OKLAHOMA STATEWIDE JURISDICATIONAL RISK ASSESSMENT

Oklahoma State Department of Health
Emergency Preparedness and Response Service
2019

Appendix A: Jurisdictional Risk Assessment

1.0 Purpose

The Oklahoma State Department of Health (OSDH) Statewide Jurisdictional Risk Assessment (JRA) is used to identify the effects specific hazards have on the state, cities and incorporated communities. The assessment further recommends mitigation strategies to lessen these effects on the healthcare and medical systems. The JRA, along with Regional County Hazard Vulnerability Analysis (HVA) provides the foundation element for pre-event Emergency Support Function #8 (ESF-8) planning related to incident-specific mitigation, preparedness, response, and recovery activities.

2.0 Scope

The original purpose of the County/Community Assessment Tool (C/CAT), the forerunner to the JRA, was to prepare the community further for an influenza pandemic, it required minor framework modifications throughout the years to address traditional all-hazards approach to planning and preparedness. However, with changes to the Public Health Emergency Preparedness (PHEP) Capability 1: Community Preparedness, the JRA was developed in accordance with redefined functions to enhance mitigation and preparedness for At-Risk Populations community needs. The JRA encompasses planning from an all hazards approach and is applicable from a county level with considerations for individual communities.

3.0 Jurisdictional Risk Assessment Process

The development of the JRA incorporated a broad spectrum of partners throughout the three-phase process: 1) identification of hazards; 2) identification of impacts from hazards; and 3) identification of potential mitigation strategies and strategy prioritization.

Organization
Oklahoma State Department of Health
Oklahoma Department of Agriculture, Food, and Forestry
Department of Housing and Urban Development
Oklahoma Homeless Alliance
State's Health Care Coalition represented by RMRS Coordinators
Oklahoma Department of Emergency Management
Oklahoma Municipal League

4.0 Population Demographics

Demographics is defined as statistical data about the characteristics of a population, such as the age, gender and income of the people within the population. When the census assembles data about people's ages and genders, this is an example of assembling information about demographics.

Population	
Population estimates, July 1, 2018	3,943,079
Population estimates base, April 1, 2010	3,751,583
Population, percent change - April 1, 2010 (estimates base) to July 1, 2018	5.1%

Population, Census, April 1, 2010	3,751,351
Age and Sex	
Persons under 5 years, percent, July 1, 2018	6.6%
Persons under 5 years, percent, April 1, 2010	7%
Persons under 18 years, percent, July 1, 2018	24.3%
Persons under 18 years, percent, April 1, 2010	17.7%
Persons 65 years and over, percent, July 1, 2018	15.7%
Persons 65 years and over, percent, April 1, 2010	13.5%
Female persons, percent, July 1, 2018	50.5%
Female persons, percent, April 1, 2010	50.5%
Race and Hispanic Origin	
White alone, percent, July 1, 2018	74.2%
White alone, percent, April 1, 2010	72.2%
Black or African American alone, percent, July 1, 2018	7.8%
Black or African American alone, percent, April 1, 2010	7.4%
American Indian and Alaska Native alone, percent, July 1, 2018	9.3%
American Indian and Alaska Native alone, percent, April 1, 2010	8.6%
Asian alone, percent, July 1, 2018	2.3%
Asian alone, percent, April 1, 2010	1.7%
Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2018	0.2%
Native Hawaiian and Other Pacific Islander alone, percent, April 1, 2010	0.1%
Two or More Races, percent, July 1, 2018	6.2%
Two or More Races, percent, April 1, 2010	5.9%
Hispanic or Latino, percent, July 1, 2018	10.9%
Hispanic or Latino, percent, April 1, 2010	8.8%
White alone, not Hispanic or Latino, percent, July 1, 2018	65.3%
White alone, not Hispanic or Latino, percent, April 1, 2010	68.7%
Population Characteristics	
Veterans, 2013-2017	276,948
Foreign born persons, percent, 2010-2014	5.9%

4.1 Incorporated Cities/Towns Populations

In Oklahoma, cities are all those incorporated communities which are 1,000 or more in population and are incorporated as cities. Towns, are defined as all those incorporated communities which have less than 1,000 in population. In Oklahoma there are 77 counties, 171 cities and 416 towns.

4.2 Access and Functional Needs Population

Numerous states have embraced the term "Access and Functional Needs (AFN)" to include the following: people with disabilities, senior citizens, the Deaf community, children, non-English speaking populations, homeless populations and people without transportation. These groups represent a large and complex variety of specific concerns and challenges for emergency responders and planners. Many of these groups have little in common, but given the definition, it

is conceivable that "access and functional needs" could cover more than 50% of the nation's population rendering the term rather meaningless, especially in emergency planning. However, the term is used to assist emergency managers and planners with guidelines for emergency planning and education for their state and county populations.

