Statewide Healthcare and Public Health Hazard Vulnerability Analysis

Hurricane Irene – Black Rock section of Bridgeport, 2011

Prepared by Yale New Haven Health

Center for Emergency Preparedness and Disaster Response

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Contents

I. Introduction

In 2017, the Connecticut Department of Public Health (DPH) engaged Yale New Haven Health's Center for Emergency Preparedness and Disaster Response to conduct a statewide public health/healthcare system Hazard Vulnerability Analysis (HVA) that encompasses the five Department of Emergency Services and Public Protection – Division of Emergency Management and Homeland Security (DEMHS) regions[1]. Connecticut's five healthcare coalitions (HCCs) are organized by the geographical boundaries of the DEMHS regions. These five HCCs are funded by the Office of the Assistant Secretary for Preparedness and Response (ASPR) in the U.S. Department of Health and Human Services, with grants administered by the Connecticut Department of Public Health. HCC core membership is a minimum of two acute care hospitals, local health, EMS and emergency management.

This public health/healthcare system HVA takes a systematic approach to identifying hazards or risks that are most likely to have an impact on the demand for Connecticut's public health services or the health care delivery system's ability to provide medical services. Hazards have been measured by their likelihood and their consequences. The overarching goal of this HVA is to determine what future events are most likely to impact regional public health and healthcare capability in each of the five Connecticut emergency response regions and in the state-as-a-whole. To answer this question all acute care hospitals, public health departments, both municipal and district, along with some additional health care facilities, were asked to complete their own specific HVA (blank form located in Appendix A). While completing the HVA form, respondents identified the following:

- most probable hazards
- hazards with the potential to have the highest impact on the regional public health and healthcare capabilities
- hazards with the potential to have the highest impact on the residents
- hazards with the lowest level of mitigation and preparedness.

The HVA, based on the Colorado Children's Hospital Community Hazard Vulnerability Analysis, has been modified to meet the needs of this engagement (see Appendix A). This tool was selected due to its comprehensive look at a variety of hazards and encompassed both community and hospital-specific hazards making it applicable to all the public health/healthcare entities in the state. To reflect the needs of Connecticut's healthcare system, some hazards were removed and new hazards were added. The final HVA form includes 101 hazards under the following categories:

- National Planning Scenarios
- Naturally Occurring Events
- Human Related Events
- Hazardous Materials Events
- Technologic Events
- Utility Events
- Geographic Events
- Other Events

The data collected from each region was aggregated using Microsoft Excel to calculate an average response for each data point on the HVA. The averages were used to generate each regional HVA. In addition, five aggregated hospital-only HVAs were prepared. Once the five region-wide HVAs were reviewed, validated and finalized by each region, the information was aggregated and the regional data averages were used to develop one statewide HVA. Connecticut's Disaster Behavioral Health Response Network and pediatric clinicians also reviewed the findings and submitted their perspective.

As indicated by the HVA results herein, hospital hazards are different from overarching regional hazards or public health

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[1] When used in this report, "regions" refer specifically and only to these five DEMHS emergency preparedness regions.

department hazards due to their focus on healthcare response. The hospital HVAs provide planners with valuable information about these critical emergency response resources. Despite the differences in HVA respondent types, hospitals and critical emergency response resources have as great an impact on community health.

To prepare this report, the analyst also collected, analyzed and incorporated data and other findings from several additional sources including the National Oceanic and Atmospheric Administration, the Federal Emergency Management Agency, the Connecticut State Data Center and The Agency for Toxic Substances & Disease Registry.

Limitations[2]

- The individuals completing the HVAs have varying levels of emergency management experience and training.
- The individual agency HVA reports are also subject to the accuracy and content of information available within each agency.
- While filling in the HVA tool, some agencies assumed the scope was specific to their agency or facility, while others considered the risks to the entire service area or community.
- When completing HVA tools, individuals are concurrently influenced by recent events. For example, these findings reveal the data collection time-frame overlapped a major and widely publicized cyber security event.

II. HVA Data Collection

The five health care coalitions provided a structured approach to data collection and reporting. Map 1 illustrates the regional boundaries and regional designation for each Connecticut town (note that the coalition's geographic boundaries are the same as the five State of Connecticut Division of Emergency Management and Homeland Security planning regions).

Map 1 – Five DEMHS Regions

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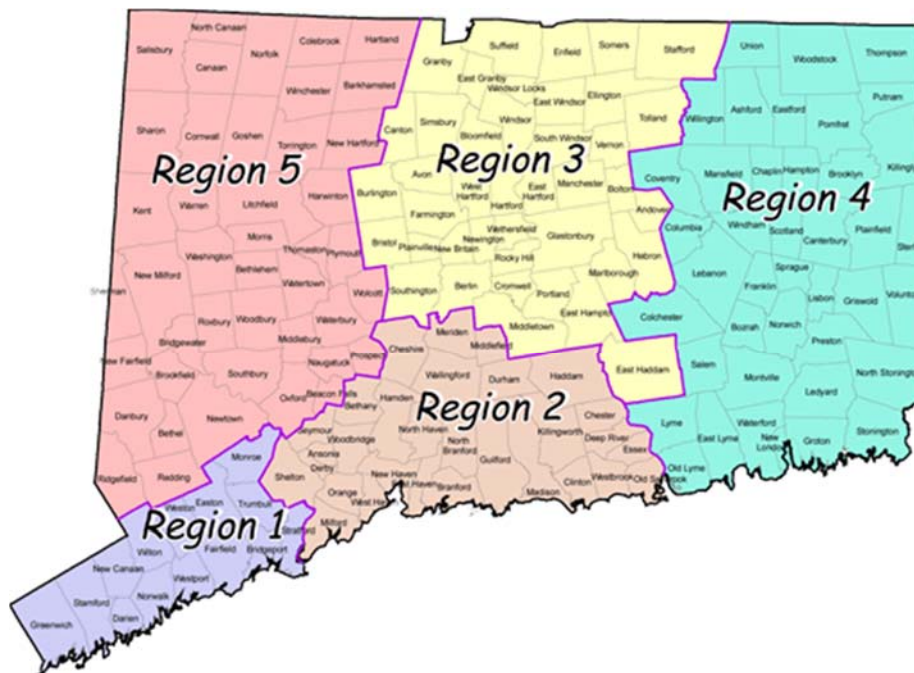
[2] Campbell, P., Trockman, S. J., & Walker, A. R. (2011). Strengthening hazard vulnerability analysis: Results of recent research In Maine. *Public Health Reports, 126*(2), 290–293. http://dx.doi.org/10.1177/003335491112600222

HHS-ASPR (n.d.) *ASPR TRACIE evaluation of hazard vulnerability assessment tools.* Retrieved from https://asprtracie.s3.amazonaws.com/documents/tracie-evaluation-of-hva-tools.pdf

This project asked healthcare providers and municipal/district health departments in each regional health care coalition to complete the HVA, which was delivered to designated staff via email. Tables 1 and 2 list these organizations.

Table 1 - Hazard Vulnerability Analysis – Health Departments Recipient and Completers List

Region I	Region 2		Region 3	Region 4	Region 5
Bridgeport	Ansonia	Naugatuck Valley	Bristol-Burlington	Eastern Highlands	Beacon Falls
Darien	Branford	New Haven	Central CT	Ledge Light	Bethel
Fairfield	Chesprocott	North Branford	Chatham	Northeast	Danbury
Greenwich	CT River Area	Quinnipiac Valley	Cromwell	Tribal Nations	Naugatuck Valley
Monroe	Derby	Seymour	East Hartford	Uncas	New Fairfield
Norwalk	Essex	Shelton	Farmington Valley		New Milford
Redding	Guilford	Wallingford	Glastonbury		Newtown
Stamford	Guilford	West Haven	Hartford		Pomperaug
Stratford	Killingworth	Westbrook	Manchester		Ridgefield
Trumbull	Madison		Middletown		Torrington Area
Weston Westport	Meriden		New Britain		Waterbury
Westport	Milford		North Central		
Wilton	Naugatuck Valley		Plainville Southington		
			West Hartford Bloomfield		
			Windsor		

Table 2 - Hazard Vulnerability Analysis – Health Care Recipient and Completers List

Region I	Region 2	Region 3	Region 4	Region 5
Bridgeport/YNHHS	Gaylord Rehab Hospital	Bradley Memorial	Day Kimball Hospital	Charlotte Hungerford
Family Centers FQHC	Griffin Hospital	Bristol	Lawrence and Memorial / YNHHS	Community Health & Well. FQHC
Greenwich/YNHHS	Midstate Medical	CT Children's Medical Center	Natchaug	Danbury / New Milford Hospitals (Western Connecticut Health Network)
Norwalk Hospital	Milford Hospital	Hartford Hospital	William Backus	Greater Danbury CHC
Optimus Health Care	Yale New Haven Hospital	Hospital for Special Care	Windham Memorial	Sharon Hospital
St. Vincent's Medical Center		John Dempsey Hospital		St. Mary's Hospital
Stamford Health Systems		Johnson Memorial		Waterbury Hospital
		Manchester Memorial		
		Middlesex Hospital		
		New Britain Hospital		
		Rockville General		
		St. Francis Hospital		

III. Connecticut Climate

According to the National Oceanic and Atmospheric Administration (https://statesummaries.ncics.org/ct), Connecticut's geographical location exposes the state to both the moderating and moistening influence of the Atlantic Ocean, as well as the effects of the hot and cold air masses from the interior of the continent. The topography varies from hilly slopes in the northwestern portion of the state to the southeastern coast along the Long Island Sound, which is characterized by diverse sections of rocky high points and marshes. Its climate is characterized by cold, snowy winters and warm, humid summers. The polar jet stream is often located near the state, giving it highly variable weather patterns, and generally abundant precipitation throughout the year. Temperatures along the coast are moderated by the close proximity to the Atlantic Ocean, with warmer winters and longer frost-free seasons than inland areas. The annual average temperature is 49°F with average temperatures of 26°F in January and 72°F in July. Temperatures above 90°F are rather infrequent, with an average of 11 days in Hartford, and up to 2 days in New Haven. Similar geographic variations exist for extreme cold (below 0°F), ranging from 1.5 days in Hartford, and 0.3 days along the coast at New Haven.

A recent Hartford Courant article discussing the impacts of climate change noted about 40 percent of Connecticut's population lives in 36 coastal communities facing the potentially dangerous combination of rising water levels and more frequent and intense storms. (http://www.courant.com/news/connecticut/hc-global-warming-hitting-long-island-sound-20170602-story.html) According to this article, the National Oceanic and Atmospheric Administration has stated that "sea level has risen at a rate of 10-11 inches per century along the Connecticut coast, faster than the global rate." Further, a 2017 report by Connecticut's Council on Environmental Quality warned Connecticut's rain has been arriving in heavier doses over the past three decades, and research predicts more intense precipitation throughout New England. Rising water levels combined with bigger storms often produce surges that hit the coast harder and penetrate farther, causing more damaging flooding.[3] In 2011 and 2012, massive storms Irene and Sandy battered Connecticut's shoreline, destroying homes, flooding roads and threatening facilities like sewage and power plants. According to another 2017 article in *Connecticut Magazine*, the Nature Conservancy has estimated Connecticut could lose as much as 24,000 acres of shoreline beaches, marshes and land to rising sea levels by 2080. (http://www.connecticutmag.com/health-and-science/connecticut-s-rising-seas-are-towns-and-cities-ready/article_e97a46de-0a74-11e7-a2f8-172f13eecce2.html).

IV. Connecticut's Disasters

In the past 60 years, Connecticut has experienced 19 major natural, federally-designated disasters and 11 emergency declarations[4]. The FEMA website provided the following list:

- Hurricane Carol – 1954
- Hurricanes Connie and Diane – 1955
- Blizzard – 1978
- Tornado – 1979
- Severe Storm – 1982
- Severe Storm – 1984
- Hurricane Gloria – 1985
- Severe Storm/Tornado – 1989
- Hurricane Bob – 1991

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[3] Graner et al. 2017. Impact of climate change on New York City's coastal flood hazard: Increasing flood heights from the preindustrial to 2300 CE. Proc Natl Acad Sci U S A. 114(45): 11861–11866.

[4] Some events received both a major disaster and emergency declaration designation.

