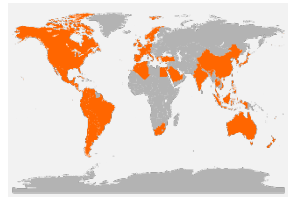




**Hennepin County
Public Health**



Jurisdictional Risk Assessment



June 2019

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Executive Summary

Risk is a function of the *probability* of impact and the overall *consequence* of that impact. The Hennepin County Public Health Jurisdictional Risk Assessment focuses the risk analysis on the most vulnerable assets and resources predicted to impact the county. In the case of people, “higher consequence” means that populations less able to adapt to hazards are affected. This type of analysis is intended to help focus resources where planning and response intervention is needed most. In the case of infrastructure, “higher consequence” means that more people were affected by its failure. For example, if a Hennepin County Service Center and a local power station had equal vulnerability to a winter storm, the power station would rank as higher risk because the consequences of it failing would be far more severe (utility disruption).

This assessment reviews potential disasters and the higher consequences for the health of Hennepin County’s population. Hennepin County Public Health reviewed 20 possible hazards and assigned priorities for those most likely to affect Hennepin County. The 3 hazards that have the greatest probability and impact to county services and communities are:

PRIORITY RANK	HAZARD/ASSESSED RISK
1	PANDEMIC INFLUENZA OUTBREAK
2	LOCALIZED INFECTIOUS DISEASE OUTBREAK
3	SEVERE/EXTREME WEATHER

16 hazards were identified as possible events meriting public health attention:

- | | |
|------------------------|---------------------------------------|
| Active Shooter | Flood |
| Biological Terrorism | Hazardous Materials Release |
| Chemical Terrorism | Localized Infectious Disease Outbreak |
| Civil Disturbance | Nuclear Facility Accident |
| Conventional Explosive | Pandemic Influenza |
| Cyber Terrorism | Temperature Extremes |
| Drought | Utility Interruption/Disruption |
| Fire | Winter Storm |

Consequences following a public health emergency may be direct or indirect and can affect Hennepin County population's health and its health infrastructure.

Direct consequences of a public health disaster are counted in the number of injuries and fatalities occurring because of the incident. Among the disaster scenarios deemed most probable, Hennepin County anticipates high fatality rates only during a pandemic influenza. Within all prioritized hazard scenarios, incident-related injuries are expected to overburden local hospitals, primary care providers, pharmacies, and emergency medical services operating capacities.

Indirect consequences of a public health emergency can include exacerbation of mental and chronic health conditions (such as asthma, chronic heart disease, depression, and diabetes) or injuries sustained while recovering from an incident. Public health emergencies can also strain at risk populations and increase social isolation, jeopardizing Hennepin County community's ability to receive critical services.

Introduction

Hennepin County is the most populous county in Minnesota with over 1.2 million inhabitants, which is one-fifth of the state's population. Hennepin County contains a large portion of the seven-county metropolitan area. The metropolitan or Twin Cities metro area accounts for 60 percent of Minnesota's population and is the sixteenth largest metropolitan area in the United States. The size and population of Hennepin County makes it vulnerable to a number of incidents that affect the health of the population.

All disasters have public health consequences. Hennepin County bears the evidence with its history of severe weather, flooding, and infectious disease outbreaks. Future occurrences of these incidents will affect Hennepin County's populations with the potential for physical injury, property loss, and economic hardship. Hennepin County is most vulnerable to infectious disease outbreaks such as influenza, measles, and other communicable diseases.

Hennepin County's hazards may come in the form of natural disasters, as the unintentional result of human activities, or through intentional acts of violence or destruction. Although the public health consequences of each of these hazards may be significant, they can be moderated through preparedness and response planning.

Since the turn of the century, public health agencies have made attempts to assess the hazard vulnerabilities of their populations. Hennepin County's first effort took place in 2011, with a technical review of risk assessment data and the introduction of a community survey to provide feedback associated with probable risks. The 2011 risk assessment provided an analysis of public health risks by using a vulnerability assessment tool to identify potential hazards, vulnerabilities, and risks related to county populations. The 2011 process was successful in identifying risks associated with Hennepin County's public health and medical systems; however, mass casualty hazards and at-risk populations were not included in the assessment.

To ensure inclusion of all potential hazards, Hennepin County planners selected a tool that includes considerations of current health indicators, data on injuries and illness related to specific hazards, and the county's health care system's ability to absorb the increased demand for resources during and after a public health emergency. Results from this risk assessment, in combination with other preparedness and response assessments, will be used to develop and modify existing priorities, plans and procedures with the overarching goal to increase Hennepin County's capability and capacity to respond to any incident.

This risk assessment report is only a starting point for mitigating public health emergencies. It will be a continuous mission to update the risk assessment as priorities evolve and new observations are made. The assessment, along with recent public health responses, has deepened our understanding of how hazards affects the county and its population. The assessment process will not only identify priority planning and response areas; it will create opportunities to form new relationships with county and community organizations, institutions, the private sector, and throughout the region, to support Hennepin County in becoming better prepared and more resilient. A great effort was made to conduct this assessment with the best available science and information. Detailed data and analysis behind the report are being publicly-shared to engage and support stakeholders in their own efforts.

Method

Scope

This assessment integrates hazard rankings from a qualitative analysis of public health consequences relating to potential hazards that may affect Hennepin County's population. The baseline data for the assessment includes the populations of the cities of Bloomington, Edina, Minneapolis, and Richfield. This is noted because each of these cities has their own local public health department. Risks associated with the hazards in the tool represent the entire Hennepin County population and are not specific to geographic areas within the county.

Approach

Hennepin County Public Health Emergency Preparedness planners used Pennsylvania's Public Health Risk Assessment Tool (PHRAT), which was developed in cooperation with the Centers for Disease Control and Prevention (CDC) to help jurisdictions identify and prioritize planning efforts for potential public health emergencies. To inform these decisions, the Pennsylvania tool guided planners through an analysis of health-related impacts of various hazards that have the potential for occurring in Hennepin County.

The current trend toward all hazards, capability-based investment in public health and health care program preparedness, offers a structure for engaging the collective Hennepin County healthcare system. The PHRAT assessed public health risks that result from each specific hazard through a measurement in five major domains: human health, healthcare services, inpatient healthcare infrastructure, community health, and public health services. The tool took a quantitative approach to impact assessment, measuring baseline levels of morbidity, services, and activities, and comparing them to the morbidity, service impacts, and activities that result from specific hazard incidents.

Hennepin County planners used the tool to generate a calculated estimate of hazard-specific risk, based on the probability and impact severity identified for each hazard. In addition to simply prioritizing hazards based on probability, the tool generated an "adjusted risk," which incorporates an assessment of the additional planning required to reduce a hazard's impact on at-risk populations.

The adjusted risk is calculated by assessing the size of Hennepin County's at-risk populations and the special planning required to address the needs of these populations in relation to each specific hazard. A preparedness score was generated using the county's current capacity in each of the 15 CDC Public Health Emergency Preparedness and Response Capabilities and the 8 ASPR Healthcare Preparedness and Response Capabilities, as well as the relevance of each capability to specific hazards. The final output of the tool is rendered by a Planning Priority Score, which reflects both adjusted risk and county's overall preparedness.

Key Findings

At-risk Populations

- At-risk populations and individuals will be affected by any hazard/incident and will require additional communication, transportation, supervision and medical care needs. Individuals who may need additional response assistance should include those who have disabilities, live in institutionalized settings, are from diverse cultures, have limited English proficiency (LEP) or are non-English speaking, are transportation disadvantaged, have chronic medical disorders, and have pharmacological dependency.
- Leaders at all levels of government throughout Hennepin County should be aware of the needs and locations of at-risk individuals in the county; likewise, stakeholders and leaders of at-risk communities should be informed about emergency preparedness and response.
- Communications plans must include guidelines and steps to make communications available in a variety of languages and formats for various at-risk populations, including LEP persons and persons with disabilities. Communication delivery mechanisms must be adapted to reach at-risk populations as well.

