a framework for understanding how structural drivers, such as racism, play out at the community level in terms of the social-cultural, physical/built, and economic/educational environments (Prevention Institute, n.d.). In addition to being a framework, THRIVE is also a tool for engaging community members and practitioners in assessing the status of community determinants, prioritizing them, and taking action to change them in order to improve health, safety, and health equity. As a framework, THRIVE is widely applicable to local, state, and national initiatives to inform policy and program direction. As a tool, THRIVE can be used in a variety of planning and implementation processes, from neighborhood-level planning to community health needs assessments and community health improvement planning processes (Prevention Institute, n.d.).

THRIVE identifies 12 community determinants of health and safety, grouped into three domains: (1) the social-cultural environment (people), (2) the physical/built environment (place), and (3) the economic/educational environment (equitable opportunity (see Figure 3.). A further breakdown of these metrics can be found below.

*Figure 3. THRIVE Factors*



Prevention Institute, <https://www.preventioninstitute.org/tools/thrive-tool-health-resilience-vulnerable-environments>

## CONCLUSION: COMMUNITY RESILIENCE <> COMMUNITY HEALTH OUTCOMES

The concept of Community Resilience has emerged as a promising approach to reducing disparities in health, especially among ethnic and racial minority groups. CR can be a protective factor against the negative effects of poverty, racism, and discrimination (Paradies, et al., 2015). Further, CR can be leveraged to address root causes of these disparities as communities with higher levels of social cohesion and community engagement were more resilient in the face of economic hardship and had better health outcomes (Johns, et al., 2012). Ultimately, by assessing factors such as social cohesion, economic stability, infrastructure, and health, organizations and governments can gain insights into a community's resilience and identify areas for improvement as well as community strengths. These insights can then be used to inform community-level outcomes, such as improving disaster preparedness, reducing economic vulnerability, and enhancing community networks. They can also be leveraged by community members looking to capitalize on windfall moments and opportunities to build up and bolster their community. Measuring community resilience is a valuable tool for promoting long-term sustainability and creating more resilient communities that can adapt and thrive in the face of future challenges.

Tech Enabled Community Resilience (TEC Resilience) is a model for building community resilience by incorporating technology to create a more robust approach powered by real-time data. It offers a way for communities to measure, respond, and adapt to changes they face. TEC Resilience is designed to harness the power of networks in a community ecosystem to drive community outcomes. Through this model, it may be possible to develop the tools necessary to accelerate community resilience. This initiative, along with others, demonstrate the work that is being done to capitalize on this strength of communities and enable progress.

Learn more at <https://www.tecresilience.com/>.

## REFERENCES

- Bloch, P., Toft, U., Reinbach, H. C., Clausen, L. T., Mikkelsen, B. E., Poulsen, K., & Jensen, B. B. (2014). Revitalizing the setting approach – supersettings for sustainable impact in community health promotion. *International Journal of Behavioral Nutrition and Physical Activity*, 11(1), 118. <https://doi.org/10.1186/s12966-014-0118-8>
- Bucher, S., Honaker, L. O., & Rodriguez, A. (2022). 2022 King County Recovery Plan. King County, Washington. <https://kingcounty.gov/~media/depts/executive/performance-strategy-budget/budget/COVID-19/AmericanRescuePlan/2022-Revive-and-Thrive-Recovery-Plan.ashx?la=en>
- Community Resilience Organizations. (2023). Community Resilience Assessment. <https://gocros.org/community-resilience-assessment>
- Davis, R., Cook, D., & Cohen, L. (2005). A Community Resilience Approach to Reducing Ethnic and Racial Disparities in Health. *American Journal of Public Health*, 95(12), 2168–2173. <https://doi.org/10.2105/AJPH.2004.050146>
- Ellis, W., Dietz, W. H., & Chen, K.-L. D. (2022). Community Resilience: A Dynamic Model for Public Health 3.0. *Journal of Public Health Management and Practice: JPHMP*, 28(Suppl 1), S18–S26. <https://doi.org/10.1097/PHH.0000000000001413>
- Johansen, C., Horney, J., & Tien, I. (2017). Metrics for Evaluating and Improving Community Resilience. *Journal of Infrastructure Systems*, 23(2), 04016032. [https://doi.org/10.1061/\(ASCE\)IS.1943-555X.0000329](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000329)
- Johns, L. E., Aiello, A. E., Cheng, C., Galea, S., Koenen, K. C., & Uddin, M. (2012). Neighborhood social cohesion and posttraumatic stress disorder in a community-based sample: Findings from the Detroit Neighborhood Health Study. *Social Psychiatry and Psychiatric Epidemiology: The International Journal for Research in Social and Genetic Epidemiology and Mental Health Services*, 47(12), 1899–1906. <https://doi.org/10.1007/s00127-012-0506-9>