- Coastal Flooding/Winter Storm – 1992
- Blizzard – 1993
- Blizzard – 1996
- Tropical Storm Floyd – 1999
- Snowstorm – 2003
- Snowstorm – 2004
- Snowstorm – 2005
- Hurricane Katrina – 2005
- Severe Storm – 2005
- Snowstorm – 2006
- Severe Storm – 2007
- Severe Storm – 2010
- Snowstorm – 2011
- Tropical Storm Irene – 2011
- Severe Storm – 2011
- Hurricane Sandy – 2012
- Winter Storm – 2013
- Winter Storm/Snow Storm – 2015

Connecticut's Man-made Disasters

Although its predictive value (from a hazard vulnerability standpoint) is limited, Connecticut's history of non-natural disasters is sobering. The following list includes the most significant events of the past 50 years.

- Hartford Hospital Fire - 1961
- Allegheny Airlines Flight 485 - 1971
- Gulliver's Nightclub Fire - 1974
- Mianus River Bridge Collapse – 1983
- L'Ambiance Plaza Collapse – 1987
- Middletown Power Plant Explosion – 2010
- Sandy Hook Elementary School Shooting – 2012
- Fairfield Train Crash - 2013

V. Social Vulnerability in Connecticut

Social vulnerability can be used to identify those communities that are more susceptible to the damaging effects of a hazard. Variables such as poverty, health, education and disability status impact an individual's ability to adapt, resist hazard consequences and recover from emergencies.[5] Disadvantaged social groups, including children, are likely to suffer disproportionally from hazards because they struggle to cope (short term) and adapt (long term).[6] In other words, they are less resilient.

This HVA uses these variables to identify areas of Connecticut with high social vulnerability indices. As this report will show, these areas are present in all five regions. Where possible, data is presented in the form of maps, which can be used to support localized risk communication and inform spatial planning.
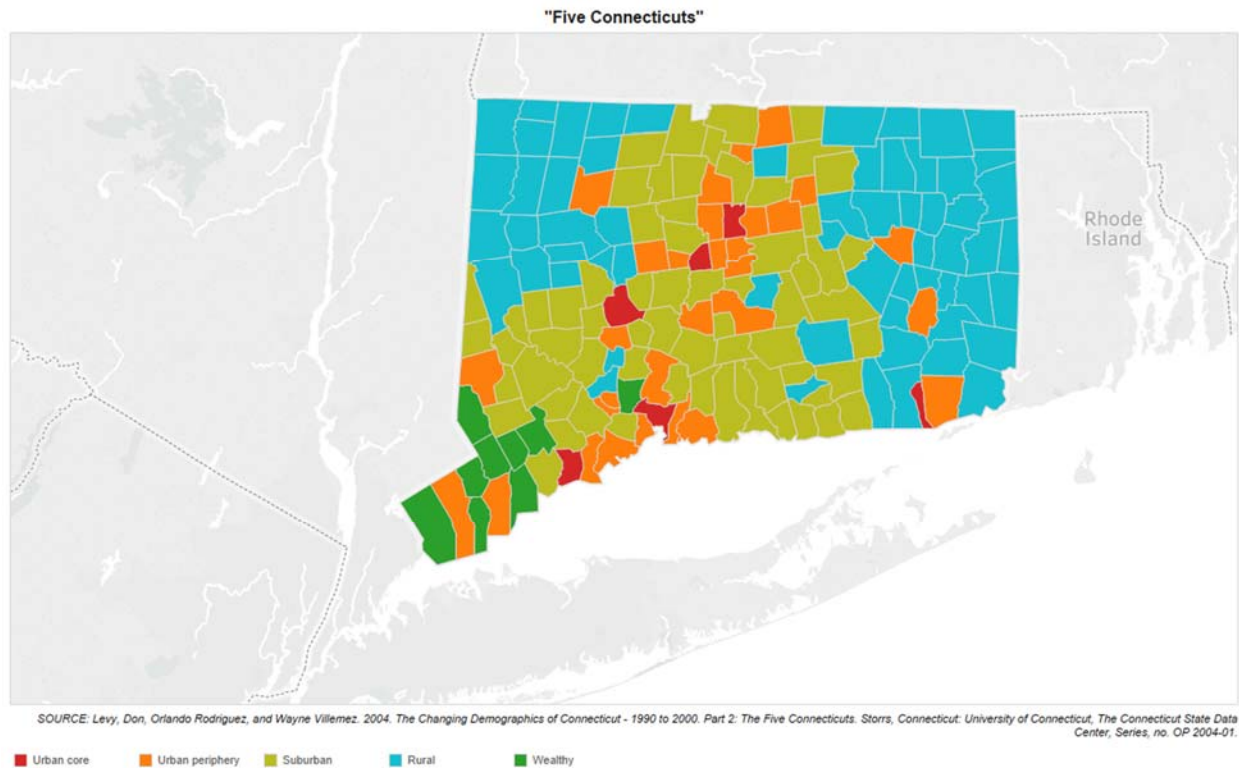
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[5] Morrow BH. (1999). Identifying and Mapping Community Vulnerability. *Disasters* 23(1): 1-18.

[6] Bergstrand et al. (2015). Assessing the Relationship Between Social Vulnerability and Community Resilience to Hazards. *Social Indicators Research* 122(2): 391–409 (doi:10.1007/s11205-014-0698-3)

The Five Connecticuts

In 2004, the Connecticut State Data Center developed the Five Connecticuts report to highlight inequalities that exist at the town level in Connecticut. The original report was based on 2000 Census data and categorized each town as one of five types (wealthy, suburban, rural, urban periphery, urban core) based on the median household income, population density, and poverty rate of each town.

Map 1 – The Five Connecticuts[7]

SOURCE: Levy, Don, Orlando Rodriguez, and Wayne Villemez. 2004. The Changing Demographics of Connecticut - 1990 to 2000. Part 2: The Five Connecticuts. Storrs, Connecticut: University of Connecticut, The Connecticut State Data Center, Series, no. OP 2004-01.

■ Urban core   ■ Urban periphery   ■ Suburban   ■ Rural   ■ Wealthy

Since this map was developed in 2004, towns have shifted in and out of these five types, but the generalities persist. These five categories provide a useful and enduring picture of Connecticut's 169 towns. It is clear that most of the state's wealthy residents live in the Southwest. The East and the Northwest are largely rural. As the map illustrates, each DEMHS region includes at least one urban core.

After reviewing previous methods and data sources and reviewing similar projects across the nation, the Connecticut State Data Center changed its approach in 2014. It now uses an adapted Human Development Index (HDI) to develop the Five Connecticuts Report.

Human Development Index

Through its website, the Connecticut State Data Center provides the Human Development Index (HDI) for each Connecticut town. The HDI is a numerical measurement tool used for analyzing the well-being of populations and uses three development indicators: a long and healthy life, access to knowledge and a decent standard of living (i.e., health, education, income). Proxy indicators are available for each and follow below:

- Educational Attainment and Educational Enrollment (proxy for education)
- Median Earnings (proxy for income)
- Life expectancy (proxy for health)

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[7] http://www.courant.com/data-desk/hc-survey-wellbeing-changes-with-income-education-race-20160304-htmlstory.html

Using data collected from DPH (raw life expectancy data) and the 2007-2011 American Community Survey, the Connecticut State Data Center calculated an HDI number for each CT town[8]. Lower numbers indicate poorer performance and Connecticut towns range from a low of 3.492 and a high of 10.764.

As Map 2 illustrates, the northeast portion of the state produces the lowest HDI scores and the southwest (the wealthiest area) generates the highest scores. The Hartford area also scored relatively low.

Map 2 – Connecticut's Human Development Indices by Town
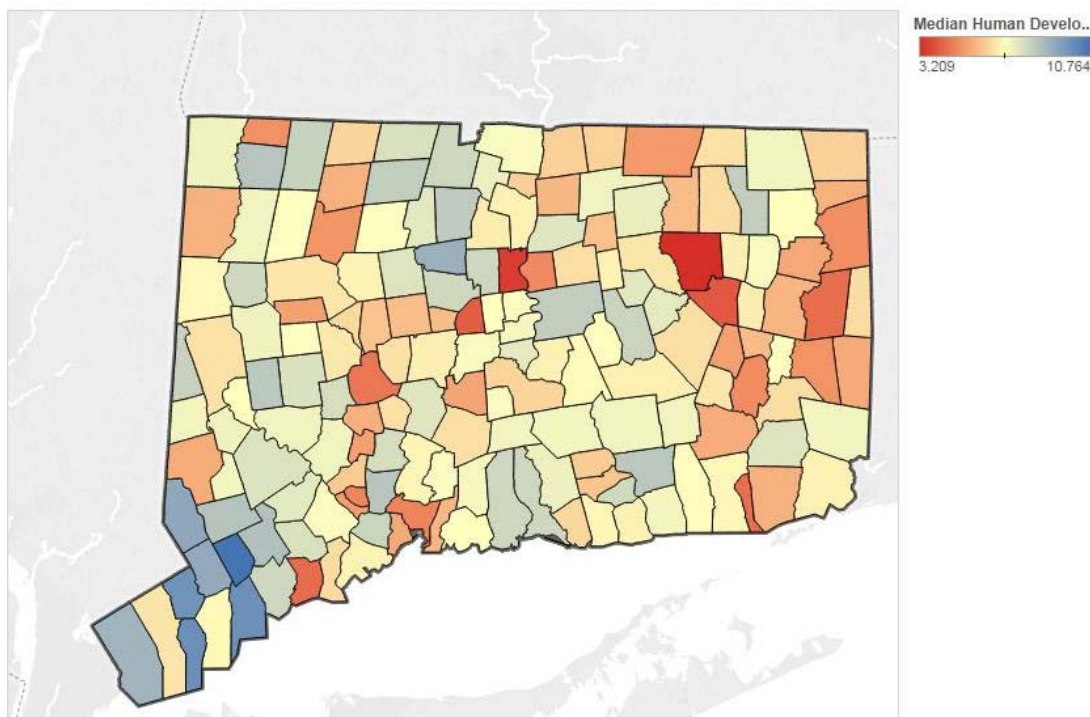
The ten lowest and highest HDI scores are listed below.

Lowest HDI (excluding Mansfield[9])

Region 3	Hartford	3.492
Region 4	Windham	3.957
Region 3	New Britain	4.057
Region 1	Bridgeport	4.323
Region 4	Plainfield	4.352
Region 4	New London	4.371
Region 5	Waterbury	4.529
Region 2	New Haven	4.759
Region 2	Ansonia	4.777
Region 3	East Hartford	4.858

[8] See Connecticut Human Development Report (County Subdivision, 2010 & 2015) for full methodology.
[9] Tracts that contain group quarters (universities, prisons, nursing homes) can influence the data at the town level. For instance, the median earnings for the UConn tract are very low compared with the rest of the tracts in Mansfield. As a result, the median earnings at the town level are the lowest in the entire state, and thus Mansfield receives a low HDI score even though the other three tracts in the town have much higher median earnings.

Highest HDI

Region 5	Redding	8.476
Region 1	Easton	8.562
Region 1	Greenwich	8.886
Region 3	Avon	8.994
Region 1	Wilton	9.185
Region 5	Ridgefield	9.254
Region 1	New Canaan	9.859
Region 1	Westport	9.949
Region 1	Darien	9.973
Region 1	Weston	10.764

Social Vulnerability Index

The Agency for Toxic Substances & Disease Registry (ATSDR) conducted a similar project to develop what they call the Social Vulnerability Index (SVI). ATSDR's SVI uses U.S. census variables at the tract level with the goal of helping local officials identify communities that may need support in preparing for hazards or recovering from disasters. In addition to offering prepared county maps and various interactive maps on their web site (https://svi.cdc.gov/), ATSDR made many datasets[10] and tools available for free download. Using shapefiles downloaded from the SVI site, YNHHS CEPDR developed the maps below in Tableau 10.4.

High population densities increase vulnerability to disasters by contributing to congestion, limited escape routes and dense infrastructure[11]. Map 3 illustrates the wealthiest county (Fairfield) is also one of the the most dense. More troubling, New Haven County, containing several low scoring HDI towns, is also very dense. Hartford County also scored fairly high on this variable. Both the northeast and northwest, areas previously characterized as rural, are predictably sparsely populated.