Response Planning

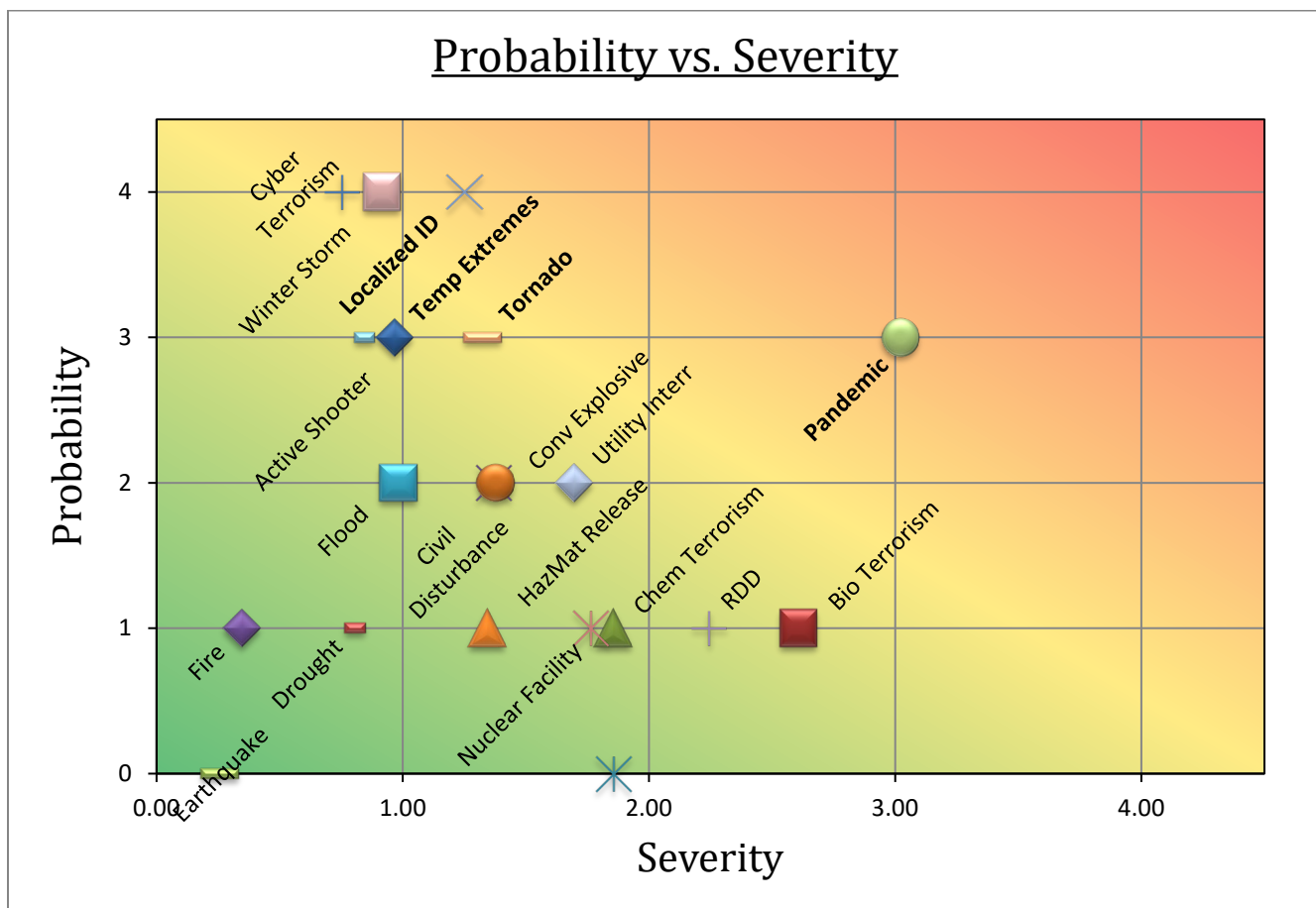
- Revise/develop response plans to ensure a response proportionate to meet the differing demands of infectious disease outbreaks of milder and more severe impact, rather than just focusing on worst case planning assumptions.
- Engage Hennepin County Emergency Management to ensure that existing response systems within the county are utilized whenever possible to meet the unique resource requirements and challenges of a public health emergency.
- Revise the Department Operations Center incident management structure to maintain a more flexible and adaptable approach to managing any public health emergency.
- Expand the involvement of preparedness and response planning beyond Hennepin County Public Health. Challenges of a large-scale public health emergency require the coordinated and combined effort, experience and expertise of all levels of government, and for profit and nonprofit organizations.
- Integrate preparedness and response plans with other organizations to ensure transparency of Hennepin County responsibilities and those of our community partners. Integration will allow for plan adequacy, prioritization of efforts and continuity of services for all populations.

Hazard Priorities

Hennepin County Public Health's risk assessment and recent history indicates that during the next 10 years, there is an 84% probability that Hennepin County will experience a local infectious disease outbreak, pandemic influenza, or severe weather incident. Moderate consequences for the health of the county's population and burdens on health care are anticipated, as shown in Figure 1 below.

Figure 1 shows hazards that Hennepin County Public Health expects to experience in the near future and their association with public health and health system consequences, as assessed by Public Health Emergency Preparedness planners who coordinated this assessment.

Figure 1 – Hazard Probability vs. Severity



Hazards on the Horizon

Data from the vulnerability assessment indicated that Hennepin County Public Health should prepare communities for:

Pandemic influenza – a global outbreak of a novel influenza virus. Pandemics occur when new (novel) influenza A viruses emerge, which are able to infect people easily and spread from person to person in an efficient and sustained way.

Pandemic Influenza receives the highest level of risk due to:

- The immediacy of the threat;
- The high risk of death or serious long-term disability a large number of Hennepin County's population; and,
- The substantial risk of exposure, due to the disease's high level of contagion or the method by which the disease is transmitted.

Localized infectious disease outbreak – a sudden increase in occurrences of a disease in a particular time and place. A localized infectious disease outbreak may affect a small and localized community, or impact thousands of people across Hennepin County.

Localized infectious disease outbreak receives a secondary level of risk due to:

- The high probability of an infectious disease outbreak due historical measles and tuberculosis incidents in Hennepin County; and,
- The potential for death or serious long-term disability. In the case of measles, hospitalizations occur due to pneumonia, encephalitis, and respiratory and neurological complications.

Extreme weather/temperature extremes – weather incidents, such as high winds, tornados, excessive rainfall, excessive snow, hail, and extreme levels of temperature. Extreme weather/temperature extremes

Extreme weather/temperature extremes – receives a tertiary level of risk due to:

- The high probability of extreme weather/temperature reoccurrences due historical incidents in Hennepin County; and,
- Heat/cold related illnesses, utility/transportation disruption, and the resulting extreme weather/temperature extreme impact on vulnerable populations.

Emerging infectious diseases stand out among the assessed hazards, as a pandemic would have both direct and indirect costs to the health of the population and to health care infrastructure, which could quickly overwhelm Hennepin County's public health system and services.

Secondary hazards were identified as significant concerns, but as less immediate threats. These include:

1. Cyber terrorism
2. Active shooter
3. Utility disruption

Although this assessment focuses on the top three hazards prioritized by the assessment tool, Hennepin County Public Health uses an all-hazards framework to structure its preparedness plans.

The figures below display the anticipated population health consequences of Hennepin County's prioritized hazards. Overall, the direct effects of a public health emergency relating to fatalities and injuries are expected to be minimal to moderate. Communicable disease outbreaks and other high consequence infectious diseases are likely to experience fatalities and an excessive strain on the county's healthcare system. Indirectly, these emergencies are projected to stress systemic public health resources, such as staff, and the availability to sustain critical client service delivery operations.

The At-Risk Populations Scores reflect Hennepin County's capability to ensure universal access to emergency response resources and services by all populations. The scores demonstrate the disproportionate impact that a particular hazard might have on populations with unique or special needs in disasters.

Hazard Priority #1 – Pandemic Influenza Outbreak

Figure 2 – Pandemic Influenza Severity Analysis

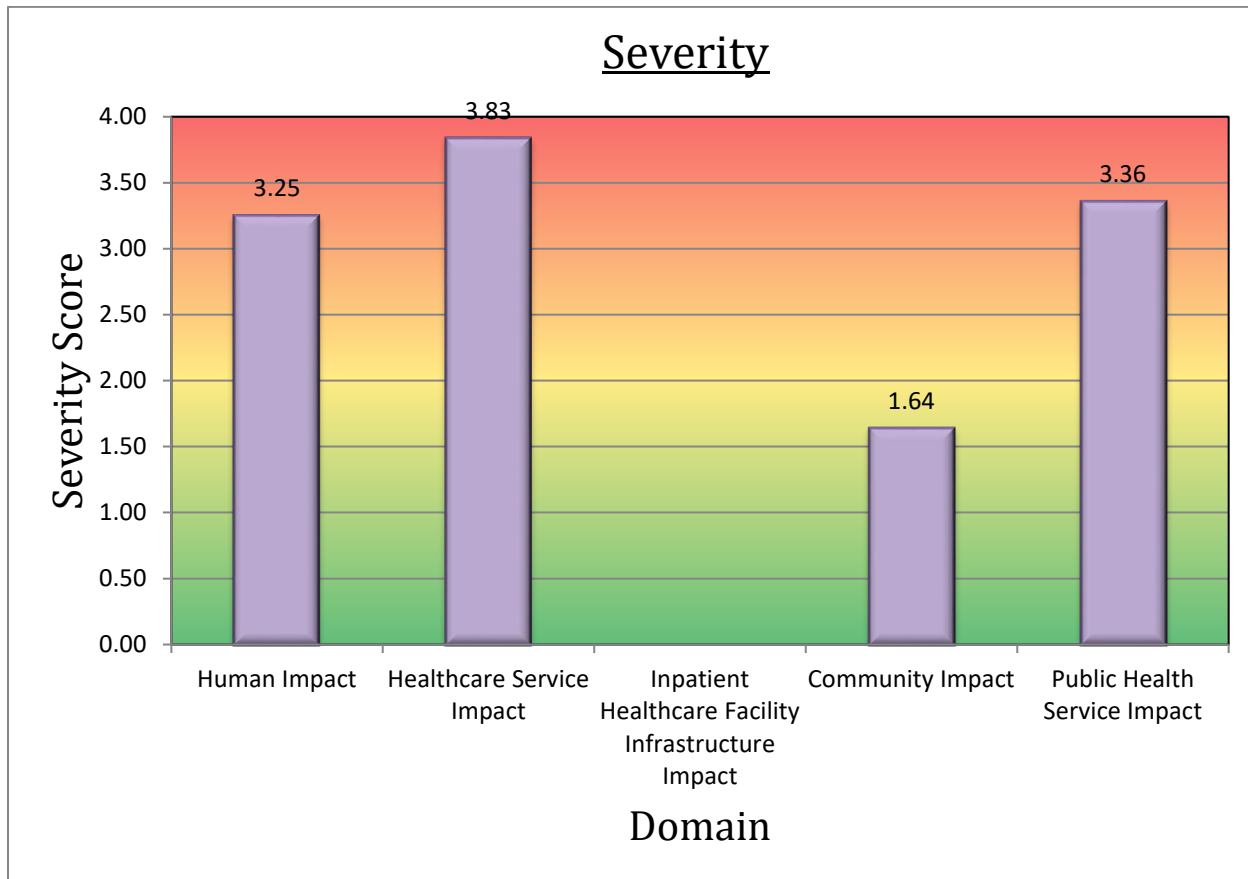


Figure 2 demonstrates that Healthcare Service Impact and Public Health Service Impact will be most heavily affected by a pandemic influenza incident.

