Region 9 Healthcare Hazard Vulnerability Assessment

February 2018

The mission of the Washington State Region 9 Healthcare Coalition is to prepare for, respond to, and recover from crisis using all available resources, providing patient care at the appropriate level and in the most efficient manner.

The Region 9 Healthcare Coalition (R9 HCC) strives to build emergency preparedness and response planning across the healthcare system to create resilient communities within the ten counties and three tribes of eastern Washington. The R9 HCC collaborates with healthcare partners on various projects and topics for regional healthcare system preparedness with the goal to provide quality patient care during medical surge events. The activities of the R9 HCC are funded under the United States Department of Health and Human Services through the Office of the Assistant Secretary for Preparedness & Response (ASPR) Healthcare Preparedness Program grant and administered through a cooperative agreement between the Washington State Department of Health (DOH) and the Spokane Regional Health District (SRHD).

ACKNOWLEDGEMENTS

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Special acknowledgment goes to R9 HCC and Eastern Washington Healthcare Response and Preparedness staff, members and partners for their participation, input, and feedback throughout the process.

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INTRODUCTION

Purpose

The Office of the Assistant Secretary for Preparedness & Response (ASPR) defines a hazard vulnerability assessment (HVA) as a systematic approach to identifying hazards or risks that are most likely to have an impact on the demand for healthcare services or the healthcare delivery system's ability to provide these services. A regional healthcare HVA is required in the 2017-2022 Healthcare Preparedness and Response Capabilities. [1]

This regional healthcare HVA is prepared for the Region 9 Healthcare Coalition to evaluate vulnerability to specific hazards and address anticipated and unanticipated risks. The assessment focuses on the input of healthcare partners as the primary stakeholder through an all hazards approach that includes naturally-occurring events, human-related events, hazardous materials events, and technologic and utility events. The analysis is based on the likelihood of the incident and the significance of the hazard. The assessment focuses on the input of healthcare partners as the core group to provide a regional healthcare outlook on hazards.

The outcome of this project is the Region 9 Healthcare Hazard Vulnerability Assessment that serves as a baseline for future organizational and jurisdictional HVAs in planning, training, mitigation, response, and recovery activities.

Scope

The R9 HCC consists of ten counties and three tribal areas. This HVA is based on a review of hazards across the region that have historically occurred or have the potential to occur. The assessment incorporates a review of existing county-based planning documents as well as internet research on regional hazards. The review takes an all hazards approach that consists of 39 hazards that span naturally-occurring events, human-related events, hazardous materials events, technologic events, and utility events. It is recognized that there are incidents that can occur elsewhere in the State that might impact the Region. This report is primarily focused on those hazards that could occur and will directly impact the counties and tribes within Region 9.

Planning Assumptions

- While there is likely significant overlap between the HVA for the R9 HCC and the HVA for an individual healthcare organization or jurisdiction, these are separate and distinct processes.[2]
- A specific vulnerability may not exist across all Coalition member organizations; however, Coalition members will generally face many of the same hazards.

[1] Office of the Assistant Secretary for Preparedness and Response (ASPR). 2017-2022 Health Care Preparedness and Response Capabilities. Capability 1: Foundation for Health Care and Medical Readiness, Objective 2: Identify Risk and Needs, Activity 1: Assess Hazard Vulnerabilities and Risks. November 2016. Accessed 25 Sept 2017. https://www.phe.gov/Preparedness/planning/hpp/reports/Documents/2017-2022-healthcare-pr-capablities.pdf

[2] U.S. Department of Health and Human Services. MSCC: The Healthcare Coalition in Emergency Response and Recovery. Chapter 5, Section 5.4: Hazards Vulnerability Analysis. May 2009. Accessed 21 December 2017. https://www.phe.gov/Preparedness/planning/mscc/healthcarecoalition/chapter5/Pages/hazards.aspx

- The regional HVA is not a replacement for an organization- or facility-specific HVA, nor for a comprehensive cross-disciplinary emergency support function regional threat/risk assessment and vulnerability analysis.
- The analysis is based upon responses received by participants, and is not a comprehensive assessment of all partners. Survey respondents, while invited to complete the surveys via email, were self-selected based on interest. The data provided by these participants is influenced by their own organizational experience and planning efforts.
- The assessment of hazards across the region are based on a combination of quantitative data (such as the occurrence of naturally-occurring events) and qualitative estimations (such as Low-Medium-High consequence scales).
- This assessment does not provide details regarding the unique attributes and risks for individual counties. Threats and vulnerabilities in this assessment may appear to be more homogenous throughout the region than they are at the local level.
- This HVA process incorporates state and local emergency management organization assessments and other public health hazard assessments, though the primary focus of this assessment is impact to healthcare.