Map 3 – Population Density

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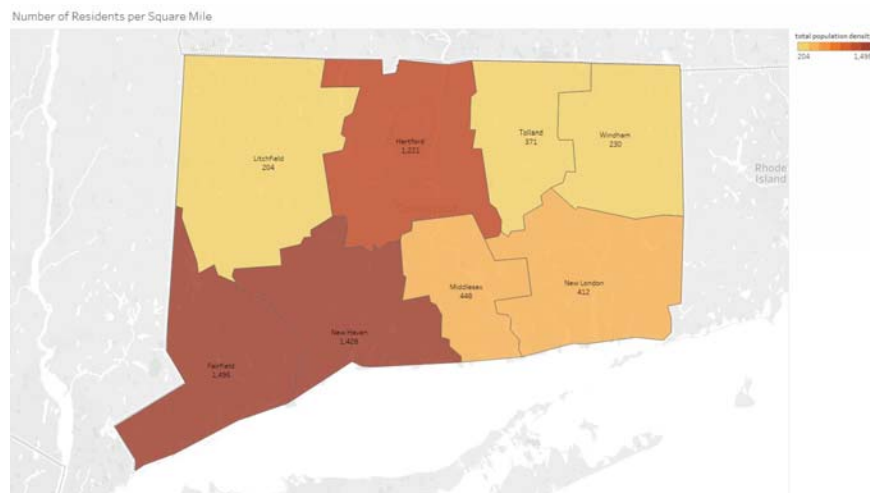
[10] Please note that these datasets provide county level data rather than town level data. The distinction between county and DEMHS region border lines is acknowledged. The illustrative value of this dataset was determined to outweigh the challenge of applying county-specific characteristics to the differently-sized regions. For the purposes of this HVA, the following has been assumed: Litchfield = Region 5, Fairfield = Region 1, New Haven = Region 2, Tolland = Region 3, Hartford = Region 3, New London = Region 4, Middlesex = Region 2.

[11] http://www.prb.org/Publications/Articles/2011/disaster-risk.aspx

Similarly, New Haven, Hartford and Fairfield Counties have the highest percentages of individuals with disabilities and households with no vehicle (Maps 4 and 5). These maps display almost identical county stratifications.

Map 4 – Disability Density
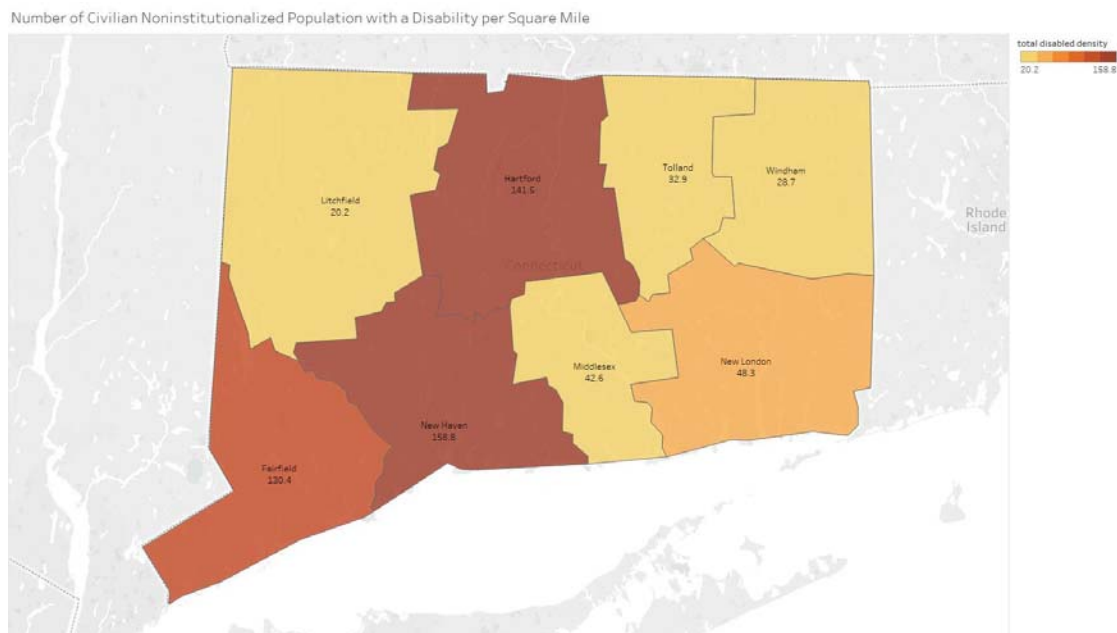
Map 5 – Total Number of Households with No Vehicle
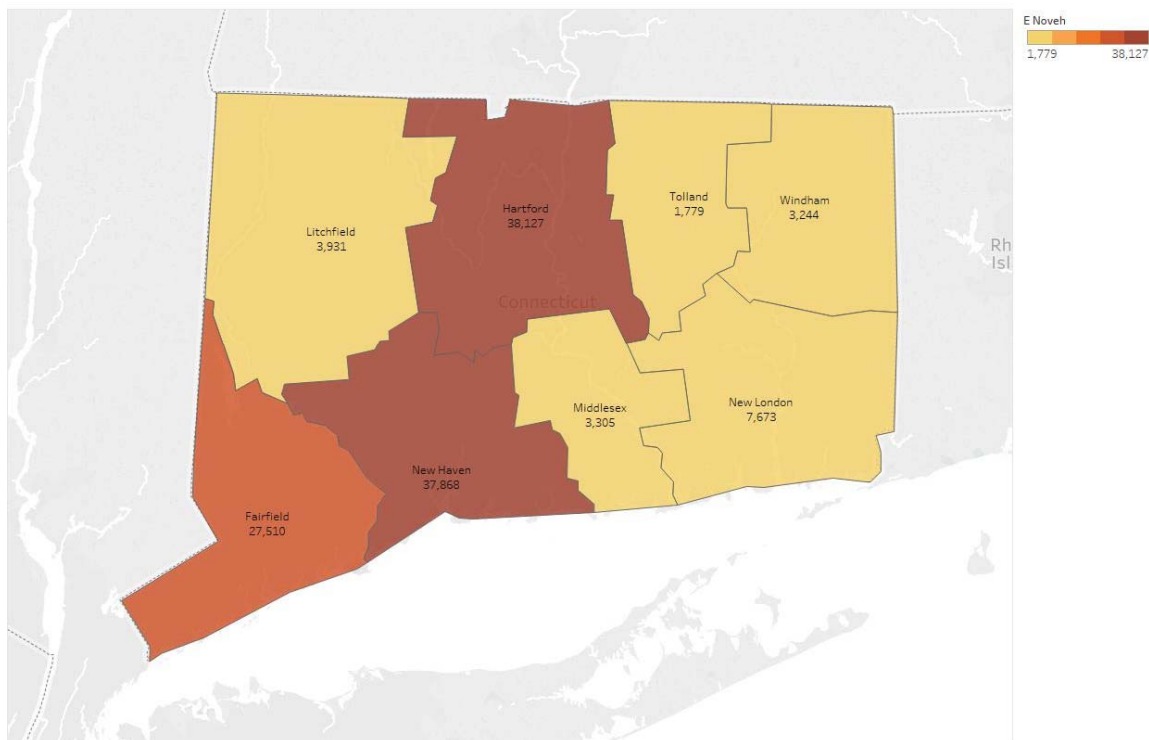
Regions 2, 3 and 4 have the highest percentage of persons living below the poverty estimate. Region 5 has the highest density of elderly residents.

Map 6 – Percentage of Persons Living Below Poverty Estimate

Percentage of persons below poverty estimate
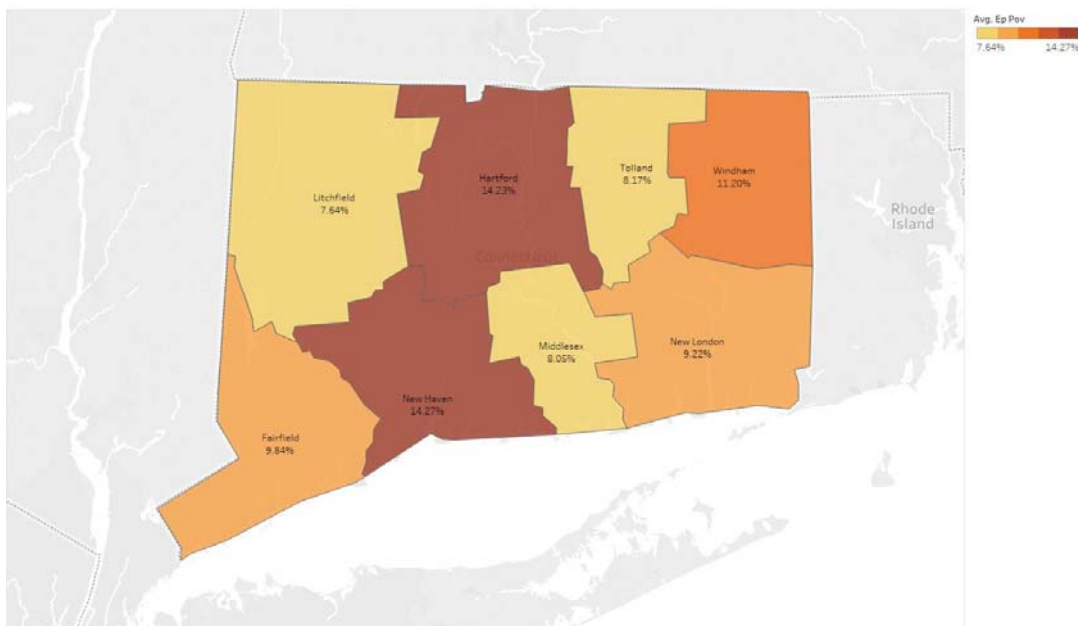
Map 7 - Percentage of Persons aged 65 and over

Percentage of persons aged 65 and older.
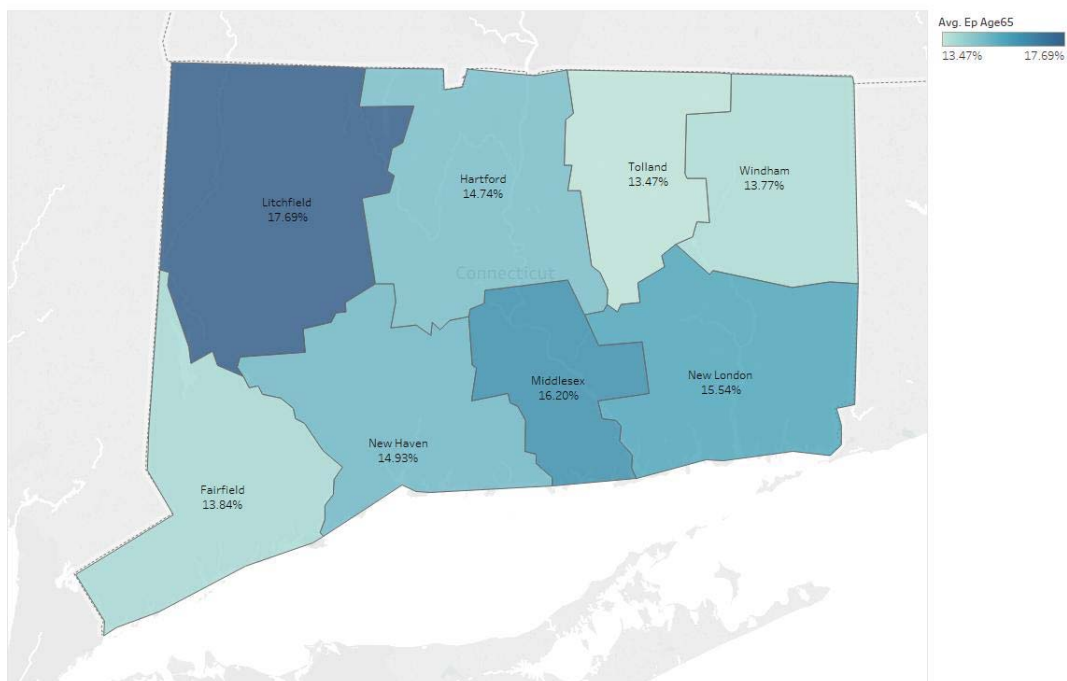
Map 8 - Percentage of Persons aged 17 and younger
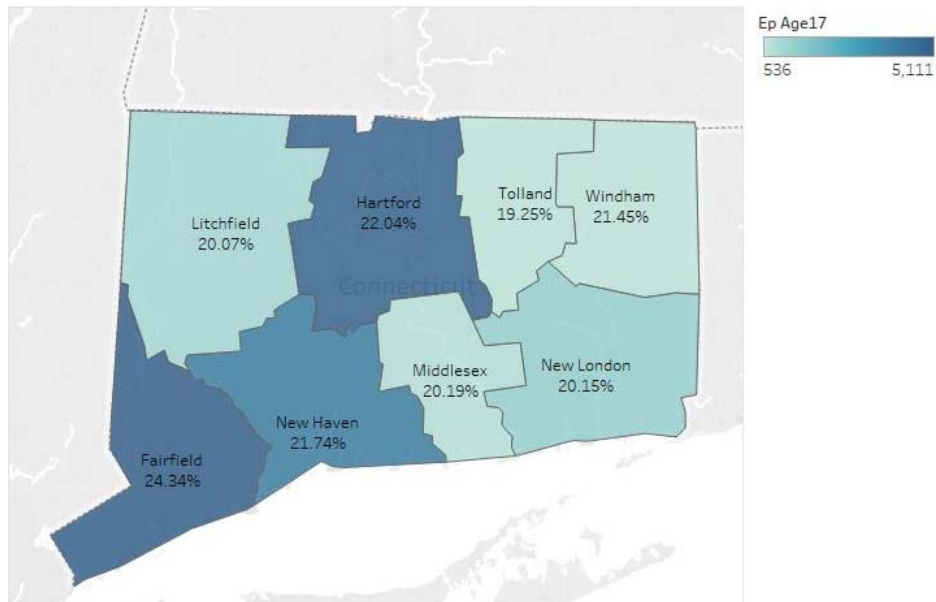
Using the definitions listed in Footnote #6, the analyst summarized the findings above (Maps 1 – 8) for each region (Table 1). This analysis reveals that Region 2 is challenged by each variable and Region 5 is relatively less vulnerable to all but one (elderly population). Region 3 is also disproportionately represented on the "more vulnerable" side.