Healthcare Service Impact	Outpatient Services	PCPs supply/demand
	Emergency Department Services	ED bed supply/demand
	Hospital Beds	Bed supply/demand
	Ancillary Services	Pharmacist supply/demand
	Ancillary Services / Trauma Units	Functioning OR supply/demand
	Trauma Units / Mental Health Services	Mental Health provider supply/demand
	Mental Health Services	Duration

Figure 3 - Pandemic Influenza Preparedness Analysis

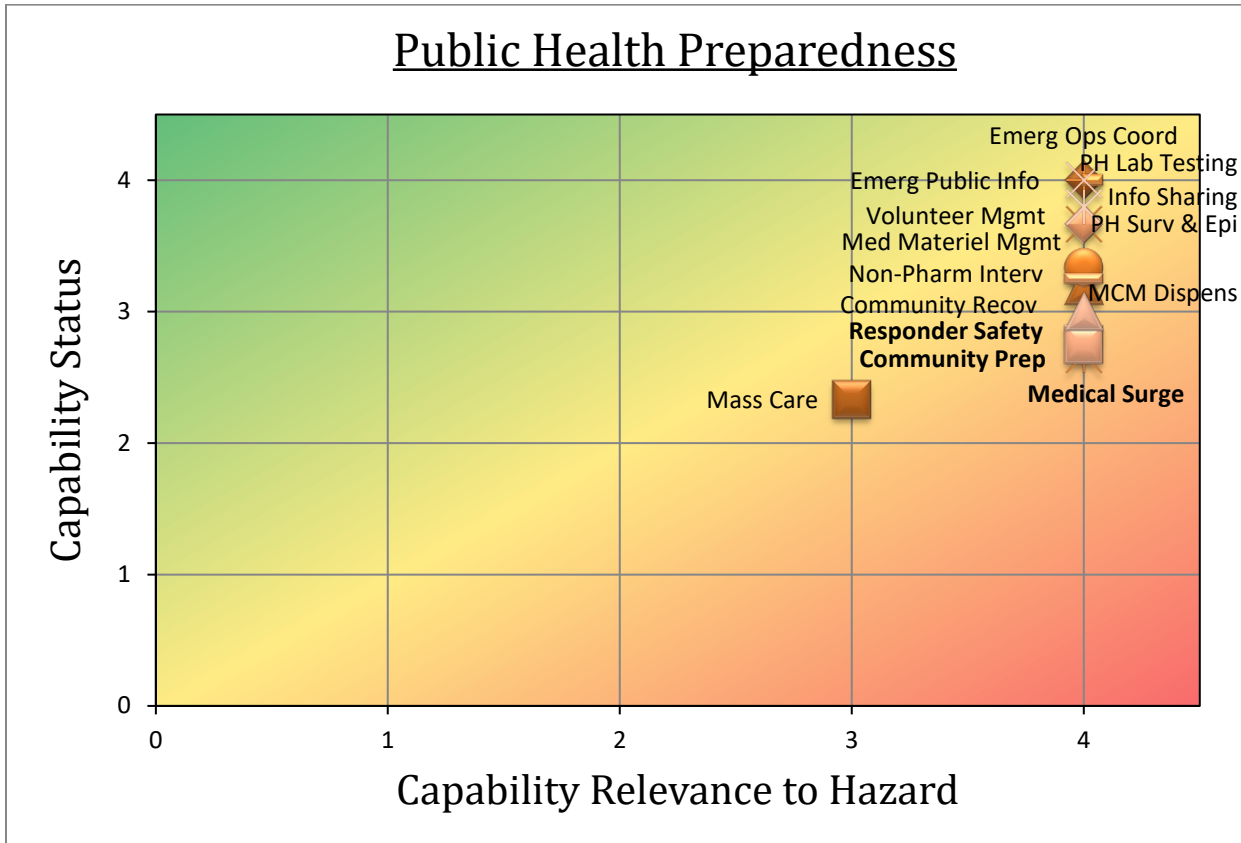


Figure 3 demonstrates Hennepin County Public Health’s current planning capability relevant to a pandemic influenza outbreak. Priority planning elements indicate that dedicated planning resources are required in the following capabilities:

1. Medical Surge
2. Community Preparedness
3. Responder Safety and Health

Figure 4 - Pandemic Influenza At-Risk Population Analysis

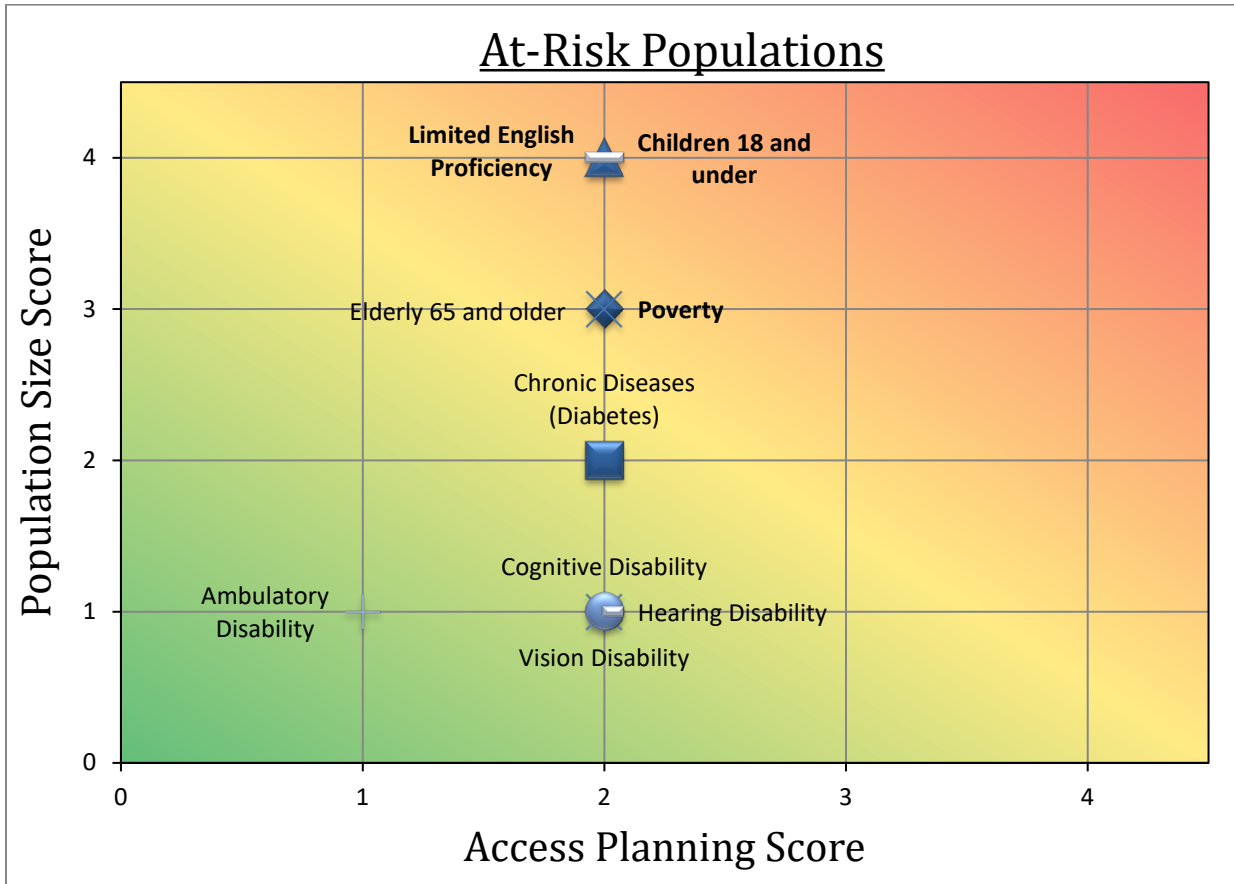


Figure 4 demonstrates Hennepin County Public Health’s planning capability relevant to a pandemic influenza outbreak. In the above graph, the Population Size Score is represented on the y-axis, and the Access Planning Score is represented on the x-axis. Populations that appear in the upper-right quadrant are both large populations by size and population that require a large number of plans and procedures to be in place.

At-risk population planning priorities:

1. Limited English proficiency
2. Children 18 and under
3. Populations at or below the poverty level

Hazard Priority #2 – Localized Infectious Disease

Figure 5 - Localized Infectious Disease Severity Analysis

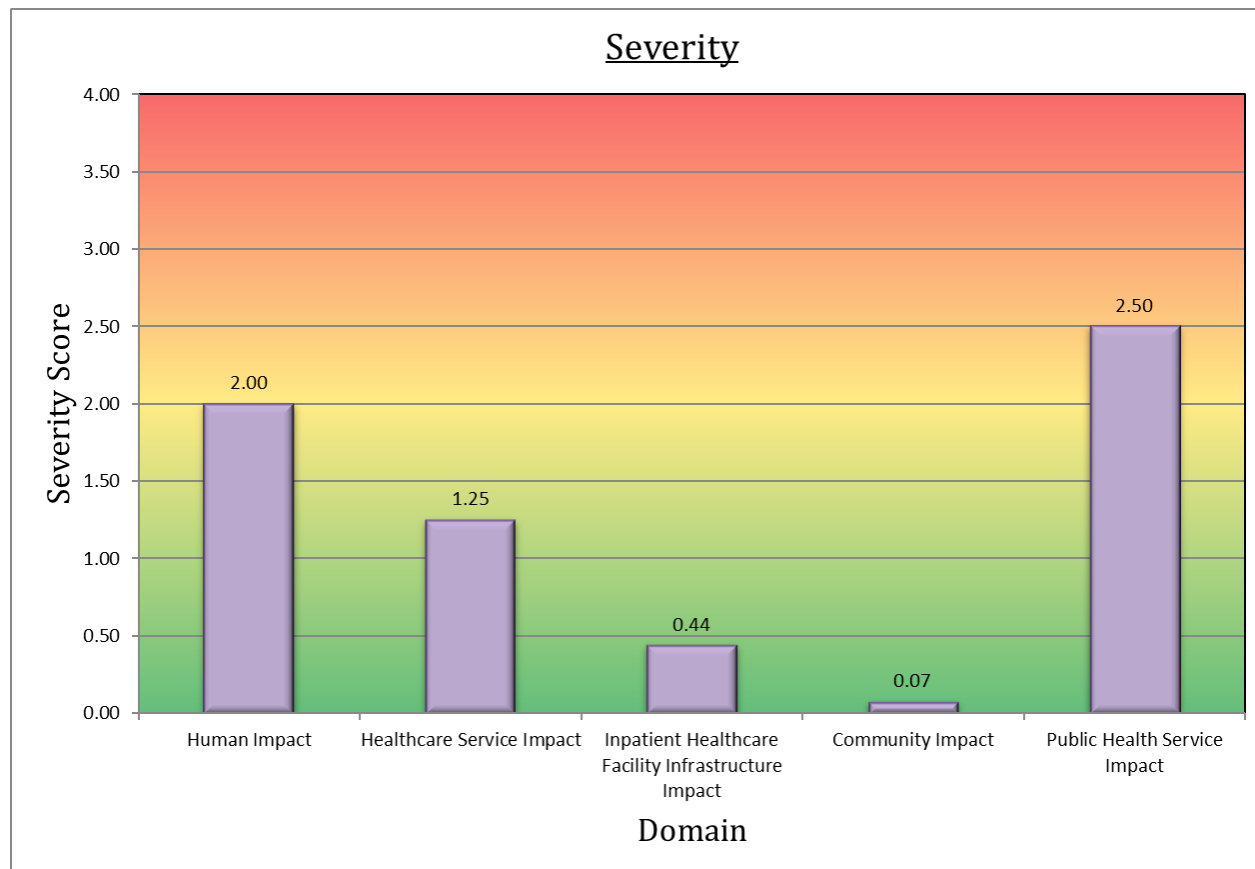


Figure 5 demonstrates that Public Health Service Impact will be most heavily affected by a localized infectious disease outbreak.

Figure 6 - Localized Infectious Disease Preparedness Analysis

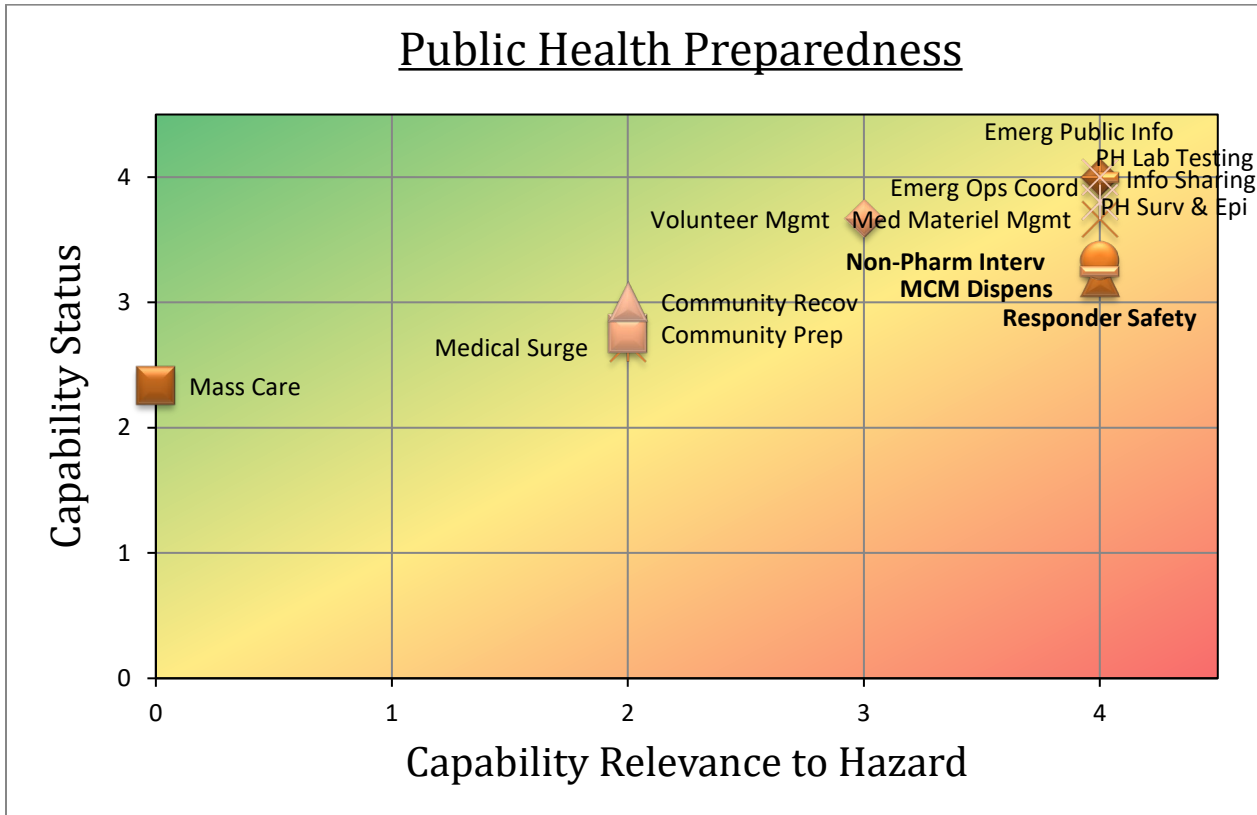


Figure 6 demonstrates Hennepin County Public Health’s current planning capability relevant to a localized infectious disease outbreak. Priority planning elements indicate that dedicated planning resources are required in the following capabilities:

1. Responder Safety and Health
2. Medical Countermeasure Dispensing and Administration
3. Non-Pharmaceutical Interventions

Figure 7 - Localized Infectious Disease At-Risk Population Analysis

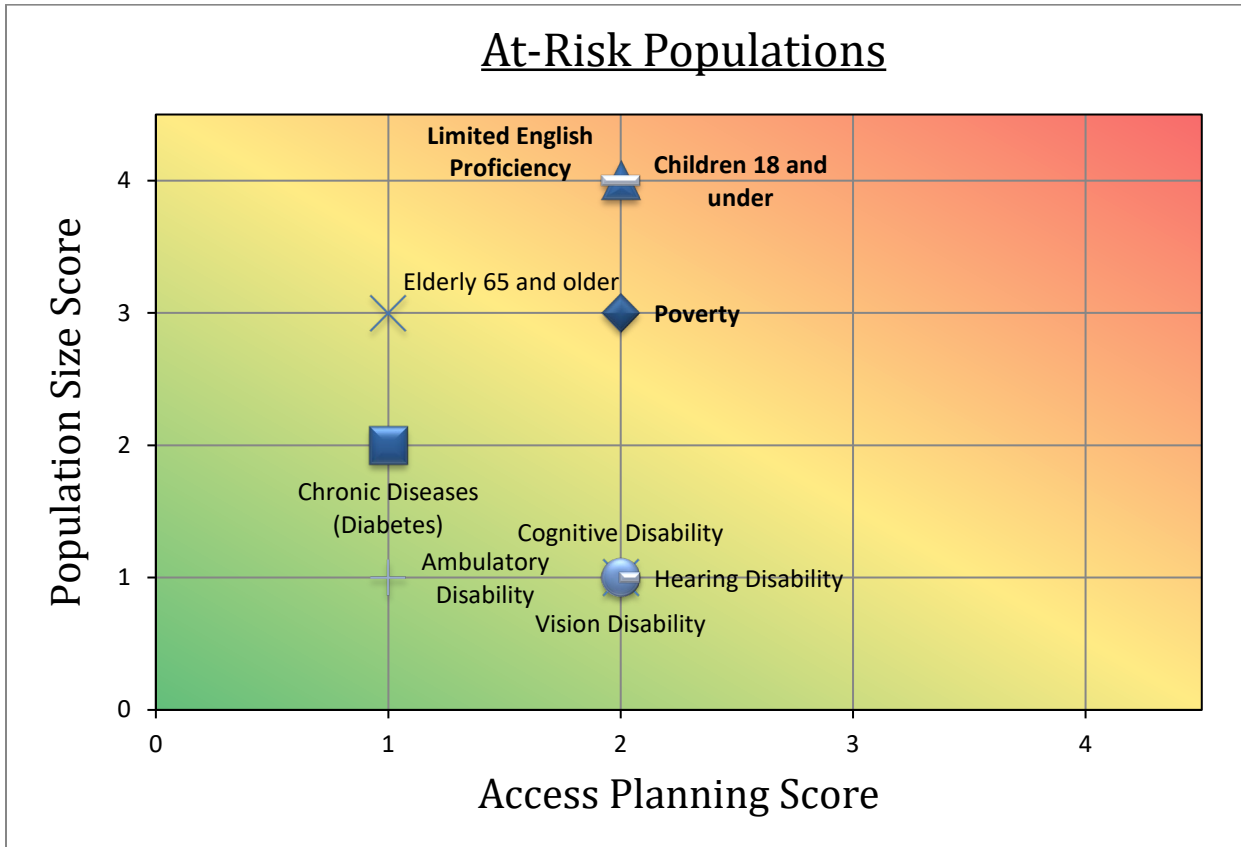


Figure 7 demonstrates Hennepin County Public Health’s planning capability relevant to a localized infectious disease outbreak. In the above graph, the Population Size Score is represented on the y-axis, and the Access Planning Score is represented on the x-axis. Populations that appear in the upper-right quadrant are both large populations by size and population that require a large number of plans and procedures to be in place.

At-risk population planning priorities:

1. Limited English proficiency
2. Children 18 and under
3. Populations at or below the poverty level

Hazard Priority #3 – Extreme Weather/Temperature Extremes

Extreme weather/temperature extremes includes hazards associated with tornados, winter storm and temperature extremes.