Regional Healthcare Hazards

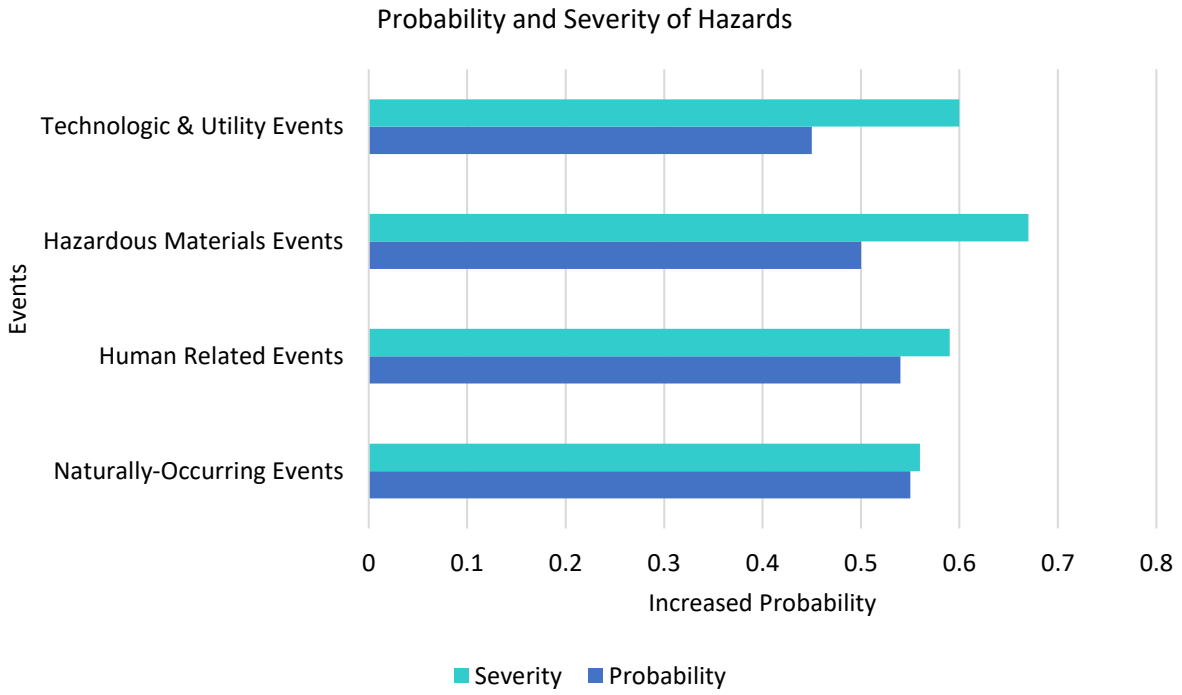
February 2018

Rank	Hazard	Response*	Occurrence	Impact
1	Mass Casualty (Trauma)	High	Low	High
2	Pandemic Influenza	Moderate	Low	High
3	Highly/Acute Infectious Disease Outbreak	Moderate	Low	High
4	Wildfire	High	High	Moderate
5	Severe Blizzard/Snow Fall	Moderate	High	High
6	Mass Electrical Failure	Moderate	Moderate	Moderate
7	Potable Water Failure	Moderate	Low	Moderate
8	High Winds	Moderate	High	Moderate
9	Chemical, Biological, Radiological, Nuclear, and Explosives Events (CBRNE)	Moderate	Low	Moderate
10	Water-/Foodborne Disease Outbreak	Moderate	Low	Moderate
11	Supply Shortage	Moderate	Moderate	Moderate
12	Ice Storm	Moderate	Low	Moderate
13	Active Shooter	Moderate	Moderate	Moderate
14	Seasonal Influenza	Low	High	Moderate
15	Cyber Attack	Low	Moderate	Moderate
16	Workplace Violence	Low	Moderate	Moderate
17	Network Failure	Low	Moderate	Moderate
18	Wastewater Treatment Failure	Low	Low	Moderate
19	Communications Failure	Low	Moderate	Moderate
20	Vaccine Preventable Disease Outbreak	Low	Low	Moderate

**The hazards are weighted by risk response to reflect the estimated priority for a regional response. The list was developed with input from R9 Healthcare Coalition members with an emphasis on healthcare and EMS partners. As such, It is not a comprehensive assessment of all members or disciplines, and does not provide details regarding the unique attributes and risks for individual counties or facilities. The regional hazard vulnerability assessment is not a replacement for an organization- or facility-specific HVA.*