Although, terminology continues to evolve, Oklahoma State Department of Health (OSDH) will use the collective term "access and functional needs" to describe populations that need "functional support assistance" and "access" before, during, and after emergency situations. The term "access and functional needs (AFN)" is more descriptive of the "assistance requirement" by these individuals for independent living and during occurrences of natural, human-caused, or technological disasters. Many State and local governments are addressing their Emergency Operations Plans (EOPs) to specifically include the AFN populations. This change in focus facilitates a more effective "whole community" approach to emergency planning efforts. This concept is also consistent with language contained in the National Response Framework (NRF).

4.2.1 HHS emPOWER
One tool available to public health planners is a program called emPOWER, which is maintained by the U.S. Department of Health & Human Services. HHS emPOWER Map 3.0 gives every public health official, emergency manager, hospital, first responder, electric company, and community member the power to discover the electricity-dependent Medicare population in their state, territory, county, and ZIP Code. The state of Oklahoma has 667,077 Medicare beneficiaries and 39,627 electricity-dependent Medicare beneficiaries. For beneficiary numbers specific to territory, county and ZIP Code within Oklahoma see HHS emPOWER Map 3.0. https://empowermap.hhs.gov/

4.3 Limited Language Proficiency Population
A Limited English Proficiency (LEP) individual can be defined as a person who does not speak English as their primary language and has a limited ability to read, speak, write, or understand English. These individuals may be entitled language assistance with respect to a particular type or service, benefit, or encounter.

Specific statistical data on the Limited Language Proficiency Population in Oklahoma can be found in 4.4.1.3 Minority/Language SVI Score.

4.4 Socioeconomic Status, Education, Culture, and Other Factors
Socioeconomic status encompasses not just income but also educational attainment, financial security, and subjective perceptions of social status and social class. Socioeconomic status can encompass quality of life attributes as well as the opportunities and privileges afforded to people within society. Poverty, specifically, is not a single factor but rather is characterized by multiple physical and psychosocial stressors. Further, socioeconomic status is a consistent and reliable predictor of a vast array of outcomes across the life span, including physical and psychological health. Thus, socioeconomic status is relevant to all realms of behavioral and social science and the relation to disaster preparedness and response.
Being of low socioeconomic status may affect how people understand disaster risk, prepare for disasters, and respond to warnings and evacuation orders. Research suggests that people of differing socioeconomic statuses may prepare for a disaster differently.

Researchers have worked to understand the correlation of socioeconomic status and its role on how persons are affected by disaster. Research findings demonstrate that people of low socioeconomic are more vulnerable in the face of disasters and are more likely to suffer more serious consequences during impact, from property damage to homelessness to physical and financial impacts.

Additionally, persons with a low socioeconomic status continue to struggle throughout the disaster process when it comes to recovery, suffering from issues including difficulty with obtaining and receiving aid, lack of access to housing, stress and depression, and physical health problems.

In an effort to understand and assist with planning for and responding to issues affecting persons in a low socioeconomic status, the Center for Disease Control and Prevention (CDC) created a tool, known as the Social Vulnerability Index. The SVI data is designed to assist public health with recognizing the socioeconomic status of their county population which can be used to identify mitigation opportunities to lessen or minimize the impact of disaster on these populations. The CDC's SVI tool can be found at the following link, https://svi.cdc.gov/map.html. As well as the Oklahoma State Department of Health SVI demographic data dashboard at the following link, https://osdh.maps.arcgis.com/apps/opsdashboard/index.html#/a6defab787ac4191a4e55e9b67f5005e

4.4.1 Centers for Disease Control and Prevention (CDC) Social Vulnerability Index
Social vulnerability refers to the resilience of communities when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss. CDC's Social Vulnerability Index uses 15 U.S. census variables at tract level to help local officials identify communities that may need support in preparing for hazards; or recovering from disaster.

4.4.1.1 Socioeconomic SVI Score
Economically disadvantaged populations are disproportionately affected by disasters. The poor are less likely to have the income or assets needed to prepare for a possible disaster or to recover after a disaster. Although the monetary value of their property may be less than that of other households, it likely represents a larger proportion of total household assets. For these households, lost property is proportionately more expensive to replace, especially without homeowner's or renter's insurance. Moreover, unemployed persons do not have employee benefits plans that provide income and health cost assistance in the event of personal injury or death. High-income populations, on the other hand, may suffer higher household losses in absolute terms, yet find their overall position mitigated by insurance policies, financial investments, and stable employment.

The relationship between education and vulnerability to disaster is not well understood, although education is associated with both income and poverty. People with higher levels of education are likelier to have access to and act upon varied hazard information from preparation to recovery. For people with less education, the practical and bureaucratic hurdles to cope with and recover from disaster prove increasingly difficult to surmount.

Socioeconomic SVI Score = 0.609 A score of 0.609 indicates a Moderate to High level of vulnerability.		
Variables	**Estimate**	**Percent**
Below Poverty	621,155	16.03%
Unemployed	110,120	2.84%
Median Income	23,327.688	1.3%
No High School Diploma	322,890	8.33%

4.4.1.2 Household Composition/Disability SVI Score

Household composition is defined here to include dependent children less than 18 years of age, persons aged 65 years and older, and single-parent households. Also included are people with disabilities. People in any of these categories are likelier to require financial support, transportation, medical care, or assistance with ordinary daily activities during disasters.