Table 1 – Regional Summary of Statewide Vulnerability Data

Variable	Regions with fewer vulnerabilities	Regions with more vulnerabilities
Geography (Coastline)	3, 5	1, 2, 4
HDI	1, 5	2, 3, 4
Population Density	4, 5	1, 2, 3
Disabled Density	4, 5	1, 2, 3
No Vehicle	4, 5	1, 2, 3
Poverty	1, 5	2, 3, 4
Elderly Density	1, 3, 4	5, 2
Pediatric Density	4, 5	1, 2, 3

Implications of Geographic and Social Vulnerabilities for EM Planning in CT

Geography

- Densely populated (with people and infrastructure) coastline communities are vulnerable to storms, wind and flooding.
- Land use planning, hazard mitigation planning, emergency response, evacuation and recovery planning should anticipate congestion and limited escape routes.
- Planners should develop geographically-specific and financially-aware mass-transit and alternate transportation plans.

HDI and Poverty

- Three CT regions have substantial populations of residents who are comparatively less healthy, less educated and posess fewer resources. Healthy communities have been defined as "safe, economically secure, and environmentally sound, as all residents have equal access to high quality educational and employment opportunities, transportation and housing options, prevention and healthcare services, and healthy food and physical activity opportunities."[12] As such, communities with low HDI scores are less healthy and socially vulnerable residents have little or no surplus capacity to absorb losses.
- Response plans should accommodate displacement and food insecurity for socially vulnerable populations.
- Response plans should consider access to healthcare, public transportation, communication and infrastructure such as water and sanitation.
- Disaster recovery plans should assume low income populations will need financial support to regain losses and avoid further/increased poverty after a disaster. When low income residents do not receive needed assistance and/or response efforts are poorly handled, they are at increased risk for feelings of anger, betrayal, hopelessness and isolation leading to or exacerbating behavioral health concerns.
- Low income populations often struggle with access to behavioral health services. In the recovery phase of a disaster, integrating behavioral services with other community services will increase access to care.

Population Density (includes coastal communities and urban cores), Disabled Density, No Vehicle

- Evacuation plans should assume many people in high population density areas are likely to rely on public transporation to evacuate.
- Communities should include community-based organizations and caregivers for individuals with a disability in preparedness planning.
- Planning should consider continuity of services.
- Planning for disabled populations should accommodate all of the following types of disabilities: physical, mental, sensory and self-care.
- Communities should work with local public transit systems to develop, test and refine preparedness, mitigation, response and recovery plans. Consider that reconstruction time of transporation infrastructure tends to be relatively slow. If possible, increase resilience by identifying transportation alternatives such as new routes, terminals or suppliers.

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[12] HRIA (Health Resources in Action). 2013. Defining healthy communities. Boston, MA: HRIA. http://hria.org/uploads/ catalogerfiles/defining-healthy-communities/defining_healthy_communities_1113_final_report.pdf.

Elderly Density

- Elderly subpopulations will experience the impact of disasters differently.
- According to the 2011 FEMA National Survey, retirement-aged people (75+ category) participated in disaster training much less than people in other age categories. Communities need to encourage the elderly living independently to participate in disaster preparedness.
- Planners should work with community-based/faith-based organizations to find the elderly quietly living alone.
- Planners should assume many elderly will also fall under disabled and no-vehicle categories.
- Planners should also assume many elderly depend upon services such as meals-on-wheels for their daily needs.
- Health Care Coalitions should work with other emergency management and social service agencies to promote pre-disaster programs that identify training/planning opportunities for the elderly.
- Although healthy and ambulatory elderly may be emotionally resilient to ill effects following a disaster, infirm elderly may be at higher risk for behavioral health issues.

Pediatric Density

- During all phases of a disaster (including pre-event and post-event/recovery phases), health care coalition leadership must consider the needs of the pediatric population by working with other pediatric-focused organizations.
- Since pediatric density and medical resources should match, planners should examine the availability of pediatric specialty healthcare resources wtihin the region.
- Emergency planning should include an assessment of local community assets such as schools, child care facilities, camps and playgrounds.
- Children in congregate settings need sufficient supervision that takes into account the special considerations of children during disasters.
- Children need to be identified and tracked including methods to account for and identify them in congregate setting and to reunite them with primary caregivers. Planners may usefully leverage work currently underway by the Child-Emergency Preparedness Committee to provide:
    - planning templates for licensed and unlicensed child care providers
    - resources via the DEMHS website
    - training for all providers in disaster preparedness and response.

VI. HVA Summaries by Region

Region 1

- Respondents rate naturally occurring events such as hurricanes and winter storms as their highest risks for occurrence.
- Hospitals rated IT Network failure, Information Systems Failure and Mass Casualty in the top five of their lists of hazards.
- This region also has concerns about their proximity to transportation infrastructure and schools.
- Cyber Attack is a substantial potential hazard.

Region 2

- Respondents identified hot and cold temperature extremes as high risks for their region.
- Cyber Attack is the number two hazard for Region 2.
- The region also rated naturally occurring events such as thunderstorms and blizzards highly.
- Region 2 hospitals have prioritized risks associated with proximity to schools, trains, major transportation routes and airports.

Region 3

- Respondents rate naturally occurring events such as hurricanes and winter storms as their highest risks for occurrence.
- Additional top ten risks include ice storms, high wind, electrical failure and extreme cold.
- Cyber Attack is the number two hazard for Region 3 hospitals. The sixth and seventh hazards are ED violence and IT network failure, respectively.

Region 4

- Naturally occurring events dominate the top ten positions on this HVA list and include blizzards, ice storms, hurricanes and thunderstorm.
- Additional hazards of concern include electrical failure, HVAC failure and workplace violence.
- Cyber Attack holds the 10th position on this list.
- The hospital HVA is similar to the region-wide HVA, but also includes generator failure in their top ten list.

Region 5

- Naturally occurring events dominate the top ten positions on this HVA list and include blizzards, thunderstorms, ice storms, high winds and temperature extremes.
- Electrical failure holds the 10th position on this list.
- The hospital HVA top ten includes Cyber Attack and Mass Casualty.

VII. Regional Reports (HVAs and HDI)

A. Region 1

Region 1 HVA Top 20

	Risk Occurrence[13]			Risk Response	
1	High Winds	44%	1	Hurricane	40%
2	Hurricane	41%	2	Process Water Failure	37%
3	Severe Thunderstorm	40%	3	Compressed Gas Cylinder Leak/Failure	37%
4	Temperature Extreme (Cold)	38%	4	Loss of Key Supplier	36%
5	Temperature Extreme (Hot)	36%	5	Supply Shortage	36%
6	Ice Storm	33%	6	Nuclear Detonation – Improvised Device	35%
7	Severe Blizzard/Snow Fall	32%	7	High Winds	35%
8	Information Systems Failure	31%	8	Active Shooter	35%
9	IT Network Failure	31%	9	Bomb Threat	34%
10	Proximity to trans. & routes airports	31%	10	Severe Thunderstorm	33%
11	Mass Casualty (Trauma)	30%	11	Flood (External)	33%
12	Cyber Attack	30%	12	Biological Attack – Plague	33%
13	Proximity to train stations	30%	13	Radiological Attack – Radiol. Disp.	33%
14	Security Card Access Failure	29%	14	Hostage Situation	32%
15	Workplace Violence	28%	15	Ice Storm	31%
16	Proximity to Bridges	28%	16	Workplace Violence	31%
17	Flood (External)	28%	17	Temperature Extreme (Cold)	31%
18	Natural Disaster – Major Hurricane	28%	18	Natural Disaster – Major Earthquake	31%
19	Violence in the ED	27%	19	Decontamination	31%
20	Drought	26%	20	Mass Casualty (Trauma)	30%

Region 1 Hospital[14] HVA Top 20

	Risk Occurrence			Risk Response	
1	High Winds	31%	1	Process Water Failure	37%
2	Proximity to Bridges	31%	2	Compressed Gas Cylinder Leak/Failure	37%
3	IT Network Failure	31%	3	Supply Shortage	36%
4	Information Systems Failure	31%	4	Loss of Key Supplier	36%
5	Mass Casualty (Trauma)	30%	5	Active Shooter	35%
6	Security Card Access Failure	29%	6	Bomb Threat	34%
7	Workplace Violence	28%	7	Evacuation	33%
8	Proximity to schools/universities	28%	8	Cyber Attack	32%
9	Proximity to train stations	28%	9	Hostage Situation	32%
10	Hurricane	27%	10	Biological Attack – Plague	32%
11	Violence in the ED	27%	11	Workplace Violence	31%
12	Cyber Attack	27%	12	Decontamination	31%
13	Severe Thunderstorm	27%	13	Helicopter Incident	30%
14	Proximity to trans. rts. & airprts	26%	14	Mass Casualty (Trauma)	30%
15	Proximity to Parks	26%	15	Explosives Attack – Improvised Explosive	30%
16	Temperature Extreme (Cold)	26%	16	Loss of Bulk Oxygen	30%
17	Severe Blizzard/Snow Fall	26%	17	Biological Disease Outbrk – Pandemic flu	29%
18	Ice Storm	25%	18	Security Card Access Failure	29%
19	HAZMAT Spill (External)	24%	19	IT Network Failure	28%
20	Decontamination	23%	20	Information Systems Failure	28%

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[13] Risk Occurrence=Measure of certainty an event will occur. Risk Response=Measure of certainty agency(ies) in question will need to respond.
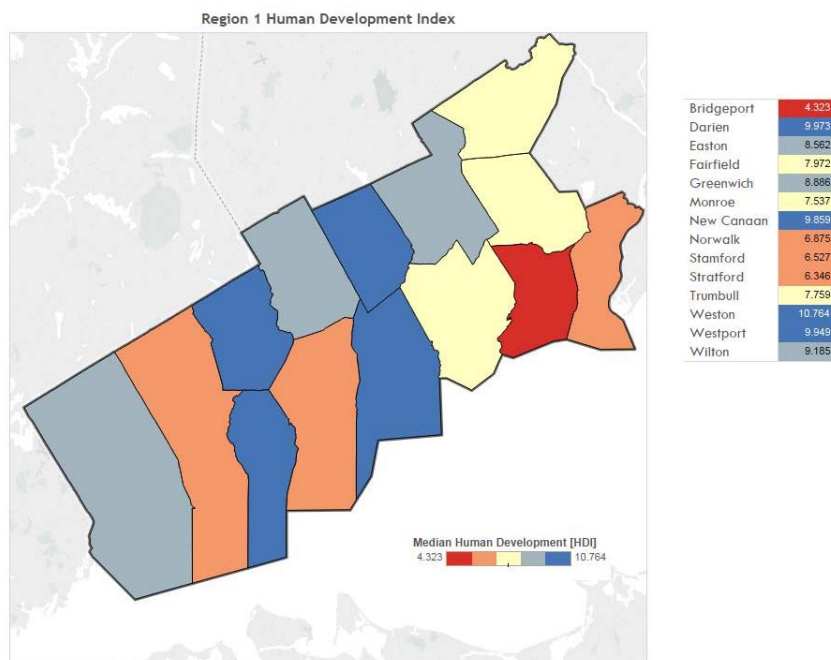[14] Bridgeport, Family Centers Federally Qualified Health Center, Greenwich, Norwalk, Optimus Health Care, St. Vincents

Region 1 Public Health HVA Top 20

	Risk Occurrence			Risk Response	
1	High Winds	44%	1	Hurricane	42%
2	Hurricane	42%	2	High Winds	39%
3	Severe Thunderstorm	41%	3	Nuclear Det. Improvised Dev	37%
4	Temperature Extreme (Cold)	39%	4	Radiological Attack – Disp.	36%
5	Temperature Extreme (Hot)	38%	5	Ice Storm	36%
6	Ice Storm	32%	6	Severe Thunderstorm	36%
7	Proximity to major trans. routes and airports	32%	7	Flood (External)	35%
8	Cyber Attack	31%	8	Radiological Incident (Ext)	34%
9	Drought	31%	9	Nat. Dis – Major Earthquake	33%
10	Severe Blizzard/Snow Fall	31%	10	Biological Attack – Plague	32%
11	Proximity to bus terminals	30%	11	Proximity to nuc. power plants	32%
12	Flood (External)	30%	12	Proximity to trans. rts & airport	32%
13	Natural Disaster – Major Hurricane	29%	13	Proximity to train stations	32%
14	Proximity to train stations	27%	14	Insect Infestation	32%
15	Proximity to nuclear power plants	26%	15	Severe Blizzard/Snow Fall	32%
16	Proximity to companies that produce, store, use, or transport hazardous materials	25%	16	Temperature Extreme (Hot)	31%
17	Proximity to Bridges	25%	17	Temperature Extreme (Cold)	31%
18	Proximity to flood plains, faults, and dams	25%	18	Sewer Failure	30%
19	Evacuation	23%	19	Nat Dis. – Major Hurricane	30%
20	Proximity to Festivals	23%	20	Proximity to bus terminals	30%

HDI[15]

Areas of (comparative) social vulnerability in Region 1 include Bridgeport, Norwalk, Stamford and Stratford.