HAZARDS REVIEW

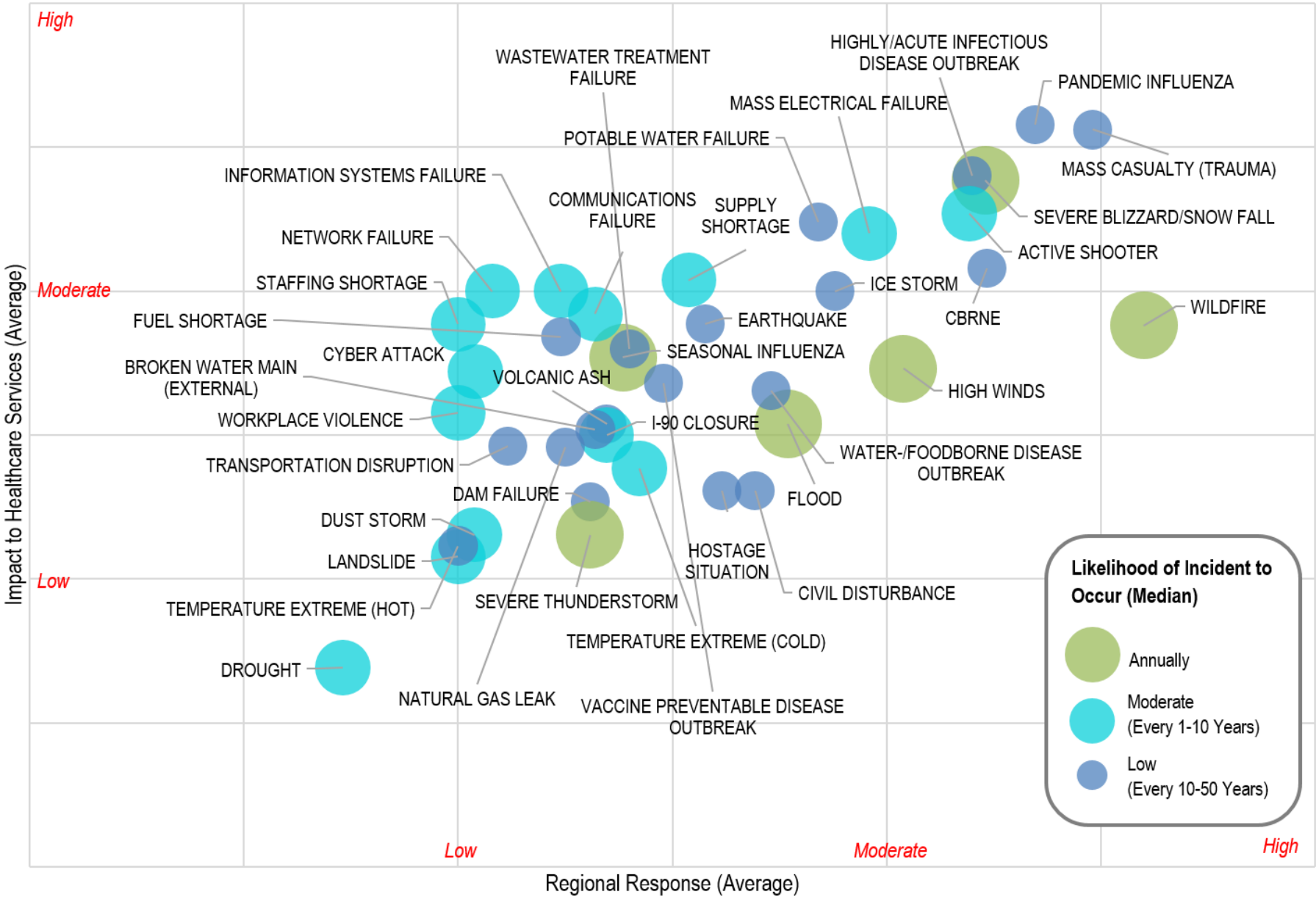
When looking at the hazards by event-type, hazardous materials events (chemical, biological, radiological, nuclear, explosives) were rated as a lower probability but the highest severity of impact. Naturally occurring events were rated as having the highest probability followed by human related events, though the severity of these events were rated lower.



Another way to look at the relationship between probability and impact is with a scatter diagram. The all hazards healthcare risk matrix is helpful in understanding how the events relate to each other based on the raw scores provided from the survey.

- Generally, as the probability of a regional response increases, the overall impact to healthcare services also goes up.
- Mass casualty, wildfire, and severe blizzard/snow fall are the only hazards to receive two or more 'high' ratings.
- Some high occurrence events, like severe thunderstorm, were rated as lower response and lower impact to healthcare.
- Other annual events like wildfire and severe blizzard/ snowstorm were rated as higher response and higher impact to healthcare.
- Low occurring events like mass casualty and pandemic influenza were rated as high response and impact.