Figure 8 – Tornado Severity Analysis

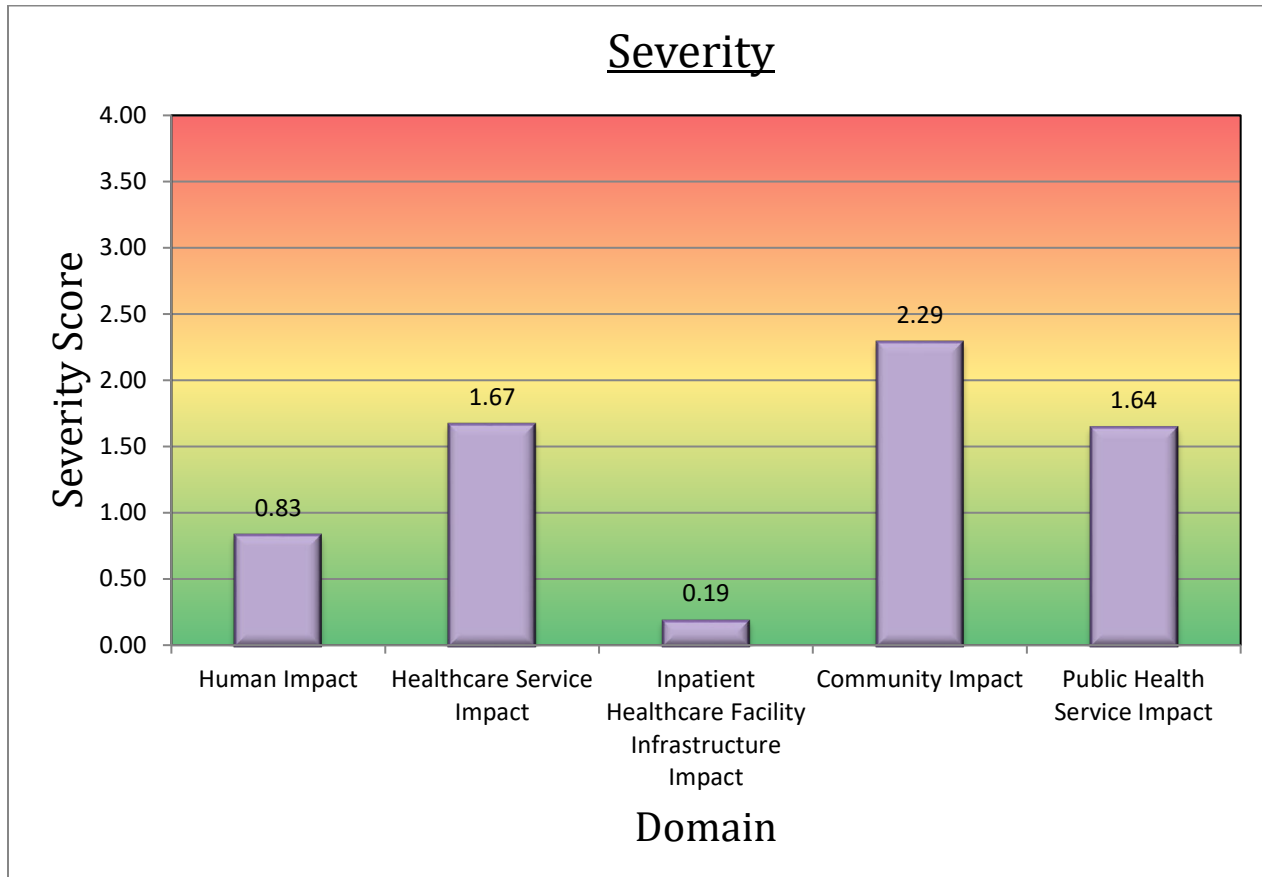


Figure 8 demonstrates that Community Impact will be most heavily affected by a tornado. Community Impact includes the following elements:

Community Impact	Water Supply	Percent of population with water outage or mandatory boil water order
	Sanitation/Sewage System	Percent with sanitation/sewage system disruption
	Public Utilities	Percentage of population with no access to electricity
	Transportation	Duration that at least ONE major transportation corridor is closed
	Business Continuity	Percent of businesses are closed
	Population Displacement	Number of persons evacuated from or to the jurisdiction
	Environmental Contamination	Radius of area requiring environmental safety assessment, remediation, or decontamination

Figure 9 – Tornado Preparedness Analysis

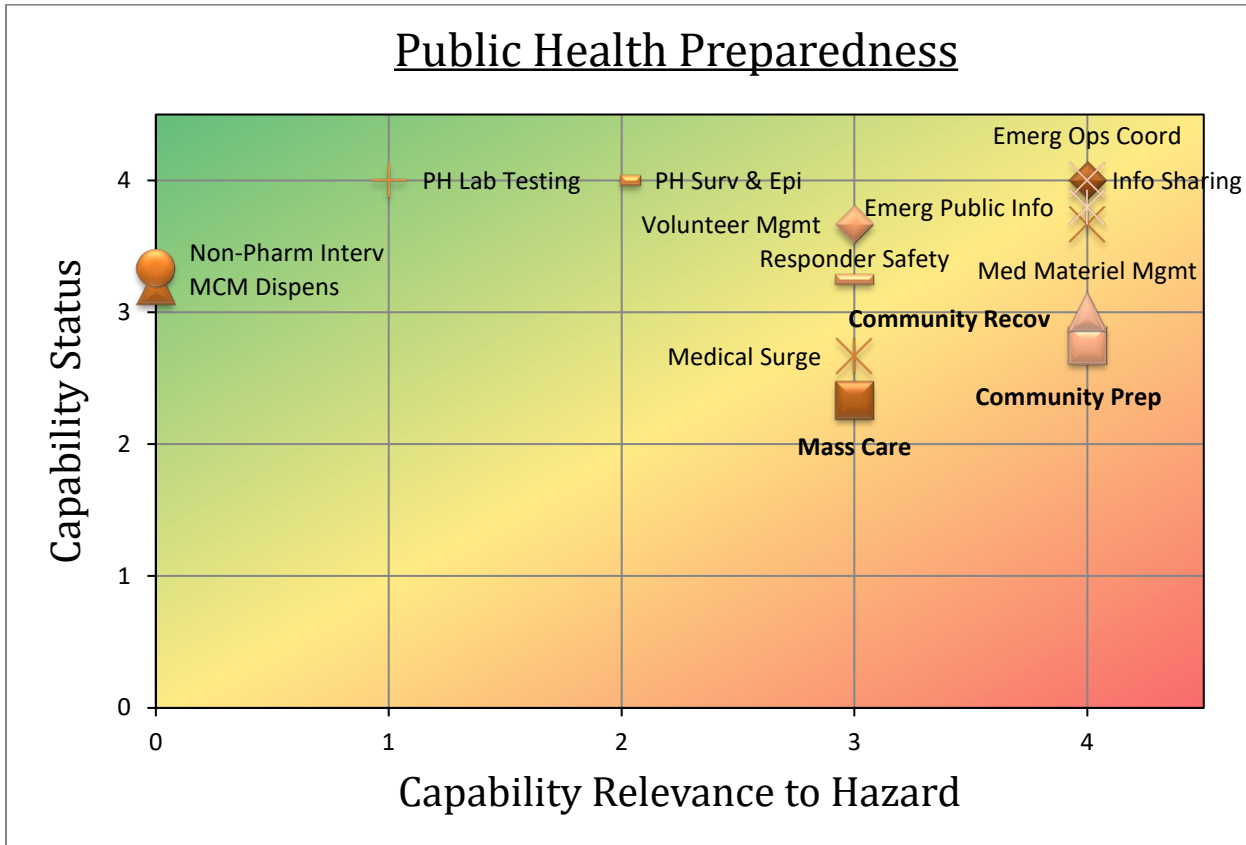


Figure 9 demonstrates Hennepin County Public Health’s current planning capability relevant to a tornado. Priority planning elements indicate that dedicated planning resources are required in the following capabilities:

1. Community Preparedness
2. Mass Care
3. Community Recovery

Figure 10 - Tornado At-Risk Population Analysis

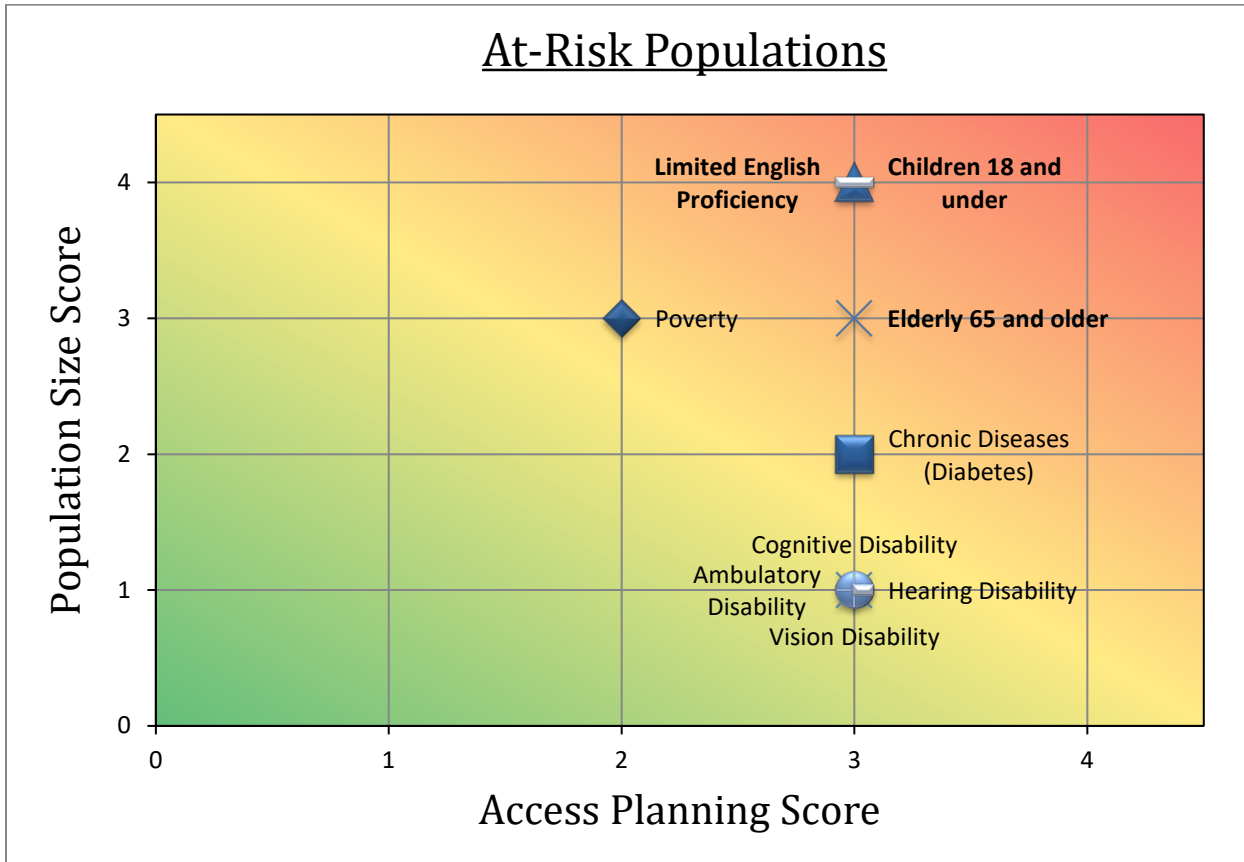


Figure 10 demonstrates Hennepin County Public Health’s planning capability relevant to a tornado.