Region 1 Human Development Index

Bridgeport	4.323
Darien	9.973
Easton	8.562
Fairfield	7.972
Greenwich	8.886
Monroe	7.537
New Canaan	9.859
Norwalk	6.875
Stamford	6.527
Stratford	6.346
Trumbull	7.759
Weston	10.764
Westport	9.949
Wilton	9.185

Median Human Development [HDI]
4.323 — 10.764

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[15] YNHHS CEPDR used the town-specific HDI data to generate region-specific HDI maps in Tableau. Please note the HDI data remained the same, the low (red) to high (blue) designation have been *re-calculated for each region*.

B. Region 2

Region 2 HVA Top 20

	Risk Occurrence			Risk Response	
1	Temperature Extreme (Hot)	54%	1	Biological Disease Outbreak – Pandemic flu	53%
2	Cyber Attack	51%	2	Biological Attack – Food Contamination	52%
3	Proximity to Parks	49%	3	Biological Attack – Plague	51%
4	Temperature Extreme (Cold)	48%	4	Natural Disaster – Major Earthquake	48%
5	Drought	47%	5	Chemical Attack – Toxic Industrial Chemicals	45%
6	Severe Thunderstorm	42%	6	Nuclear Detonation – Improvised Device	45%
7	High Winds	41%	7	Cyber Attack	44%
8	Severe Blizzard/Snow Fall	40%	8	Drought	43%
9	Proximity to bus terminals	38%	9	Biological Attack – Foreign Animal Disease	43%
10	Proximity to train stations	37%	10	Proximity to bus terminals	43%
11	Ice Storm	37%	11	Temperature Extreme (Hot)	43%
12	Biological Disease Outbreak – Pand flu	37%	12	Biological Attack – Aerosol Anthrax	42%
13	Hurricane	37%	13	Radiological Attack – Radiological Dispersal	42%
14	Proximity to local schools/universities	35%	14	Natural Disaster – Major Hurricane	42%
15	Natural Disaster – Major Hurricane	35%	15	Explosives Attack – Improvised Explosive	41%
16	Explosives Attack – IE	34%	16	Chemical Attack – Nerve Agent	41%
17	Proximity to major trans routes/airports	34%	17	Epidemic/Pandemic	40%
18	Proximity to Bridges	33%	18	Chemical Attack – Blister Agent	40%
19	Proximity to Civic/Sports Events	33%	19	Proximity to nuclear power plants	40%
20	Flood (External)	32%	20	Temperature Extreme (Cold)	39%

Region 2 Hospital[16] HVA Top 20

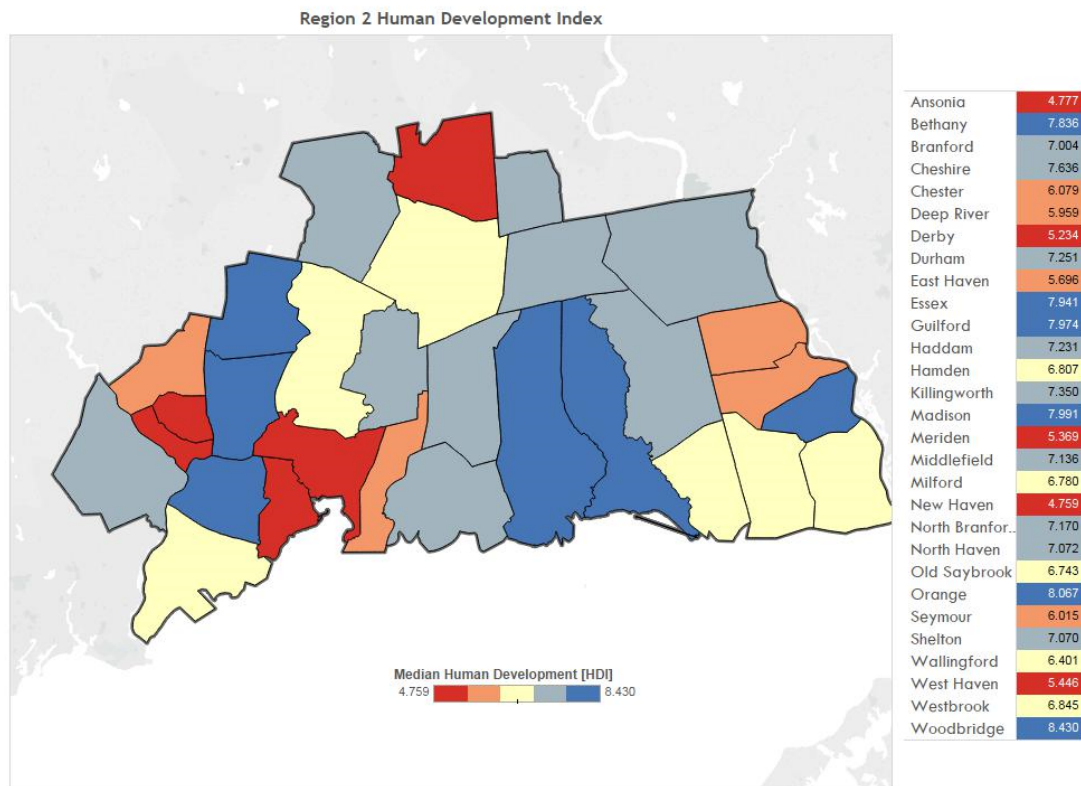|	Risk Occurrence			Risk Response	
1	Proximity to local schools and universities	35%	1	Flood (External)	32%
2	Proximity to train stations	35%	2	Active Shooter	31%
3	Proximity to major trans. routes & airports	35%	3	Natural Disaster – Major Earthquake	30%
4	Proximity to Parks	35%	4	Biological Disease Outbreak – Pandemic flu	29%
5	High Winds	33%	5	Epidemic/Pandemic	28%
6	Proximity to Bridges	33%	6	Biological Attack – Food Contamination	28%
7	Natural Disaster – Major Hurricane	33%	7	Nuclear Detonation – Improvised Device	28%
8	Temperature Extreme (Hot)	32%	8	Natural Disaster – Major Hurricane	27%
9	Proximity to Civic/Sports Events	32%	9	High Winds	26%
10	Hurricane	31%	10	Cyber Attack	26%
11	Severe Blizzard/Snow Fall	29%	11	Explosives Attack – Improvised Explosive	25%
12	Biological Disease Outbreak – Pandemic flu	29%	12	Natural Gas Leak	24%
13	Proximity to bus terminals	29%	13	Workplace Violence	24%
14	Flood (External)	29%	14	Bomb Threat	24%
15	Temperature Extreme (Cold)	29%	15	Biological Attack – Foreign Animal Disease	24%
16	Proximity to Festivals	29%	16	Radiological Attack – Radiological Dispersal	24%
17	Proximity to Federal buildings	29%	17	Biological Attack – Plague	24%
18	Epidemic/Pandemic	28%	18	Loss of Bulk Oxygen	23%
19	Cyber Attack	28%	19	Violence in the ED	23%
20	Workplace Violence	27%	20	Biological Attack – Aerosol Anthrax	22%

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[16] Griffin, Milford, Yale-New Haven, Midstate and Fairhaven. Excluding Fairhaven from this HVA did not have an appreciable difference on the outcome. Gaylord Hospital is not included in this dataset.

Region 2 Local Public Health HVA Top 20

	Risk Occurrence			Risk Response	
1	Temp. Extreme (Hot)	53%	1	Biological Attack – Plague	57%
2	Cyber Attack	51%	2	Biological Attack – Food Contamination	55%
3	Drought	51%	3	Biological Disease Outbreak – Pandemic flu	54%
4	Temp. Extreme (Cold)	48%	4	Proximity to bus terminals	52%
5	Proximity to Parks	46%	5	Chemical Attack – Toxic Industrial Chemicals	52%
6	Severe Thunderstorm	44%	6	Temperature Extreme (Hot)	50%
7	Severe Blizzard/Snow Fall	40%	7	Drought	49%
8	High Winds	40%	8	Natural Disaster – Major Earthquake	47%
9	Ice Storm	39%	9	Nuclear Detonation – Improvised Device	46%
10	Hurricane	36%	10	Temperature Extreme (Cold)	46%
11	Evacuation	36%	11	Proximity to train stations	46%
12	Explosives Attack – Improvised Explosive	35%	12	Biological Attack – Foreign Animal Disease	45%
13	Proximity to bus terminals	34%	13	Chemical Attack – Nerve Agent	45%
14	Biological Disease Otbrk – Pan. flu	34%	14	Biological Attack – Aerosol Anthrax	44%
15	Insect Infestation	33%	15	Proximity to nuclear power plants	43%
16	Proximity to local schools/univ.	33%	16	Natural Disaster – Major Hurricane	43%
17	Proximity to train stations	33%	17	Chemical Attack – Blister Agent	43%
18	Electrical Failure / Power Outage	32%	18	Radiological Attack – Radiological Dispersal	43%
19	Natural Disaster – Major Hurricane	32%	19	Proximity to Parks	43%
20	Prox.to major trans. rts and airports	32%	20	Evacuation	43%

HDI

In Region 2, pockets of social vulnerability are present in Ansonia, Chester, Deep River, East Haven, Meriden, New Haven, Seymour and West Haven.