Region 9 All Hazards Healthcare Risk Matrix

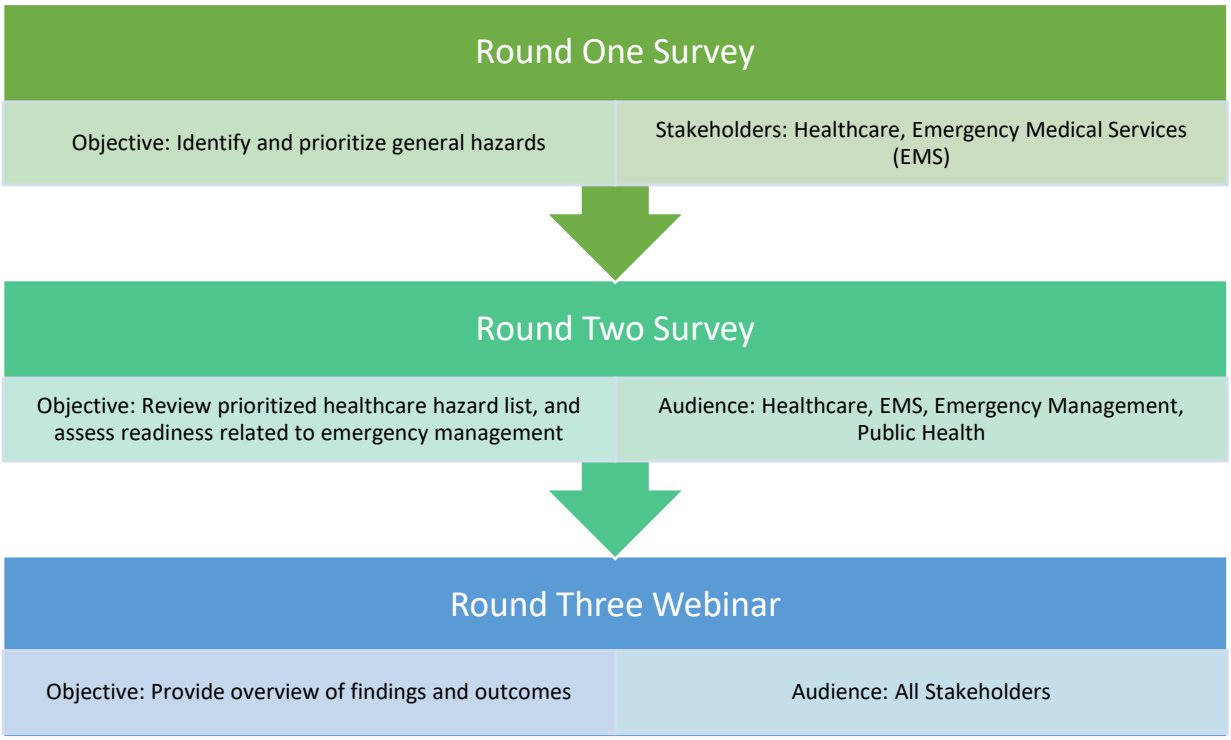


METHODOLOGY & RESULTS

The R9 HCC used the Arizona Coalition for Healthcare Emergency Response's Community Hazard Vulnerability Assessment (CHVA) tool to prioritize and weigh hazards.[3] The CHVA is based on the Kaiser Permanente HVA tool, but has been modified based upon the work of many partners including Children's Hospital Colorado and a Wisconsin workgroup consisting of state and local emergency management and public health departments, tribal health and hospital emergency planners. The CHVA includes a review of natural, technological, and human-caused hazards as they specifically relate to healthcare.

Process Overview

The project was divided into three phases, using email to gather information, provide feedback, and report conclusions. The first phase focused primarily on the healthcare and emergency medical services (EMS) professionals. The second phase expanded the audience to also include emergency management and public health to validate the findings from the first survey with cities/counties and local health jurisdictions.



[3] Arizona Coalition for Healthcare Emergency Response. Community-based Hazard Vulnerability Assessment. Accessed 25 Sept 2017. https://azchercentral.org/hazard-vulnerability-analysis/.

Prior to the Round One Survey, Region 9 HCC staff reviewed regional hazard mitigation plans and previous HVAs to determine the baseline hazards. A template list from the CHVA was used as the starting point, and then hazards that were not relevant to the region were eliminated, like hurricane and tornado. Hazards that were not pertinent to the regional level were also eliminated, like internal fire, HVAC failure, and indoor air quality issues.

A final list of 39 hazards were identified and grouped into the following categories. This summary was used to prepare the list of general hazards prior to the first round of surveying.

Table 1. List of Regional Hazards[4]

Naturally Occurring Events	Pandemic/Epidemic Events	Human Related Events	Technologic, Utility, and Hazardous Events
•Dam Failure •Drought •Dust Storm •Earthquake •Flood/Flash Flood •High Winds •Ice Storm •Landslide •Severe Blizzard/ Snow Fall •Severe Thunderstorm •Temperature Extreme (Cold) •Temperature Extreme (Hot) •Volcanic Ash •Wildfire	•Highly/Acute Infectious Disease Outbreak •Pandemic Influenza •Seasonal Influenza •Vaccine Preventable Disease Outbreak •Water-/Foodborne Disease Outbreak	•Active Shooter •Civil Disturbance •Hostage Situation •Mass Casualty (Trauma) •Staffing Shortage •Workplace Violence •Supply Shortage •Transportation Disruption •I-90 Closure	•Communications Failure •Information Systems Failure •Network Failure •Cyber Attack •Broken Water Main (External) •Mass Electrical Failure •Fuel Shortage •Natural Gas Leak •Potable Water Failure •Wastewater Treatment Failure •Chemical, Biological, Radiological, Nuclear, Explosives (CBRNE)

Participants were asked to review and rate the hazards based on the probability of the event and the impact to healthcare services.[5] Probability was calculated by two metrics: occurrence and response. Typical HVAs assess probability with just occurrence, but this may result in higher ratings from high frequency events. The response metric helps to offset the emphasis on occurrence, and helps raise the standard to a higher community level.

[4] To reduce emphasis on hazardous materials events, individual ratings from the chemical, biological, radiological, nuclear, explosives events were combined to produce single averages for the occurrence, response, and impact metrics. This was relabeled as the acronym CBRNE.

[5] Standard HVAs done at the organizational level include metrics on impacts to humans, property, and business. For this assessment, these are combined into one metric focusing on the impact to healthcare services at the regional level.

Table 2. Definition of Metrics

Metric	Definition	Rating
Probability	Occurrence: Likelihood of the incident to occur	0 = Rare or N/A 1 = Low (Every 10-50 years) 2 = Moderate (Every 1-10 years) 3 = High (Annually)
	Response: Likelihood there would be a regional response	0 = No regional response expected 1 = Low regional response 2 = Moderate regional response 3 = High regional response
Impact	Possibility of impact to regional healthcare services	0 = No impact expected 1 = Low, causes minimal disruption; managed at daily level 2 = Moderate, causes disruption outside of normal means but does not threaten regional healthcare service delivery 3 = High, causes significant disruption and threatens regional service delivery

For naturally-occurring incidents specifically, occurrence was pre-populated in the survey based on a review of regional hazard plans and the National Oceanic and Atmospheric Administration Storm Events Database. For the other hazard categories, participants indicated the occurrence based on their own organizational HVAs and professional experience.

Table 3. Historical Occurrences for Naturally-Occurring Incidents

Incident	# of Regional Occurrences 1996-2017[6]	Probability of Occurrence from 2011 R9 HVA[7]	Round One Survey Rating
Dam Failure	-	Low	1
Drought	1	Moderate	2
Dust Storm	33	Moderate	2
Earthquake	-	Low	1
Flood/Flash Flood	132	High	3
High Winds	152	High	3
Ice Storm	23	Low	1
Landslide	-	Moderate	2
Severe Blizzard/Snow Fall	752	High	3
Severe Thunderstorm	186	High	3
Temperature Extreme (Cold)	17	Moderate	2
Temperature Extreme (Hot)	3	Low	1
Volcanic Ash[8]	1	Low	1
Wildfire	123	High	3

[6] National Oceanic and Atmospheric Administration (NOAA). Storm Events Database. Accessed 11 October 2017. https://www.ncdc.noaa.gov/stormevents/.