At-risk population planning priorities:

1. Limited English proficiency
2. Children 18 and under
3. Elderly 65 and older

Figure 11 – Winter Storm Severity Analysis

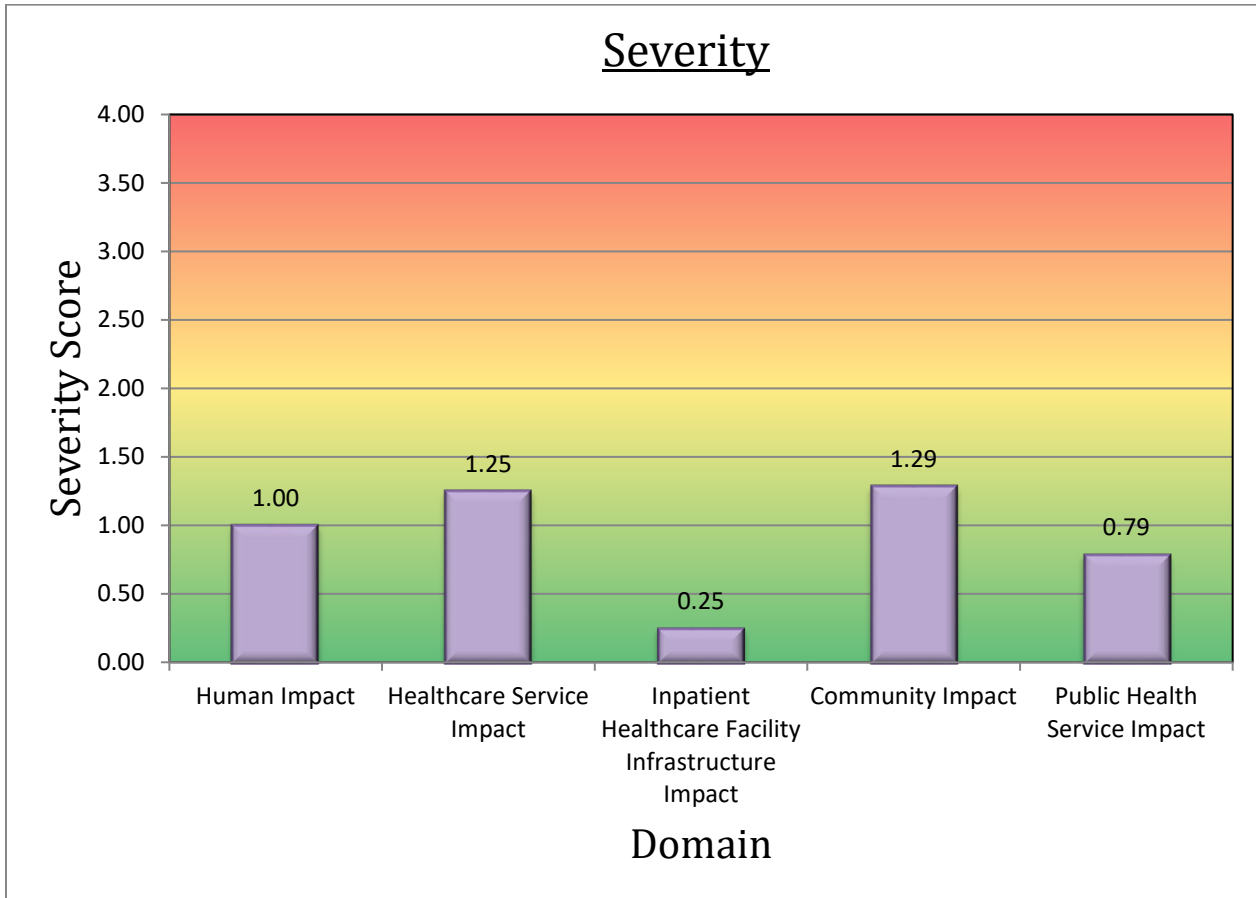


Figure 11 demonstrates that Community Impact will be most heavily affected by a winter storm. Community Impact includes the following elements:

Community Impact	Water Supply	Percent of population with water outage or mandatory boil water order
	Sanitation/Sewage System	Percent with sanitation/sewage system disruption
	Public Utilities	Percent of population with no access to electricity
	Transportation	Duration that at least ONE major transportation corridor is closed
	Business Continuity	Percent of businesses are closed
	Population Displacement	Number of persons evacuated from or to the jurisdiction
	Environmental Contamination	Radius of area requiring environmental safety assessment, remediation, or decontamination

Figure 12 – Winter Storm Preparedness Analysis

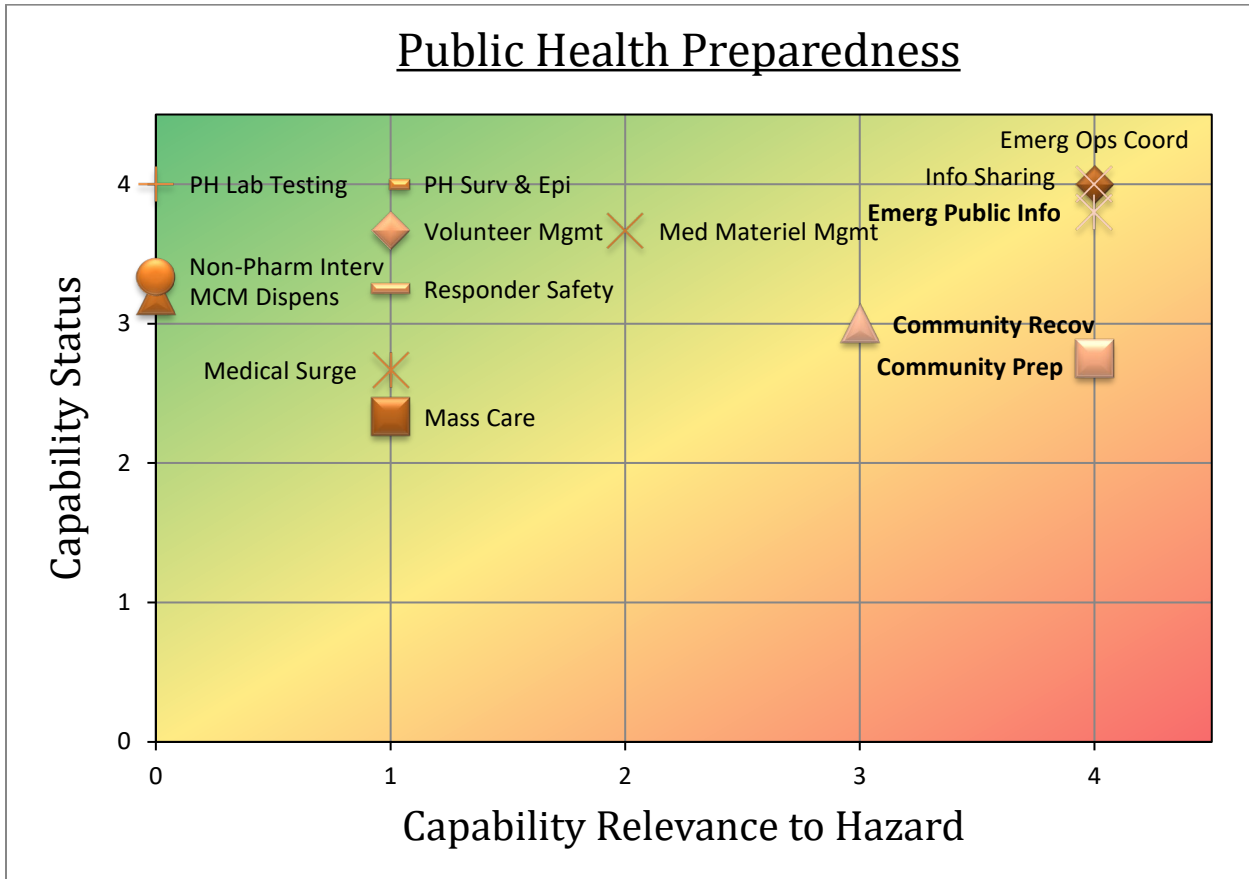


Figure 12 demonstrates Hennepin County Public Health’s current planning capability relevant to a winter storm. Priority planning elements indicate that dedicated planning resources are required in the following capabilities:

1. Community Preparedness
2. Emergency Public Information and Warning
3. Community Recovery

Figure 13 – Winter Storm At-Risk Population Analysis

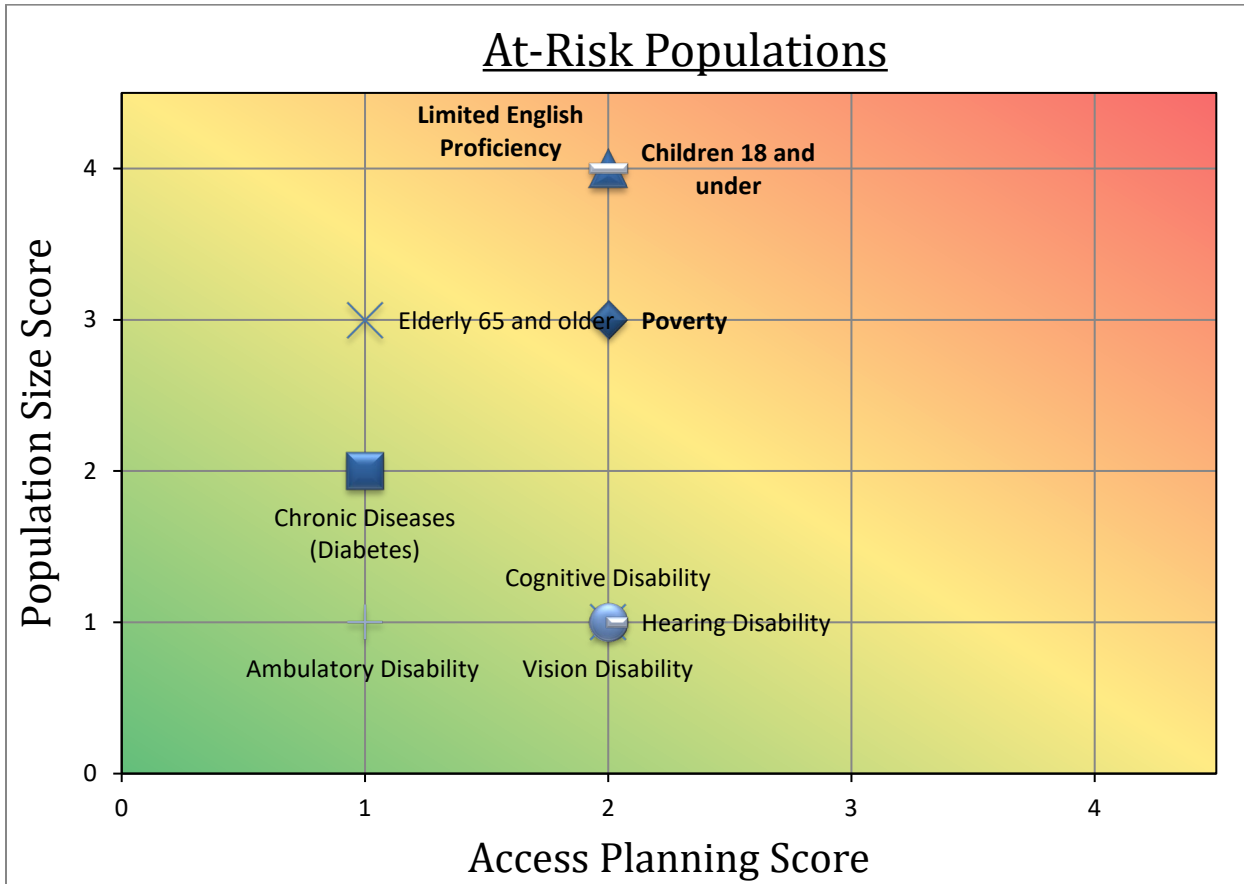


Figure 13 demonstrates Hennepin County Public Health’s planning capability relevant to a winter storm.

At-risk population planning priorities:

1. Limited English proficiency
2. Children 18 and under
3. Populations at or below the poverty level

Figure 14 – Temperature Extremes Severity Analysis

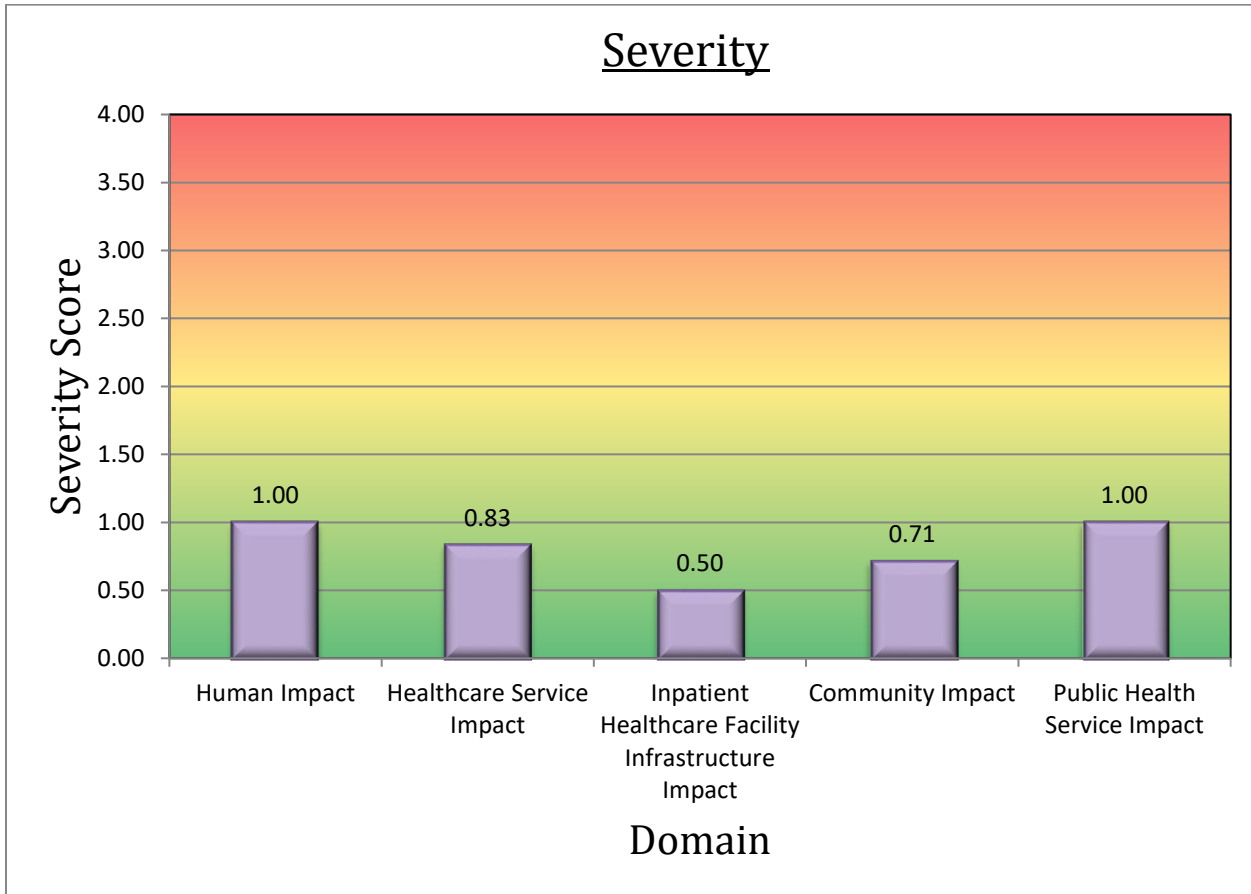


Figure 14 demonstrates that Human Impact and Public Health Impact will be most heavily affected by temperature extremes. Human Impact includes the following elements:

Human Impact	Mortality	Deaths/day
	EMS Transports	Transports/day
	ED Visits	ED visits/day
	Outpatient Visits	Visits/day
	Trauma Center Injuries	Trauma center injuries/day
	Mental Health Impact	Percent of population developing psychopathology and behavioral changes after the incident, including PTST, depression, anxiety, alcohol and substance abuse, domestic violence, and loss of social functions

Figure 15 – Temperature Extremes Preparedness Analysis

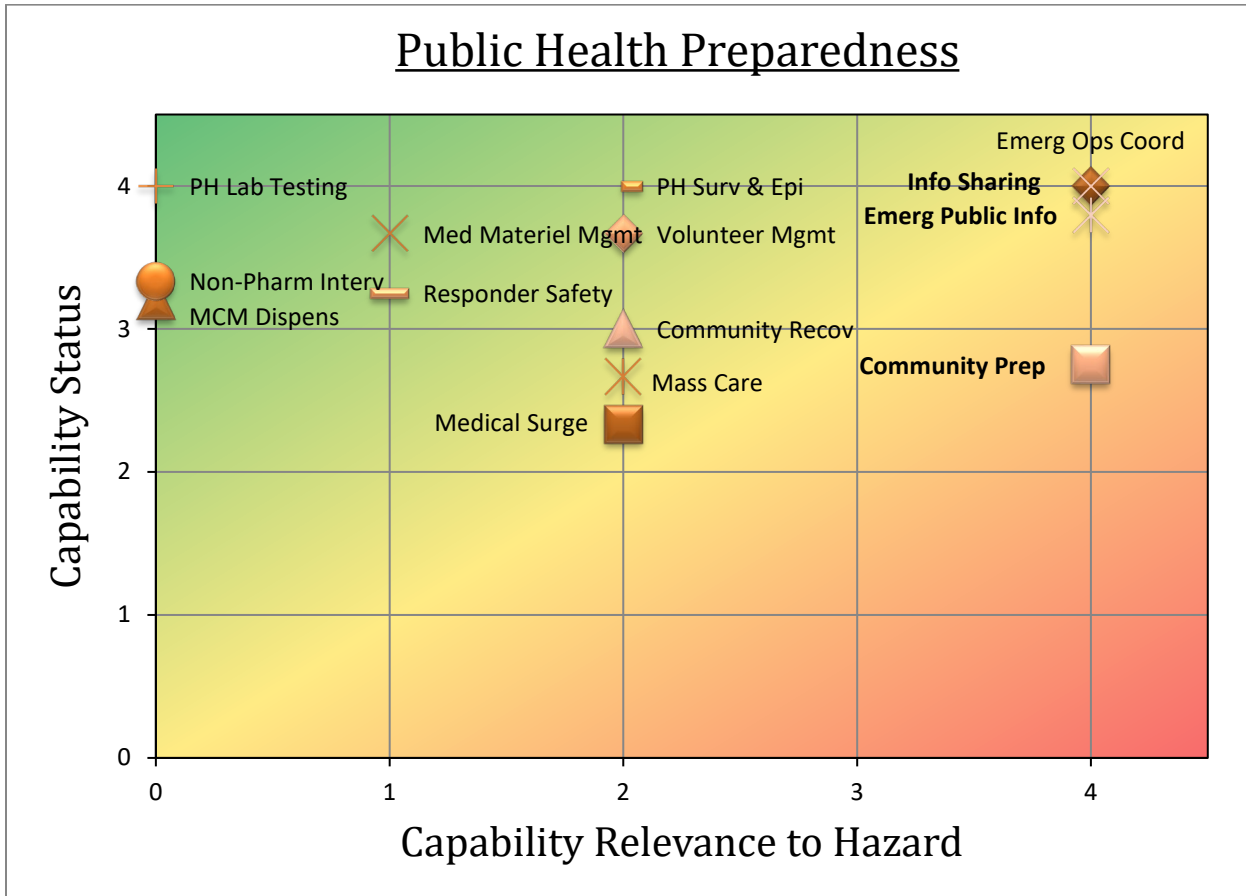


Figure 15 demonstrates Hennepin County Public Health’s current planning capability relevant to temperature extremes. Priority planning elements indicate that dedicated planning resources are required in the following capabilities:

1. Community Preparedness
2. Emergency Public Information and Warning
3. Information Sharing

Figure 16 – Temperature Extremes At-Risk Population Analysis

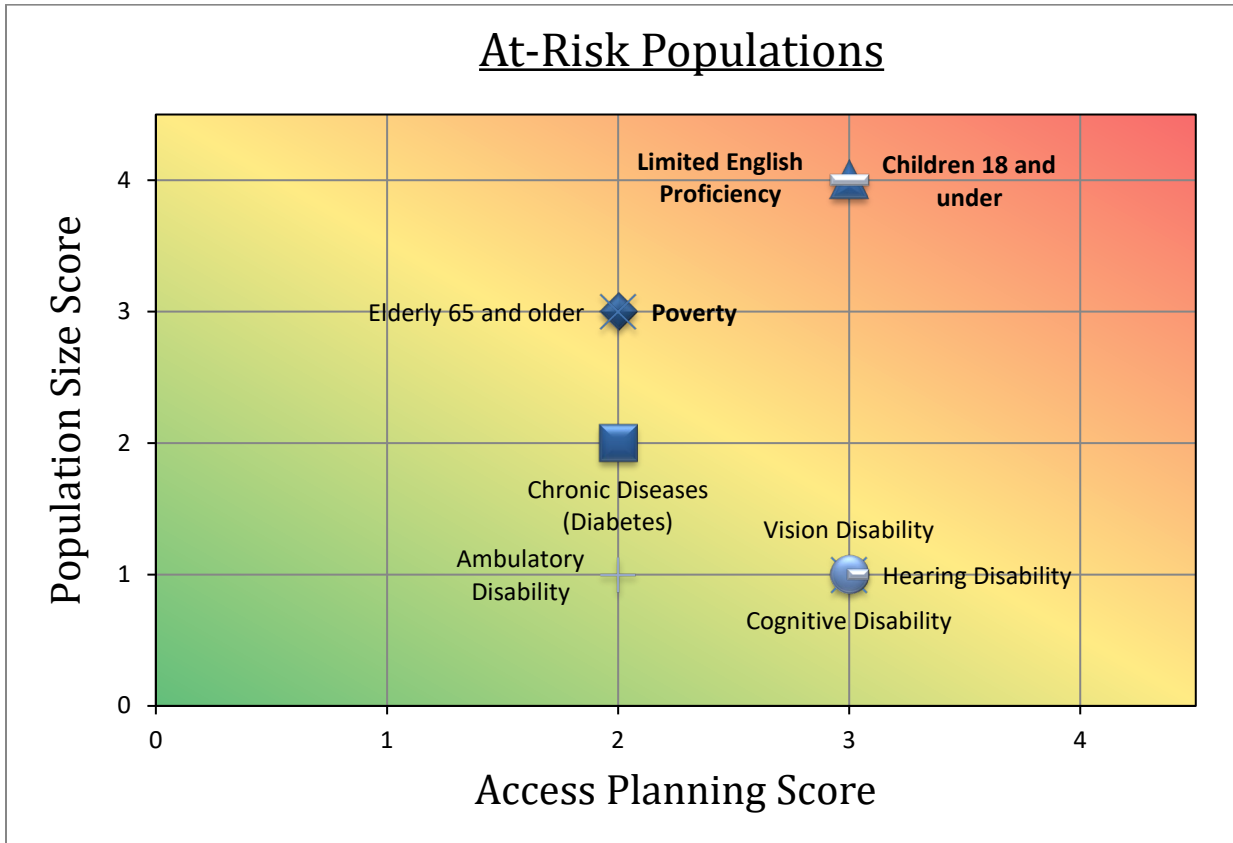


Figure 16 demonstrates Hennepin County Public Health’s planning capability relevant to temperature extremes.

At-risk population planning priorities:

1. Limited English proficiency
2. Children 18 and under
3. Populations at or below the poverty level

Planning Recommendations

Priority capabilities from the hazard analysis

1. Community Preparedness

- a. Engage community partners to identify populations that may be at-risk.
- b. Collaborate with emergency management and community and faith-based partners to identify and implement strategies for public health, medical, and mental/behavioral health service planning priorities identified within the jurisdictional risk assessment.

2. Community Recovery

- a. Identify the services that can be provided by the public health agency and by community and faith-based partners that were identified prior to the incident, as well as by new community partners, which may arise during the incident response.
- b. In conjunction with healthcare organizations (e.g., healthcare facilities and public and private community providers) and based upon recovery operations, determine the community's health service priorities and goals, which are the responsibility of public health.
- c. Partner with public health, medical, and mental/behavioral health professionals and other social networks (e.g., faith-based, volunteer organizations, support groups, and professional organizations) from within and outside the jurisdiction as applicable to the incident, to educate their constituents regarding applicable health interventions being recommended by public health.

3. Emergency Public Information and Warning

- a. Utilize social media (e.g., Twitter, Facebook, TPT|NOW) when and if possible for public health messaging.
- b. Disseminate information to the public using pre-established message maps in languages and formats that consider jurisdiction demographics, at-risk populations, economic disadvantages, limited language proficiency, and cultural or geographical isolation.

4. Medical Countermeasure Dispensing and Administration

- a. Prior to an incident, and if applicable during an incident, engage private sector, local, state, regional, and federal partners, as appropriate to the incident, to identify and fill required response roles.

5. Information Sharing

- a. Prior to and as necessary during an incident, identify intra-jurisdictional stakeholders across public health, public safety, private sector, law enforcement, and other disciplines to determine information-sharing needs.
- b. Prior to and as necessary during an incident, work with elected officials, identified stakeholders (both inter- and intra-jurisdictional) and private sector leadership to promote and ensure continual connection (e.g., ongoing standing meetings, webinars, and teleconferences) and use continuous quality improvement process

to define and redefine information-sharing needs.

6. Medical Surge

- a. At the time of an incident, support situational awareness by utilizing the ongoing real-time exchange of information among response partners and coalitions.
- b. During an incident, provide information to educate the public, paying special attention to the needs of at-risk individuals (e.g., information is linguistically appropriate, culturally sensitive, and sensitive to varied literacy levels) regarding changes to the availability of healthcare services.

7. Non-pharmaceutical Interventions

- a. Prior to an incident, engage healthcare organizations, government agencies, and community sectors (e.g., education, social services, faith-based, business, and legal) in determining their roles and responsibilities in non-pharmaceutical interventions on an ongoing basis through multidisciplinary meetings.
- b. At the time of an incident, assist community partners with coordinating support services (e.g., medical care and mental health) to individuals included in non-pharmaceutical intervention(s).

8. Responder Safety and Health

- a. Conduct or participate in exposure, mental/behavioral health, and medical surveillance of public health incident responders before, during, and after an incident.
- b. Coordinate with healthcare partners to facilitate access to and promote the availability of medical and mental/behavioral health services for responders, either on-site or off-site as applicable to the incident.
- c. Provide guidance to partner organizations to help conduct monitoring of any responder staff for medical/mental/behavioral incident-related health outcomes.

Conclusion

Hennepin County Public Health planners worked closely with geographic information system (GIS) staff to include indicators from 2010 census data for the county's populations vulnerable to each of the identified hazards. This approach enabled the assessment to identify areas of the county with greater concentrations of at-risk residents, understanding that people rely on social and service networks to ensure their safety, health and comfort. These complex, often invisible, social networks are much harder to assess than the built environment and are not completely captured by the geographic or quantitative demographic data captured in this study.

Sensitivity to harm from hazards was ranked based on disabilities, limited English proficiency, income, chronic diseases, and age. People living below the poverty level, young children, and elderly adults living alone were assumed to be the most affected by significant disease outbreak and severe weather events. Ability to adapt to hazards contributed to the priority ranking based on income, education level, and physical and language isolation.

People living in poverty, with low educational attainment, low English reading or speaking skills, and/or elderly living alone were seen as having the greatest difficulty avoiding harm during public health emergencies. While the social vulnerability index employed in this assessment does not capture complex social support systems and public health/healthcare service networks, the use of data at the census tract level enables us to visualize important geographic aspects of social vulnerability and also serves as a useful starting point and a tool for further planning and assessment efforts.

This assessment represents a step forward for Hennepin County Public Health Emergency Preparedness. The assessment offers a practical list of public health activities that will build Hennepin County's public health preparedness capacity before, during and after a disaster. A cross-cutting theme within each hazard is a need to better understand and meet the unique vulnerabilities of at-risk populations in our communities. This work already is underway within other departments in the county and with community partners. However, increased collaboration is necessary to engage and strengthen these partnerships. Investments that Hennepin County Public Health makes now will result in stronger, more resilient, and better prepared communities to respond to any public health emergency.