- Morton, M. J., & Lurie, N. (2013). Community Resilience and Public Health Practice. *American Journal of Public Health*, 103(7), 1158–1160. <https://doi.org/10.2105/AJPH.2013.301354>
- National Institute of Standards and Technology. (2016). Community resilience. NIST. <https://www.nist.gov/community-resilience>
- Nirupama, N. (2012). Risk and vulnerability assessment: A comprehensive approach. *International Journal of Disaster Resilience in the Built Environment*, 3(2), 103–114. <https://doi.org/10.1108/17595901211245189>
- Paradies, Y., Ben, J., Denson, N., Elias, A., Priest, N., Pieterse, A., Gupta, A., Kelaher, M., & Gee, G. (2015). Racism as a Determinant of Health: A Systematic Review and Meta-Analysis. *PLoS ONE*, 10(9), e0138511. <https://doi.org/10.1371/journal.pone.0138511>
- Patel, S. S., Rogers, M. B., Amlôt, R., & Rubin, G. J. (2017). What Do We Mean by “Community Resilience”? A Systematic Literature Review of How It Is Defined in the Literature. *PLoS Currents*, 9, ecurrents.dis.db775aff25efc5ac4f0660ad9c9f7db2. <https://doi.org/10.1371/currents.dis.db775aff25efc5ac4f0660ad9c9f7db2>
- Paton, D., & Johnston, D. (2017). *Disaster resilience: An integrated approach*. Charles C. Thomas Publisher Ltd. [https://www.ccthomas.com/details.cfm?P\\_ISBN13=9780398091699#tabs](https://www.ccthomas.com/details.cfm?P_ISBN13=9780398091699#tabs)
- Pinter-Wollman, N., Jelić, A., & Wells, N. M. (2018). The impact of the built environment on health behaviours and disease transmission in social systems. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 373(1753), 20170245. <https://doi.org/10.1098/rstb.2017.0245>
- Pothukuchi, K. (2005). Attracting Supermarkets to Inner-City Neighborhoods: Economic Development Outside the Box. *Economic Development Quarterly*, 19(3), 232–244. <https://doi.org/10.1177/0891242404273517>

Prevention Institute. (n.d.). THRIVE: Tool for Health & Resilience In Vulnerable Environments | Prevention Institute. Retrieved July 11, 2023, from <https://www.preventioninstitute.org/tools/thrive-tool-health-resilience-vulnerable-environments>

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science* (New York, N.Y.), 277(5328), 918–924. <https://doi.org/10.1126/science.277.5328.918>

UNC Institute for the Environment & MDC, Inc. (2009). Community Based Vulnerability Assessment. Emergency Preparedness Demonstration Project. <https://www.mdcinc.org/wp-content/uploads/2017/11/Community-Based-Vulnerability-Assessment.pdf>

Wandersman, A., & Nation, M. (1998). Urban neighborhoods and mental health. Psychological contributions to understanding toxicity, resilience, and interventions. *The American Psychologist*, 53(6), 647–656.