[7] Washington State Homeland Security Region 9. Regional Threat/Risk Assessment and Vulnerability Analysis Report. January 2011. Prepared for Washington State Homeland Security Region 9. https://goo.gl/xb79YC

[8] Mount Saint Helena eruption on May 18, 1980.

Survey Results

Round One of the survey process was sent via email using the Region 9 HCC email account (hcc@srhd.org) to the healthcare stakeholders, which consisted of 120 participants representing 50 facilities/organizations. Responses were collected from October 23 to November 3, 2017 via SurveyMonkey.

A total of 29 responses were received. Over half of the responses came from Spokane County (17 responses), followed by Lincoln County (3 response), and Whitman County (2 responses). All other counties had one response each. There was one response from the Kalispel Tribe. Participants represented a variety of core member types, with over half coming from hospitals (18), followed by outpatient (8) and behavioral health (6). Other sectors represented include public health, long-term care, EMS, home health, primary care, and ambulatory surgery. The majority years worked was between 11-15 years and over 21 years in their field.

Participants represented the following organizations. Some organizations had multiple participants.

- Adams County Integrated Health Care Services
- Columbia Surgery Center/ Columbia Surgical Specialists
- Dayton General Hospital
- East Adams Rural Healthcare
- Eastern State Hospital
- Ferry County Public Hospital District
- Frontier Behavioral Health
- Kalispel Tribe of Indians
- Kindred at Home
- Lincoln Hospital District 3
- MultiCare Deaconess Hospital
- MultiCare Valley Hospital
- Newport Hospital & Health Services
- Northeast Washington Health Programs
- Odessa Memorial Healthcare Center
- Providence Health Care
- Rockwood Clinic
- Spokane Eye Surgery Center
- Spokane Regional Health District
- Spokane Treatment and Recovery Services
- Spokane Valley Ambulatory Surgery Center
- St. Luke's Rehabilitation Institute
- Tri-State Memorial Hospital
- Whitman Hospital and Medical Center

The Round Two survey was distributed on November 20, 2017 to December 1, 2017 via SurveyMonkey. The second survey was sent to the same healthcare stakeholders as the first survey. The participant list was also expanded to include public health and emergency managers as a way to verify the outputs from the first survey and gather feedback on the ranking identified by healthcare partners. The second survey was sent to 158 individuals and received 15 individual responses. This included 6 hospitals, 4 public health officials, and 3 each of long-term care and outpatient.

Participants in the second survey were asked to review the ranked hazards and provide any feedback on the list. Additionally, participants were asked to rate the readiness of the region based on the four phases of emergency management: mitigation, preparedness, response, and recovery.

- Mitigation refers to measures that reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.

- Preparedness refers to adequate regional planning in place to prepare for risk, including planning, organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during incident response.
- Response refers to region's ability to implement and take action on plans in place immediately before, during, and after a hazard impact.
- Recovery refers to actions taken to return a regional to normal or near-normal conditions.

Round Three of the process was a webinar hosted by R9 HCC staff to review outputs of the Round One and Two surveys, and discuss the ranked hazard list. All stakeholders were invited to the webinar, which was hosted on Wednesday, December 13, 2017. Six people attended the webinar.

Final Analysis

Through discussion of the ranked hazards, concern was raised over how the hazards were being ranked and whether the ranking was relevant to the organizational HVAs. In comparing the results from the two surveys, the outputs of the Round One survey were more reliable and consistent. The Round One survey had larger participation, including from all counties in the region, and a stronger cross-sector representation of HCC core membership. The data was less skewed by outlier data, and better represented both historic hazard vulnerability assessments and current and future priorities for the HCC. Based on the results of the two surveys and the discussion in the webinar, the decision was made to utilize the top hazard ranking from the Round One survey as the priority list for this regional healthcare HVA.

Using the Round One data, the hazard ratings for each individual response were aggregated into a mean and median score for each hazard and for each of the three metrics (Occurrence, Response, Impact). Following this, the CHVA tool was then populated using the median score at the input metric. The median was used for the CHVA because it denotes the midpoint of the frequency distribution. Additionally, for the CHVA to work correctly, a whole number should be used for the input, which the median produces. The output of the CHVA produced an initial hazard ranking.

REGION 9 COMMUNITY VULNERABILITY PROFILE

A brief summary of the Region 9 community profile and social vulnerability indicators is included in this section. For a complete discussion on the demographics and populations at-risk, please see the Region 9 Healthcare Coalition Community Vulnerability Profile.[9]

In the 2017-2022 Health Care Preparedness and Response Capabilities, ASPR directs that regional healthcare hazard vulnerability assessments should consider individuals who might require additional help before, during, or after a disaster or emergency. *(ASPR 2017-2022, Capability 1, Obj. 2, Activity 1)*

Geography

The R9 HCC area includes ten counties and three tribal areas in eastern Washington. The region spans from the Canadian border in the north to the Columbia River in the south, and is bordered by Idaho to the east. The area makes up 25% of the state's total area with 16,454 square miles. Major geographic areas include the northern Rocky Mountains in northeast corner of the region; the Blue Mountains in the southeast corner where Washington borders Oregon and Idaho; the Columbia/Central Basin lies in the center; and the region also contains parts of the Snake and Columbia Rivers, along with numerous tributaries.