Region 2 Human Development Index

C. Region 3

Region 3 HVA Top 20

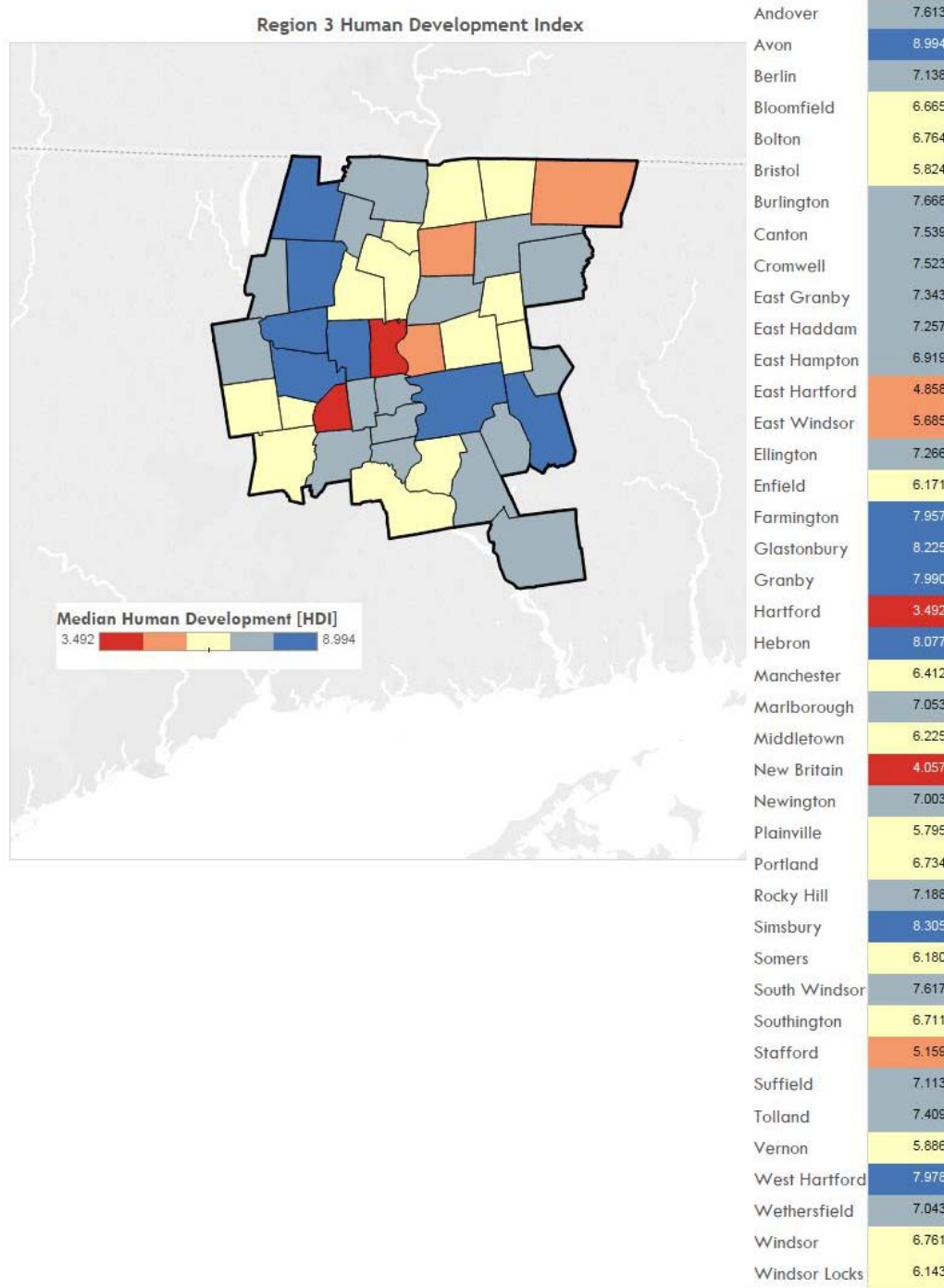|	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	37%	1	Natural Disaster – Major Hurricane	32%
2	Severe Thunderstorm	37%	2	Severe Blizzard/Snow Fall	30%
3	Hurricane	33%	3	Biological Disease Outbreak – Pan flu	30%
4	Cyber Attack	33%	4	Hurricane	29%
5	Hail	32%	5	Nuclear Detonation – Improvised Device	28%
6	Ice Storm	30%	6	Evacuation	27%
7	Natural Disaster – Major Hurricane	28%	7	Radiological Attack – Radiological Disp.	27%
8	High Winds	27%	8	Natural Disaster – Major Earthquake	26%
9	Electrical Failure / Power Outage	27%	9	Tornado	26%
10	Temperature Extreme (Cold)	25%	10	Epidemic/Pandemic	26%
11	Temperature Extreme (Hot)	25%	11	Violence in the ED	25%
12	Violence in the ED	25%	12	Severe Thunderstorm	25%
13	IT Network Failure	24%	13	Biological Attack – Foreign Animal Disease	25%
14	Drought	23%	14	Ice Storm	24%
15	Mass Casualty (Trauma)	23%	15	Chemical Attack – Toxic Indl Chemicals	24%
16	Proximity to Bridges	22%	16	Biological Attack – Plague	24%
17	Proximity to Parks	22%	17	Earthquake	24%
18	Proximity to flood plains, faults, and dams	22%	18	Chemical Attack – Nerve Agent	24%
19	Communications Failure	22%	19	Biological Attack – Aerosol Anthrax	23%
20	Information Systems Failure	22%	20	Mass Casualty (Trauma)	23%

Region 3 Hospitals HVA

	Risk Occurrence			Risk Response	
1	Ice Storm	30%	1	Ice Storm	28%
2	Cyber Attack	29%	2	Natural Disaster – Major Hurricane	28%
3	Hurricane	27%	3	Cyber Attack	28%
4	Natural Disaster – Major Hurricane	26%	4	Hurricane	28%
5	Severe Blizzard/Snow Fall	26%	5	Biological Disease Outbreak – Pan flu	27%
6	Violence in the ED	25%	6	Nuclear Detonation – Improvised Device	25%
7	IT Network Failure	24%	7	Severe Blizzard/Snow Fall	24%
8	Severe Thunderstorm	23%	8	Violence in the ED	24%
9	Mass Casualty (Trauma)	22%	9	Biological Attack – Foreign Animal Disease	22%
10	Temperature Extreme (Cold)	22%	10	Natural Disaster – Major Earthquake	22%
11	High Winds	22%	11	Fire (Internal)	21%
12	Temperature Extreme (Hot)	22%	12	Severe Thunderstorm	21%
13	Communications Failure	22%	13	Communications Failure	21%
14	Electrical Failure / Power Outage	21%	14	Information Systems Failure	21%
15	Information Systems Failure	21%	15	High Winds	20%
16	VIP Situation	20%	16	Evacuation	19%
17	Fire (Internal)	20%	17	Tornado	19%
18	Active Shooter	19%	18	Broken Water Main (Internal)	19%
19	Broken Water Main (Internal)	18%	19	Temperature Extreme (Cold)	19%
20	Elevator Failure	18%	20	Temperature Extreme (Hot)	19%

Region 3 Public Health HVA

	Risk Occurrence			Risk Response	
1	Communications Failure	37%	1	Mass Casualty (Trauma)	46%
2	Information Systems Failure	37%	2	Staffing Shortage	40%
3	Cyber Attack	35%	3	Communications Failure	37%
4	Hurricane	34%	4	Information Systems Failure	37%
5	Severe Blizzard/Snow Fall	32%	5	Natural Disaster – Major Hurricane	33%
6	High Winds	30%	6	Radiological Attack – Radiological Dispersal	32%
7	Electrical Failure / Power Outage	30%	7	Epidemic/Pandemic	32%
8	Ice Storm	29%	8	Evacuation	31%
9	Severe Thunderstorm	28%	9	Biological Disease Outbreak – Pandemic flu	31%
10	Drought	27%	10	Earthquake	30%
11	Staffing Shortage	27%	11	Natural Disaster – Major Earthquake	29%
12	Natural Disaster – Major Hurricane	26%	12	Radiological Incident (External)	28%
13	Temperature Extreme (Cold)	26%	13	Nuclear Detonation – Improvised Device	28%
14	Temperature Extreme (Hot)	26%	14	Hurricane	28%
15	Proximity to Bridges	25%	15	Tornado	28%
16	IT Network Failure	25%	16	Dam Inundation	27%
17	Proximity to flood plains, faults, and dams	24%	17	Biological Attack – Plague	26%
18	Proximity to Parks	24%	18	Biological Attack – Aerosol Anthrax	26%
19	Proximity to major trans. routes and airports	23%	19	Chemical Attack – Toxic Industrial Chemicals	26%
20	Proximity to Festivals	22%	20	Chemical Attack – Chlorine Tank Explosion	26%

HDI

In Region 3, the towns of East Hartford, East Windsor, Hartford, New Britain and Stafford have the lowest HDI scores.

Region 3 Human Development Index

Median Human Development [HDI]
3.492 — 8.994

Town	HDI
Andover	7.613
Avon	8.994
Berlin	7.138
Bloomfield	6.665
Bolton	6.764
Bristol	5.824
Burlington	7.668
Canton	7.539
Cromwell	7.523
East Granby	7.343
East Haddam	7.257
East Hampton	6.919
East Hartford	4.858
East Windsor	5.685
Ellington	7.266
Enfield	6.171
Farmington	7.957
Glastonbury	8.225
Granby	7.990
Hartford	3.492
Hebron	8.077
Manchester	6.412
Marlborough	7.053
Middletown	6.225
New Britain	4.057
Newington	7.003
Plainville	5.795
Portland	6.734
Rocky Hill	7.188
Simsbury	8.305
Somers	6.180
South Windsor	7.617
Southington	6.711
Stafford	5.159
Suffield	7.113
Tolland	7.409
Vernon	5.886
West Hartford	7.978
Wethersfield	7.043
Windsor	6.761
Windsor Locks	6.143

D. Region 4

Region 4 HVA Top 20

	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	40%	1	Generator Failure	38%
2	Ice Storm	34%	2	Ice Storm	35%
3	Hurricane	33%	3	Biological Disease Outbreak – Pan. flu	34%
4	Severe Thunderstorm	33%	4	Severe Blizzard/Snow Fall	34%
5	Electrical Failure/Power Outage	31%	5	Hurricane	33%
6	High Winds	30%	6	Natural Disaster – Major Hurricane	33%
7	HVAC Failure	30%	7	Workplace Violence	31%
8	Workplace Violence	29%	8	Epidemic/Pandemic	30%
9	Temperature Extreme (Cold)	28%	9	Biological Attack – Food Contamination	29%
10	Cyber Attack	27%	10	Biological Attack – Plague	29%
11	Temperature Extreme (Hot)	27%	11	Natural Disaster – Major Earthquake	28%
12	Violence in the ED	26%	12	HVAC Failure	28%
13	Generator Failure	25%	13	Fire (Internal)	28%
14	Proximity to local schools/ univ.	25%	14	Nuclear Detonation – Improvised Device	26%
15	Proximity to flood plains, faults, dams	25%	15	Violence in the ED	26%
16	Flood (External)	24%	16	Sewer Failure	26%
17	Natural Disaster – Major Hurricane	23%	17	Mass Casualty (Trauma)	26%
18	IT Network Failure	23%	18	IT Network Failure	26%
19	Sewer Failure	23%	19	Radiological Attack – Radiological Dispersal	25%
20	Information Systems Failure	23%	20	Flood (External)	25%

Region 4 Hospital[17] HVA Top 20

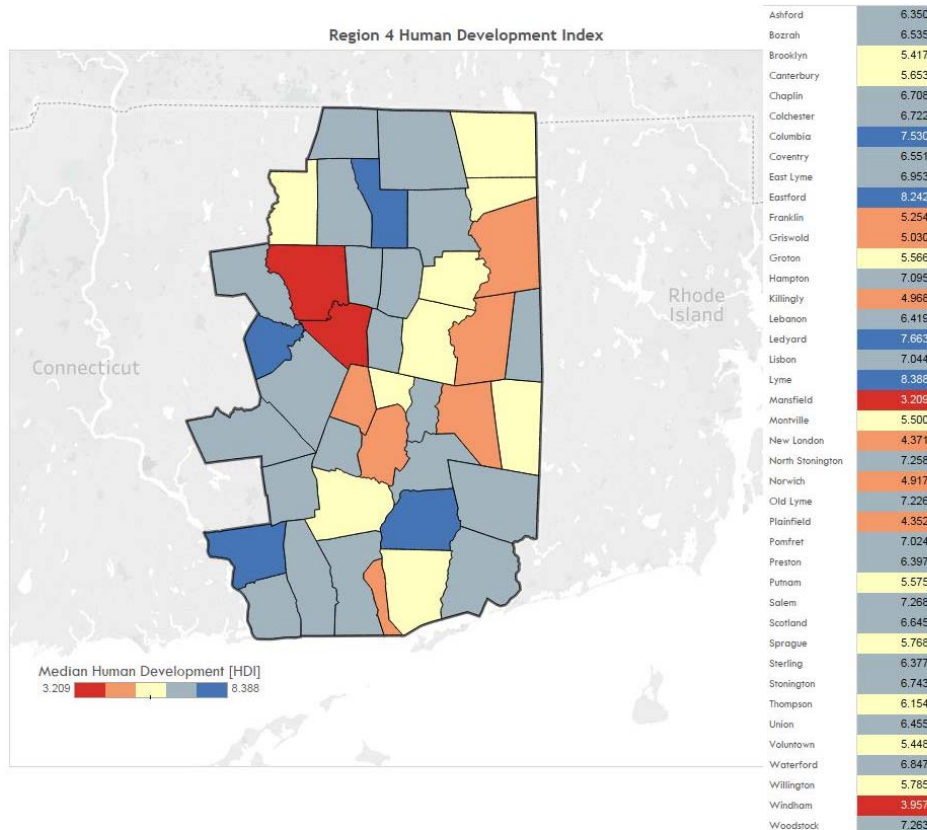|	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	37%	1	Generator Failure	38%
2	Hurricane	36%	2	Severe Blizzard/Snow Fall	35%
3	Ice Storm	33%	3	Ice Storm	35%
4	HVAC Failure	30%	4	Hurricane	33%
5	Workplace Violence	29%	5	Workplace Violence	31%
6	Electrical Failure / Power Outage	29%	6	Biological Disease Outbreak – Pan. flu	30%
7	Severe Thunderstorm	26%	7	Electrical Failure / Power Outage	28%
8	Violence in the ED	26%	8	HVAC Failure	28%
9	Generator Failure	25%	9	Fire (Internal)	28%
10	Proximity to flood plains, faults, dams	24%	10	Violence in the ED	26%
11	High Winds	23%	11	Mass Casualty (Trauma)	26%
12	IT Network Failure	23%	12	IT Network Failure	26%
13	Information Systems Failure	23%	13	Information Systems Failure	25%
14	Natural Disaster – Major Hurricane	22%	14	Natural Disaster – Major Hurricane	25%
15	Active Shooter	22%	15	Temperature Extreme (Cold)	25%
16	Proximity to local schools and univ.	21%	16	Sewer Failure	24%
17	Biological Disease Outbreak – Pandemic flu	21%	17	HAZMAT Spill (Internal)	23%
18	Decontamination	21%	18	Fuel Shortage	23%
19	Fire (Internal)	20%	19	Epidemic/Pandemic	23%
20	Cyber Attack	20%	20	Earthquake	22%