Eastern Washington experiences a diverse climate due to its location east of the Cascade Mountain range. While the west half of the state is in a rainy oceanic climate, the eastern half receives little rainfall due to the rain shadow created by the Cascade Mountains that casts a shadow of dryness east of the mountains. Annual precipitation can range from a low of 7–9 inches in the dry areas near the junction of the Snake and Columbia Rivers in the Columbia Basin, to a high of 75–90 inches of precipitation in the more mountainous areas. Average seasonal temperatures can range from lows of 20s in the winter up to high 90s in the summer.

Disaster Declarations

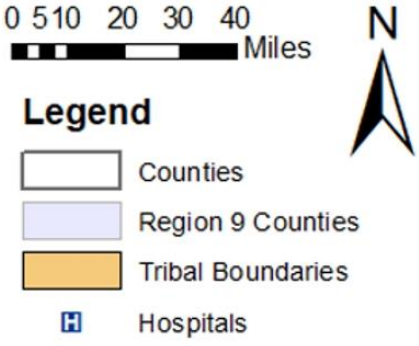
According to FEMA, there have been 40 natural disasters affecting the counties of Region 9 from 1953 to 2016, resulting in 129 disaster declarations at the county level.[10]

- Fire has received the most declarations across the region with 17 declarations, followed by flood at 12 declarations, and severe storm at 7 declarations.
- At the county level, Spokane and Stevens counties have had the highest number of disaster declarations in the region at 18 declarations.
- Most disasters have historically occurred in August (13 declarations), followed by July (5 declarations) and January (4 declarations).
- Some of the major disaster declarations include the drought of 1977 that affected nine of the ten counties in the region (as well as the majority of eastern Washington); the Mount Saint Helens eruption and resulting volcanic ash in 1980; the ice storm event in 1996 that impacted Spokane and Pend Oreille counties; and the widespread wildfires of 2015.

[9] Accessible on the Region 9 Healthcare Coalition website at www.srhd.org/hcc

[10] Federal Emergency Management Agency (FEMA). Data Visualization: Disaster Declarations for State and Counties. Accessed December 28, 2017. https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties.

Region 9 Healthcare Coalition



Created by Spokane Regional Health District, Data Center, January 2018.

Population Characteristics

With 671,178 residents in 2016, the Region 9 counties make up almost 10% of Washington's total population.[11] Spokane County is the most populated county in the region at close to 500,000 residents, and Garfield County is the least populated county in the region (and the State) with just over 2,200 residents. Region 9 includes some of the most rural counties in the state, with Garfield, Ferry, and Columbia counties all having less than 5 people per square mile; Garfield County is the least populated county with 3.2 persons per square mile.

The region has about the same percent of population under 18 years as the state, but eight of the ten counties have larger populations of 65 years and older than the state total. Adams County has the largest percentage of young residents in the region at 35.7% of the population, while Columbia County has the largest percentage of elderly residents at 28.3%. These age groups are considered populations at risk and could require additional needs in the event of an emergency.

Table 4. Population Characteristics by County

County	Total Population (2016)	% Population Under 18 Years	% Population 65 Years and Over	Population per Square Mile (2010 Census)
Adams	19,238	35.7%	10.5%	9.7
Asotin	22,306	20.8%	21.7%	34
Columbia	3,938	17.8%	28.3%	4.7
Ferry	7,614	17.4%	25.1%	3.4
Garfield	2,247	20%	25.7%	3.2
Lincoln	10,350	21.4%	25%	4.6
Pend Oreille	13,123	19.2%	24.6%	9.3
Spokane	499,072	22.2%	15.6%	267.2
Stevens	44,439	21.9%	22.1%	17.6
Whitman	48,851	15.3%	10.1%	20.7
Region 9 HCC (total)	671,178	21.9%	16.2%	37.4 (average)
Washington	7,288,000	22.4%	14.8%	101.2 (average)

Tribal Area Demographics

In Region 9, there are three tribal areas: Colville (which is half in Region 9 and half in Region 7), Spokane, and Kalispel. The total population of the three tribes in Region 9 is 9,827 as reported on reservations and off-reservations trust land in the American Community Survey.[12] Three-quarters of the tribal population in the region is part of the Colville Tribal Area. Kalispel (23.2%) and Spokane reservations (22%) have higher percentages of population under 18 years old, while the Colville Reservation had a higher percentage of population 65 years and over (14.9%).

[11] U.S. Census Bureau. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016.
[12] American Community Survey. My Tribal Area. 2012-2016 American Community Survey 5-Year Estimates. Accessed 27 Nov 2017. https://www.census.gov/tribal/.

Table 5. Demographics by Tribal Area

People	Colville Tribal Area	Kalispel Tribal Area	Spokane Tribal Area
Total Population	7,478	285	2,064
Population under 18 years	24%	29.8%	32.2%
Population 65 years and over	15.1%	8.4%	12.6%

Region 9 Social Vulnerability

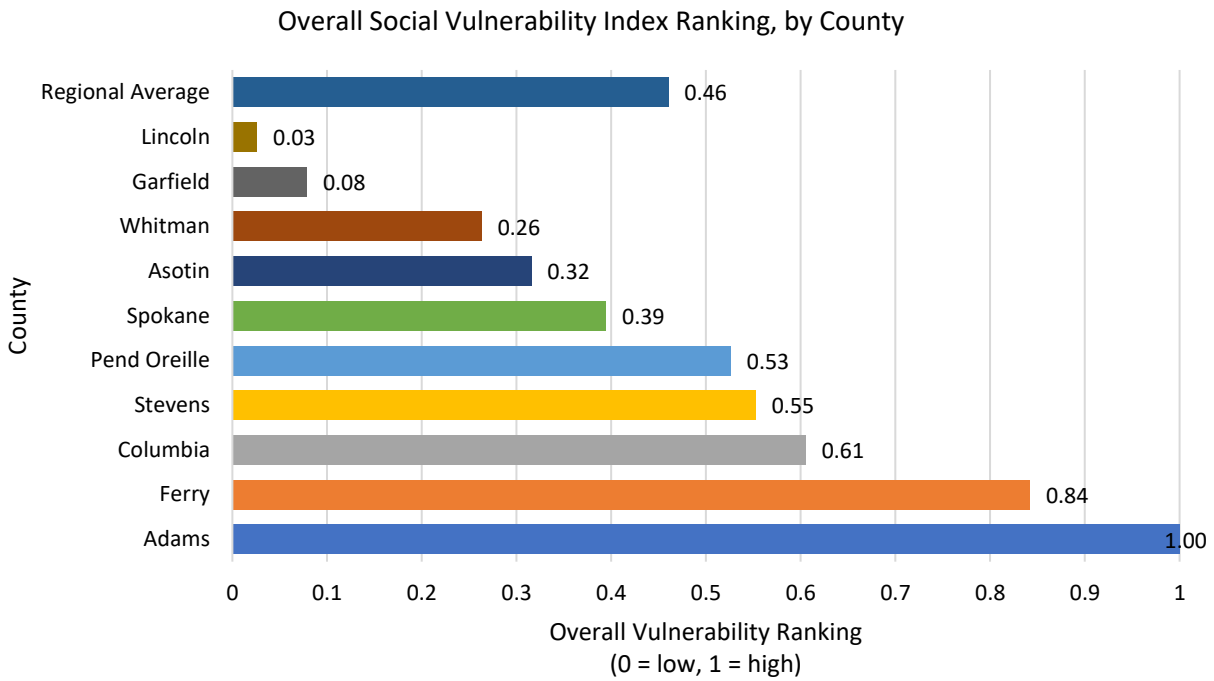
During disasters, populations with higher levels of social vulnerability are more likely to be adversely affected. Vulnerability to hazards is influenced by many factors, including age or income, the strength of social networks, and neighborhood characteristics. Evidence indicates that communities that exhibit certain social conditions, including high poverty, low percentage of vehicle access, or crowded households, are more vulnerable at all stages—before, during, and after—of an emergency.

To help identify vulnerable populations and at-risk individuals, the Center for Disease Control developed the Social Vulnerability Index (SVI).[13] The SVI can help emergency managers better prepare for and respond to emergency events and hazards by identifying areas with higher vulnerabilities and higher rates of access and functional needs. The SVI provides an overall ranking for each census tract that can be aggregated at the county level to provide a comprehensive assessment. Percentile ranking values range from 0 to 1, with higher values indicating greater vulnerability.

SVI Outputs for Region 9 Counties:

- Adams County has the highest social vulnerability ranking in the region with a ranking of 1, which is reserved for the most vulnerable.
- When looking at the rankings by social vulnerability theme, Adams County received the highest ranking available in socioeconomic status, and minority status and language. When compared to all counties across the state, Adams County is the most vulnerable according to the SVI.
- Ferry, Columbia, Pend Oreille, and Stevens counties all have higher than average social vulnerability rankings.
- Ferry County received high ranking in socioeconomic status as well, while Asotin, Columbia, Pend Oreille, and Stevens counties received high rankings in household composition and disability status. Spokane and Whitman counties received high rankings in housing and transportation.
- Lincoln County has the lowest social vulnerability with an overall ranking of 0.03, followed by Garfield County with 0.07.
- Lincoln County is also the least vulnerable county in the region and the second to least in the entire state, received the lowest rankings possible in minority status and language, and housing and transportation.
- Spokane County, the most populated county in the region, has a moderate vulnerability ranking at 0.39.

[13] Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. Social Vulnerability Index 2014 Database Washington. Centers for Disease Control and Prevention. Accessed on 22 Nov 2017. https://svi.cdc.gov/SVIDataToolsDownload.html.



Information on the location and relative concentration of different types of social vulnerabilities can help emergency managers locate and plan for the specific needs of their communities. Examples of using this information include identifying areas with hard-to-reach, underserved population groups in the region; identifying areas in need of emergency shelters; identifying communities that will need continued support to recover after an emergency or natural disaster; and helping allocate emergency preparedness funding based on community need.

Stakeholders noted the need to better understand and meet the unique vulnerabilities of persons at risk in the region to improve community health and resilience. Effective emergency preparations require an integration of individual and population level approaches to overcome barriers to locating and reaching at-risk persons before and during an emergency. The information provided here can help emergency managers to think critically about the identification and engagement of at-risk groups and how to best serve them over the course of a disaster.

CONCLUSION

This Regional Healthcare Hazard Vulnerability Assessment is the first time the Region 9 Healthcare Coalition has undertaken an analysis of potential hazards and the impact on the demand for healthcare services or the ability to provide those services across the region. The assessment focuses on the input of healthcare partners as the primary stakeholder through an all hazards approach that includes naturally-occurring events, human-related events, and technologic and utility events. The assessment offers a prioritized list of hazards that can serve as a baseline for future organizational and jurisdictional HVAs in planning, training, mitigation, response, and recovery activities.

The Region 9 HCC HVA is intended to be a broad strategic planning tool that provides linkages among hazards, risks, and vulnerabilities so that healthcare partners can better plan for emergencies and disasters. The threat picture for the region is dynamic and will change over time. Future planning efforts that utilize this document to assist in prioritizing activities must weigh relative risks and vulnerabilities. Not all hazards are equal in terms of risk, and therefore all real and perceived vulnerabilities may not apply. The top regional hazards list is not absolute, and reflects the participants' experience and expertise. Ultimately, it is local, state, and national priorities, budgets and funding, and the dynamic nature of threat and risk assessments that will drive long-range preparedness efforts for Region 9.