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[17] Backus, UCFS Healthcare, Windham, Day Kimball, Natchaug

Region 4 Local Public Health HVA Top 20

	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	44%	1	Natural Disaster – Major Hurricane	45%
2	Severe Thunderstorm	40%	2	Biological Attack – Plague	39%
3	Temperature Extreme (Cold)	39%	3	Biological Disease Outbreak – Pandemic flu	39%
4	High Winds	39%	4	Natural Disaster – Major Earthquake	37%
5	Flood (External)	37%	5	Radiological Incident (External)	36%
6	Temperature Extreme (Hot)	37%	6	Epidemic/Pandemic	36%
7	Cyber Attack	37%	7	Ice Storm	35%
8	Ice Storm	35%	8	Biological Attack – Food Contamination	34%
9	Electrical Failure / Power Outage	35%	9	Flood (External)	34%
10	Dam Inundation	30%	10	Severe Blizzard/Snow Fall	33%
11	Drought	28%	11	Hurricane	33%
12	Hurricane	28%	12	Biological Attack – Aerosol Anthrax	32%
13	Sewer Failure	28%	13	Nuclear Detonation – Improvised Device	32%
14	Proximity to local schools and universities	27%	14	Chemical Attack – Toxic Industrial Chemicals	30%
15	Chemical Attack – Toxic Industrial Chemicals	26%	15	Dam Inundation	30%
16	Proximity to flood plains, faults, and dams	25%	16	Radiological Attack – Radiological Dispersal	28%
17	Natural Disaster – Major Hurricane	25%	17	Tornado	28%
18	Proximity to nuclear power plants	25%	18	Sewer Failure	28%
19	Proximity to Bridges	24%	19	Biological Attack – Foreign Animal Disease	27%
20	Proximity to Parks	23%	20	Chemical Attack – Blister Agent	27%

HDI

Pockets of vulnerability in Region 4 include Franklin, Griswold, Killingly, Mansfield, New London, Norwich, Plainfield and Windham.

Region 4 Human Development Index

Ashford	6.350
Bozrah	6.535
Brooklyn	5.417
Canterbury	5.653
Chaplin	6.708
Colchester	6.722
Columbia	7.530
Coventry	6.551
East Lyme	6.953
Eastford	8.242
Franklin	5.254
Griswold	5.030
Groton	5.566
Hampton	7.095
Killingly	4.968
Lebanon	6.419
Ledyard	7.663
Lisbon	7.044
Lyme	8.388
Mansfield	3.209
Montville	5.500
New London	4.371
North Stonington	7.258
Norwich	4.917
Old Lyme	7.226
Plainfield	4.352
Pomfret	7.024
Preston	6.397
Putnam	5.575
Salem	7.268
Scotland	6.645
Sprague	5.768
Sterling	6.377
Stonington	6.743
Thompson	6.154
Union	6.455
Voluntown	5.448
Waterford	6.847
Willington	5.785
Windham	3.957
Woodstock	7.263

Median Human Development [HDI]
3.209 — 8.388

E. Region 5

Region 5 HVA Top 20

	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	45%	1	Hurricane	42%
2	Severe Thunderstorm	43%	2	Natural Disaster – Major Hurricane	41%
3	Ice Storm	41%	3	Biological Attack – Food Contamination	40%
4	Temperature Extreme (Cold)	37%	4	Dam Inundation	39%
5	Temperature Extreme (Hot)	37%	5	Severe Blizzard/Snow Fall	39%
6	Hurricane	36%	6	Ice Storm	39%
7	High Winds	35%	7	Biological Attack – Aerosol Anthrax	38%
8	Cyber Attack	34%	8	Flood (External)	35%
9	Natural Disaster – Major Hurricane	34%	9	Natural Disaster – Major Earthquake	35%
10	Electrical Failure / Power Outage	34%	10	Biological Attack – Plague	35%
11	Flood (External)	32%	11	Biological Disease Outbreak – Pandemic flu	35%
12	Information Systems Failure	29%	12	Severe Thunderstorm	34%
13	Violence in the ED	29%	13	Electrical Failure / Power Outage	33%
14	Drought	28%	14	Cyber Attack	32%
15	HVAC Failure	27%	15	Epidemic/Pandemic	32%
16	IT Network Failure	26%	16	Radiological Attack – Radiological Dispersal	32%
17	Flood (Internal)	26%	17	Mass Casualty (Trauma)	31%
18	Proximity to local schools and universities	25%	18	Chemical Attack – Toxic Industrial Chemicals	31%
19	Tornado	25%	19	Potable Water Failure	31%
20	Broken Water Main (External)	24%	20	Radiological Incident (External)	31%

Region 5 Hospital[18] HVA Top 20

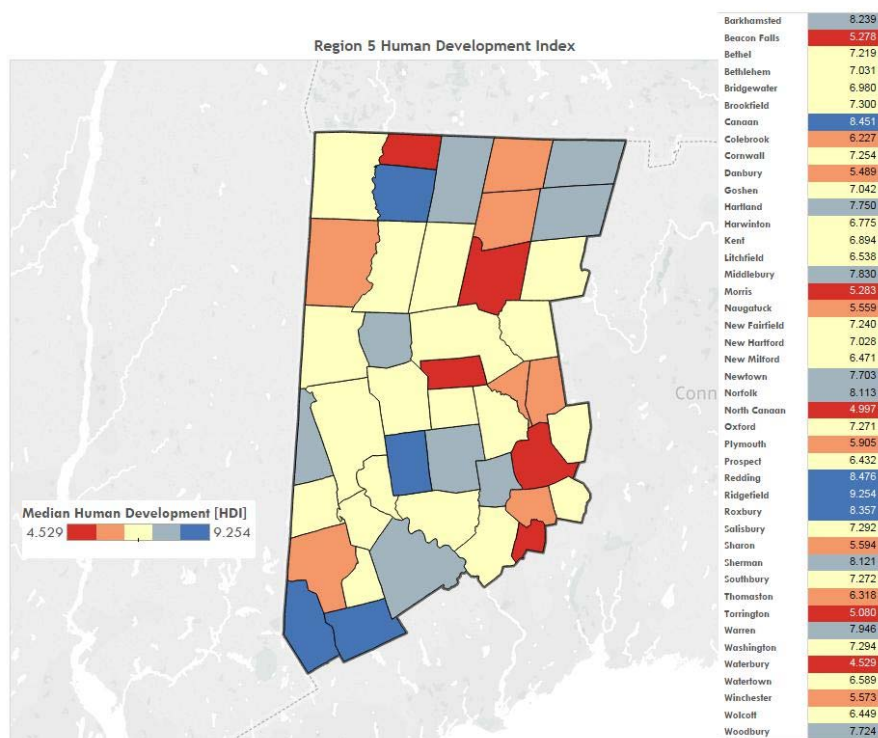|	Risk Occurrence			Risk Response	
1	Temperature Extreme (Cold)	30%	1	Biological Attack – Plague	31%
2	Temperature Extreme (Hot)	30%	2	Hurricane	31%
3	Cyber Attack	30%	3	Temperature Extreme (Hot)	30%
4	Severe Blizzard/Snow Fall	29%	4	Mass Casualty (Trauma)	30%
5	Information Systems Failure	29%	5	Biological Attack – Aerosol Anthrax	30%
6	Flood (External)	28%	6	Nuclear Detonation – Improvised Dev	29%
7	HVAC Failure	27%	7	Potable Water Failure	29%
8	Decontamination	27%	8	Severe Blizzard/Snow Fall	29%
9	Ice Storm	26%	9	Cyber Attack	29%
10	Mass Casualty (Trauma)	26%	10	Flood (Internal)	29%
11	Severe Thunderstorm	26%	11	Broken Water Main (External)	29%
12	Hurricane	25%	12	Decontamination	28%
13	Violence in the ED	24%	13	Tornado	28%
14	IT Network Failure	24%	14	Natural Disaster – Major Earthquake	28%
15	Biological Disease Outbreak – Pandemic flu	24%	15	Temperature Extreme (Cold)	27%
16	High Winds	23%	16	Information Systems Failure	27%
17	Potable Water Failure	23%	17	IT Network Failure	27%
18	Flood (Internal)	23%	18	Biological Attack – Food Contamination	27%
19	Workplace Violence	23%	19	Ice Storm	26%
20	Broken Water Main (External)	23%	20	Biological Disease Outbreak – Pandemic flu	26%

[18] Danbury, Saint Mary's, Sharon, Charlotte, Waterbury Hospital

Region 5 Local Public Health HVA Top 20

	Risk Occurrence			Risk Response	
1	Severe Blizzard/Snow Fall	46%	1	Natural Disaster – Major Hurricane	45%
2	Severe Thunderstorm	44%	2	Dam Inundation	43%
3	High Winds	41%	3	Biological At. – Food Contamination	42%
4	Ice Storm	41%	4	Hurricane	42%
5	Temperature Extreme (Cold)	40%	5	Ice Storm	40%
6	Natural Disaster – Major Hurricane	39%	6	Flood (External)	38%
7	Temperature Extreme (Hot)	38%	7	Severe Blizzard/Snow Fall	38%
8	Hurricane	38%	8	Biological Attack – Aerosol Anthrax	38%
9	Electrical Failure / Power Outage	37%	9	Natural Disaster – Major Earthquake	37%
10	Cyber Attack	36%	10	Electrical Failure / Power Outage	37%
11	Drought	34%	11	Biological Disease Outbreak – Pan flu	36%
12	Flood (External)	30%	12	Epidemic/Pandemic	35%
13	Tornado	29%	13	Radiological Incident (External)	35%
14	Proximity to local schools and universities	27%	14	Severe Thunderstorm	34%
15	Insect Infestation	26%	15	High Winds	34%
16	Sewer Failure	26%	16	Radiological Attack – Radiological Dispersal	33%
17	Proximity to flood plains, faults, and dams	26%	17	Biological Attack – Plague	33%
18	Epidemic/Pandemic	25%	18	Cyber Attack	32%
19	Dam Inundation	25%	19	Chemical Attack – Toxic Industrial Chemicals	32%
20	Proximity to train stations	24%	20	Sewer Failure	31%

HDI

Beacon Falls, Colebrook, Danbury, Morris, Naugatuck, North Caanan, Plymouth, Sharon, Thomaston, Torrington, Waterbury and Winchester are potential areas of concern for Region 5.

	HDI
Barkhamsted	8.239
Beacon Falls	5.278
Bethel	7.219
Bethlehem	7.031
Bridgewater	6.980
Brookfield	7.300
Canaan	8.451
Colebrook	6.227
Cornwall	7.254
Danbury	5.489
Goshen	7.042
Hartland	7.750
Harwinton	6.775
Kent	6.894
Litchfield	6.538
Middlebury	7.830
Morris	5.283
Naugatuck	5.559
New Fairfield	7.240
New Hartford	7.028
New Milford	6.471
Newtown	7.703
Norfolk	8.113
North Canaan	4.997
Oxford	7.271
Plymouth	5.905
Prospect	6.432
Redding	8.476
Ridgefield	9.254
Roxbury	8.357
Salisbury	7.292
Sharon	5.594
Sherman	8.121
Southbury	7.272
Thomaston	6.318
Torrington	5.080
Warren	7.946
Washington	7.294
Waterbury	4.529
Watertown	6.589
Winchester	5.573
Wolcott	6.449
Woodbury	7.724

Region 5 Human Development Index

Median Human Development [HDI]
4.529 — 9.254

VIII. Connecticut Statewide HVA

The analyst produced the Statewide HVA table (below) by calculating the average of each Region's average response[19] to the HVA Tool questions. Cyber Attack emerged as the top risk for occurrence in Connecticut. Otherwise, hospital and public health emergency planners consider naturally occurring weather events to be the most likely disaster scenarios.

	Risk Occurrence			Risk Response	
1	Cyber Attack	51%	1	Biological Disease Outbreak – Pandemic flu	54%
2	Temperature Extreme (Hot)	49%	2	Biological Attack – Plague	52%
3	Temperature Extreme (Cold)	47%	3	Natural Disaster – Major Earthquake	48%
4	High Winds	42%	4	Nuclear Detonation – Improvised Device	48%
5	Severe Thunderstorm	42%	5	Radiological Attack – Radiological Dispersal	46%
6	Severe Blizzard/Snow Fall	42%	6	Natural Disaster – Major Hurricane	42%
7	Hurricane	40%	7	Epidemic/Pandemic	41%
8	Ice Storm	39%	8	Biological Attack – Foreign Animal Disease	40%
9	Drought	39%	9	Hurricane	40%
10	Natural Disaster – Major Hurricane	35%	10	Biological Attack – Food Contamination	40%
11	Electrical Failure / Power Outage	35%	11	Cyber Attack	39%
12	Proximity to Civic/Sports Events	35%	12	Explosives Attack – Improvised Explosive	39%
13	Proximity to bus terminals	35%	13	Chemical Attack – Nerve Agent	38%
14	Biological Disease Outbreak – Pandemic flu	34%	14	Chemical Attack – Blister Agent	38%
15	Hail	32%	15	Chemical Attack – Toxic Industrial Chemicals	38%
16	Proximity to local schools and universities	31%	16	Biological Attack – Aerosol Anthrax	37%
17	Proximity to major trans. routes and airports	30%	17	Temperature Extreme (Hot)	37%
18	Flood (External)	30%	18	Chemical Attack – Chlorine Tank Explosion	37%
19	Proximity to Bridges	30%	19	Temperature Extreme (Cold)	36%
20	Explosives Attack – Improvised Explosive	30%	20	Severe Blizzard/Snow Fall	36%

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[19] The five regional HVAs used the average of the individual agency HVAs. The statewide HVA used the average of the five regional HVAs.

Appendix A – Connecticut Hazard Vulnerability Analysis Tool

COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL

	PROBABILITY		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY			RISK Occurrence	RISK Response	Non Weighted
National Planning Scenarios	Occurrence	Response				Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	External (Region/State)		0 - 100%	0 - 100%	0 - 198
Biological Attack – Aerosol Anthrax												0%	0%	0
Biological Attack – Food Contamination												0%	0%	0
Biological Attack – Foreign Animal Disease												0%	0%	0
Biological Attack – Plague												0%	0%	0
Biological Disease Outbreak – Pandemic flu												0%	0%	0
Chemical Attack – Blister Agent												0%	0%	0
Chemical Attack – Chlorine Tank Explosion												0%	0%	0
Chemical Attack – Nerve Agent												0%	0%	0
Chemical Attack – Toxic Industrial Chemicals												0%	0%	0
Cyber Attack												0%	0%	0
Explosives Attack – Improvised Explosive												0%	0%	0
Natural Disaster – Major Earthquake												0%	0%	0
Natural Disaster – Major Hurricane												0%	0%	0
Nuclear Detonation – Improvised Device												0%	0%	0
Radiological Attack – Radiological Dispersal												0%	0%	0
Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!				
Naturally Occurring Events														
Dam Inundation												0%	0%	0
Drought												0%	0%	0
Earthquake												0%	0%	0
Epidemic/Pandemic												0%	0%	0
Flood (External)												0%	0%	0
High Winds												0%	0%	0
Hurricane												0%	0%	0
Ice Storm												0%	0%	0
Insect Infestation												0%	0%	0
Severe Blizzard/Snow Fall												0%	0%	0

COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL

	PROBABILITY		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY			RISK Occurrence	RISK Response	Non Weighted
						Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	Internal (Jurisdic-tional)	External (Region/State)		0 - 100%	0 - 100%	0 - 198
Severe Thunderstorm												0%	0%	0
Temperature Extreme (Cold)												0%	0%	0
Temperature Extreme (Hot)												0%	0%	0
Tornado												0%	0%	0
Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!				
Human Related Events														
Active Shooter												0%	0%	0
Bomb Threat												0%	0%	0
Civil Disturbance												0%	0%	0
Forensic Admission												0%	0%	0
Hostage Situation												0%	0%	0
Infant Abduction												0%	0%	0
Labor Action												0%	0%	0
Mass Casualty (Trauma)												0%	0%	0
Missing Adult												0%	0%	0
Missing Child												0%	0%	0
Staffing Shortage												0%	0%	0
Violence in the ED												0%	0%	0
VIP Situation												0%	0%	0
Workplace Violence												0%	0%	0
Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!				
Hazardous Materials Events														
Decontamination												0%	0%	0
HAZMAT Spill (Internal)												0%	0%	0
HAZMAT Spill (External)												0%	0%	0
Indoor Air Quality Issues												0%	0%	0
Large Internal Spill												0%	0%	0
Radiologic Exposure (Internal)												0%	0%	0
Radiological Incident (External)												0%	0%	0
Small-Medium Sized Internal Spill												0%	0%	0

COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL

	A	B	C	D	E	F	G	I	K	M	N	O	P	Q
		PROBABILITY		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY		RISK Occurrence	RISK Response	Non Weighted
2	DPH	Likelihood of future occurrence and facility response		Percentage of population likely to be injured or killed under an average occurrence of the hazard	Percentage of properties likely to be affected under an average occurrence of the hazard	Percentage of businesses likely to be affected under an average occurrence of the hazard	Internal (Jurisdictional)	Internal (Jurisdictional)	Internal (Jurisdictional)	Internal (Jurisdictional)	External (Regional/State)	Relative threat (increases with percentage)	Relative threat (increases with percentage)	Relative threat (increases with number)
3,4,5		0 - 100%										0 - 100%	0 - 100%	0 - 198
79	Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
80	**Technologic Events**													
81	Communications Failure											0%	0%	0
82	Infant Security Alarm Failure											0%	0%	0
83	Information Systems Failure											0%	0%	0
84	Magnetic Resonance Imaging (MRI) Incident											0%	0%	0
85	IT Network Failure											0%	0%	0
86	Pharmacy Medication Dispenser Failure											0%	0%	0
87	Security Card Access Failure											0%	0%	0
88	Security Video Surveillance											0%	0%	0
91	Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
92	**Utility Events**													
93	Broken Water Main (Internal)											0%	0%	0
94	Broken Water Main (External)											0%	0%	0
95	Compressed Gas Cylinder Leak/Failure											0%	0%	0
96	Electrical Failure / Power Outage											0%	0%	0
97	Elevator Failure											0%	0%	0
98	Fire (Internal)											0%	0%	0
99	Fire Detection/Alarm Failure											0%	0%	0
100	Fire Suppression Failure											0%	0%	0
101	Flood (Internal)											0%	0%	0
102	Fuel Shortage											0%	0%	0
103	Generator Failure											0%	0%	0
104	HVAC Failure											0%	0%	0
105	Loss of Bulk Oxygen											0%	0%	0
106	Medical Gas Failure											0%	0%	0
107	Medical Vacuum Failure											0%	0%	0
108	Natural Gas Failure											0%	0%	0
109	Natural Gas Leak											0%	0%	0
110	Oxygen Leak											0%	0%	0

COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL

	A	B	C	D	E	F	G	I	K	M	N	O	P	Q
		PROBABILITY		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY		RISK Occurrence	RISK Response	Non Weighted
111	Potable Water Failure											0%	0%	0
112	Process Water Failure											0%	0%	0
113	Sewer Failure											0%	0%	0
114	Steam Failure											0%	0%	0
115	Structural Damage											0%	0%	0
116	Tube System Failure											0%	0%	0
119	Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
120	**Geographic Events**													
121	Proximity to nuclear power plants											0%	0%	0
122	Proximity to Bridges											0%	0%	0
123	Proximity to bus terminals											0%	0%	0
124	Proximity to Civic/Sports Events											0%	0%	0
125	Proximity to companies that produce, store, use, or transport hazardous materials											0%	0%	0
126	Proximity to Federal buildings											0%	0%	0
127	Proximity to Festivals											0%	0%	0
128	Proximity to flood plains, faults, and dams											0%	0%	0
129	Proximity to local schools and universities											0%	0%	0
130	Proximity to major trans. routes and airports											0%	0%	0
131	Proximity to Parks											0%	0%	0
132	Proximity to train stations											0%	0%	0
135	Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
151	**Other Events**													
152	Airplane Crash											0%	0%	0
153	Evacuation											0%	0%	0
154	Helicopter Incident											0%	0%	0
156	Isolation Capacity											0%	0%	0
157	Loss of Key Supplier											0%	0%	0
158	Supply Shortage											0%	0%	0
164	Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
165	Overall Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			

	A	PROBABILITY		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY			RISK Occurrence	RISK Response	Non Weighted
							Internal (Jurisdictional)	Internal (Jurisdictional)	Internal (Jurisdictional)	Internal (Jurisdictional)	External (Regional/State)		Relative threat (increases with percentage)	Relative threat (increases with percentage)	Relative threat (increases with number)
2	**COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL**	Likelihood of future occurrence and facility response		Percentage of population likely to be injured or killed under an average occurrence of the hazard	Percentage of properties likely to be affected under an average occurrence of the hazard	Percentage of businesses likely to be affected under an average occurrence of the hazard							0 - 100%	0 - 100%	0 - 190

NOTE: The top 20 events automatically turn red in the last three columns.
NOTE: If you do not use an Event, clear out all of the data -- including the zero -- as it will impact the Average rating.

WARNING: Do NOT delete or add Rows in the spreadsheet. The formulas and pivot tables are sensitive! Changes may result in inaccurate calculations. To change an event, simply delete or replace the events in Column A.

DPH

Must refresh the screen in the Data Tab or Press the REFRESH Button to the right after making changes to the CHVA Tool.

Organization Name

	Risk Occurrence			Risk Response			Non Weighted Risk	
1	Overall Average:	0%	1	Overall Average:	0%	1	Overall Average:	0
2	VIP Situation	0%	2	VIP Situation	0%	2	VIP Situation	0
3	Radiological Attack – Radiological Dispersal	0%	3	Radiological Attack – Radiological Dispersal	0%	3	Radiological Attack – Radiological Dispersal	0
4	Active Shooter	0%	4	Active Shooter	0%	4	Active Shooter	0
5	Violence in the ED	0%	5	Infant Abduction	0%	5	Infant Abduction	0
6	Asbestos release during const. or renovation	0%	6	Asbestos release during const. or renovation	0%	6	Asbestos release during const. or renovation	0
7	Proximity to Federal buildings	0%	7	Proximity to Federal buildings	0%	7	Proximity to Federal buildings	0
8	Average:	0%	8	Average:	0%	8	Average:	0
9	Steam Failure	0%	9	Steam Failure	0%	9	Steam Failure	0
10	Biological Attack – Aerosol Anthrax	0%	10	Biological Attack – Aerosol Anthrax	0%	10	Biological Attack – Aerosol Anthrax	0
11	Utility Events	0%	11	Utility Events	0%	11	Utility Events	0
12	Biological Attack – Food Contamination	0%	12	Biological Attack – Food Contamination	0%	12	Biological Attack – Food Contamination	0
13	Hail	0%	13	Drought	0%	13	Drought	0
14	Biological Attack – Foreign Animal Disease	0%	14	Biological Attack – Foreign Animal Disease	0%	14	Biological Attack – Foreign Animal Disease	0
15	Proximity to Bridges	0%	15	Proximity to Bridges	0%	15	Proximity to Bridges	0
16	Biological Attack – Plague	0%	16	Biological Attack – Plague	0%	16	Biological Attack – Plague	0
17	Proximity to nuclear power plants	0%	17	Proximity to nuclear power plants	0%	17	Proximity to nuclear power plants	0
18	Biological Disease Outbreak – Pandemic flu	0%	18	Biological Disease Outbreak – Pandemic flu	0%	18	Biological Disease Outbreak – Pandemic flu	0
19	Severe Thunderstorm	0%	19	Severe Thunderstorm	0%	19	Severe Thunderstorm	0
20	Bomb Threat	0%	20	Bomb Threat	0%	20	Bomb Threat	0

NOTE: The top 20 events on the CHVA are listed with the top five in each risk category highlighted yellow.
NOTE: If an event is not listed in your top 20, but is highlighted red on the Data Entry tab, it means that the event has the same ratings as your number 20 event.
NOTE: You must enable MACROS in order for the refresh button to work.

1/26/2018

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