The Region 9 HCC will review this HVA annually to ensure it is consistent with current planning priorities and to reflect any changes in emerging hazards.

APPENDIX

A. References

B. Round One Survey

C. Round Two Survey

D. Community Hazard Vulnerability Assessment Tool Template

A. References

Agency for Toxic Substances and Disease Registry, Geospatial Research, Analysis, and Services Program. Social Vulnerability Index 2014 Database Washington. Centers for Disease Control and Prevention. Accessed on 22 Nov 2017. https://svi.cdc.gov/SVIDataToolsDownload.html.

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B. Round One Survey

View on Dropbox: https://goo.gl/PQEw6e

C. Round Two Survey

View on Dropbox: https://goo.gl/ZQSkVa

D. Community Hazard Vulnerability Assessment Tool

Round One Survey Results								Version 1.0 (8/13)		
COMMUNITY HAZARD VULNERABILITY ASSESSMENT TOOL	PROBABILITY		HEALTHCARE IMPACT	MITIGATION	PREPAREDNESS	RESPONSE	RECOVERY	RISK Occurrence	RISK Response	Non Weighted
	Likelihood of future occurrence and regional response		Percentage of population likely to be injured or killed under an average occurrence of the hazard	External (Region/ State)	External (Region/ State)	External (Region/ State)	External (Region/ State)	Relative threat (increases with percentage)	Relative threat (increases with percentage)	Realtive threat (increases with number)
	0 = Rare or N/A 1 = Low (Every 10-50 years) 2 = Moderate (Every 1-10 years) 3 = High (Annually)		0 = No impact expected 1 = Low (causes minimal disruption; managed at daily level) 2 = Moderate (causes disruption outside of normal means but does not threaten regional healthcare service delivery) 3 = High (causes significant disruption and threatens regional service delivery)	1 = Substantial 2 = Moderate 3 = Limited or none	1 = Substantial 2 = Moderate 3 = Limited or none	1 = Substantial 2 = Moderate 3 = Limited or none	1 = Substantial 2 = Moderate 3 = Limited or none	0 - 100%	0 - 100%	0 - 198
Naturally Occurring Events	**Occurrence**	**Response**								
DAM FAILURE	1	1	1					1%	1%	2
DROUGHT	2	1	1					1%	1%	3
DUST STORM	2	1	1					1%	1%	3
EARTHQUAKE	1	1	2					1%	1%	4
FLOOD/FLASH FLOOD	3	2	1					2%	1%	5
HIGH WINDS	3	2	2					4%	2%	10
ICE STORM	1	2	2					1%	2%	6
LANDSLIDE	2	1	1					1%	1%	3
SEVERE BLIZZARD/SNOW FALL	3	2	3					5%	4%	15
SEVERE THUNDERSTORM	3	1	1					2%	1%	4
TEMPERATURE EXTREME (COLD)	2	1	1					1%	1%	3
TEMPERATURE EXTREME (HOT)	1	1	1					1%	1%	2
VOLCANIC ASH	1	1	1					1%	1%	2
WILDFIRE	3	3	2					4%	4%	12
HIGHLY/ACUTE INFECTIOUS DISEASE OUTBREAK	1	2	3					2%	4%	9
PANDEMIC INFLUENZA	1	2	3					2%	4%	9
SEASONAL INFLUENZA	3	1	2					4%	1%	8
VACCINE PREVENTABLE DISEASE OUTBREAK	1	1	2					1%	1%	4
WATER-/FOODBORNE DISEASE OUTBREAK	1	2	2					1%	2%	6
Average:	1.84	1.47	1.68							
Human Related Events	**Occurrence**	**Response**								
ACTIVE SHOOTER	2	2	2					2%	2%	8
CIVIL DISTURBANCE	1	2	1					1%	1%	3
HOSTAGE SITUATION	1	2	1					1%	1%	3
MASS CASUALTY (TRAUMA)	1	3	3					2%	5%	12
STAFFING SHORTAGE	2	1	2					2%	1%	6
WORKPLACE VIOLENCE	2	1	2					2%	1%	6
SUPPLY SHORTAGE	2	2	2					2%	2%	8
TRANSPORTATION DISRUPTION	1	1	1					1%	1%	2
I-90 CLOSURE	2	1	2					2%	1%	6
Average:	1.56	1.67	1.78							
Hazardous Materials Events	**Occurrence**	**Response**								
CBRNE	1	2	2					1%	2%	6
Average:	1.00	2.00	2.00							
Technologic & Utility Events	**Occurrence**	**Response**								
COMMUNICATIONS FAILURE	2	1	2					2%	1%	6
INFORMATION SYSTEMS FAILURE	2	1	2					2%	1%	6
NETWORK FAILURE	2	1	2					2%	1%	6
CYBER ATTACK	2	1	2					2%	1%	6
BROKEN WATER MAIN (EXTERNAL)	1	1	1					1%	1%	2
MASS ELECTRICAL FAILURE	2	2	2					2%	2%	8
FUEL SHORTAGE	1	1	2					1%	1%	4
NATURAL GAS LEAK	1	1	1					1%	1%	2
POTABLE WATER FAILURE	1	2	2					1%	2%	6
WASTEWATER TREATMENT FAILURE	1	1	2					1%	1%	4
Average:	1.50	1.20	1.80							
Overall Average:	1.47	1.59	1.82							