Children and elders are the most vulnerable groups in disaster events. Children, especially in the youngest age groups, cannot protect themselves during a disaster because they lack the necessary resources, knowledge, or life experiences to effectively cope with the situation. Perhaps because parental responsibility for children is assumed, children are rarely incorporated into disaster-scenario exercises. Thus, local authorities are not adequately prepared to provide specific goods or services for children.

Elders living alone and people of any age having physical, sensory, or cognitive challenges are also likely to be more vulnerable to disasters. Many older or disabled people have special needs that require the assistance of others. Family members or neighbors who would ordinarily look in on an elder, or a caretaker responsible for the welfare of a disabled person, might be less able to do so during a crisis or may find the magnitude of the task beyond their capability.

The number of traditional households of two parents and children has decreased in the United States. In addition to the usually lower socioeconomic status of single-parent households, such households are especially vulnerable in a disaster because all daily caretaker responsibility falls to the one parent.

Household Composition/Disability SVI Score = 0.717 A score of 0.717 indicates a High level of vulnerability.		
Variables	**Estimate**	**Percent**
Aged 65 or Older	561,885	14.5%
Aged 17 or Younger	952,325	24.57%
Civilian with a Disability	594,454	15.34%
Single-Parent Households	143,324	9.81%

4.4.1.3 Minority/Language SVI Score

The social and economic marginalization of certain racial and ethnic groups, including real estate discrimination, has rendered these populations more vulnerable at all stages of disaster. African Americans; Native Americans; and populations of Asian, Pacific Islander, or Hispanic

origin are correlated with higher vulnerability rates. In recent decades, the numbers of persons immigrating to the United States from Latin America and Asia have substantially increased.

Many immigrants are not fluent in English, and literacy rates for some groups are lower. To the degree that immigrants have limited English proficiency, disaster communication is made increasingly difficult. This difficulty is especially true in communities whose first language is neither English nor Spanish and for whom translators and accurate translations of advisories may be scarce. Immigrants are likelier to rely on relatives and local social networks (i.e., friends and neighbors) for information.

Minority/Language SVI Score = 0.61 A score of 0.61 indicates a Moderate to High level of vulnerability.		
Variables	**Estimate**	**Percent**
Minority	1,281,718	33.07%
Speak English "Less than Well"	76,034	1.96%

4.4.1.4 Housing/Transportation

Housing quality is an important factor in evaluating disaster vulnerability. It is closely tied to personal wealth; that is, poor people often live in more poorly constructed houses or mobile homes that are especially vulnerable to strong storms or earthquakes.

Mobile homes are not designed to withstand severe weather or flooding and typically do not have basements. They are frequently found outside of metropolitan areas and, therefore, may not be readily accessible by interstate highways or public transportation. Also, because mobile homes are often clustered in communities, their overall vulnerability is increased.

Multi-unit housing in densely populated urban areas also poses a heightened risk for tenants. Population densities of cities are much higher than those of suburban or rural areas. People living in high-rise apartments are particularly vulnerable to overcrowding when funneled into a limited number of exit stairwells. Furthermore, large numbers of people exiting in the street can make safe and orderly evacuation of everyone difficult and dangerous. Crowding within housing units exacerbates these difficulties.

Rates of automobile ownership are generally lower in urban areas, especially among inner city poor populations. Thus, transportation out of an evacuation zone is problematic for people who do not have access to a vehicle. For some people, fuel costs may prevent vehicle use. Paradoxically, lower urban auto-ownership rates do not necessarily translate into easy evacuation for people with vehicles because the high-population densities of cities can cause severe traffic congestion on interstate highways and other major roads.

Populations residing in group quarters such as college dormitories, farm workers' dormitories, psychiatric institutions, and prisons also present special concerns during evacuation. Residents of nursing homes and long-term care facilities are especially vulnerable because of their special and timely needs and because of understaffing in these institutions in emergencies. Moreover, many institutions can be unprepared to quickly remove their entire staff and residents under conditions that require specialized vehicles.

Housing/Transportation SVI Score = 0.51 A score of 0.51 indicates a Moderate level of vulnerability.		
Variables	**Estimate**	**Percent**
Multi-Unit Structure	123,593	7.27%
Mobile Homes	161,687	9.51%
Crowding	40,671	2.39%
No Vehicle	82,935	5.67%
Group Quarters	109,974	6.47%

4.5 Animal Populations

There are several reasons why integrating animal concerns into an emergency response plan boosts the potential of the plan to save human lives.

People may put themselves at risk to protect animals and, through their actions or inactions, endanger responders or divert critical response resources. While this conduct is well documented pertaining to household pets (as in Hurricane Katrina and other incidents), similar behaviors may occur in livestock owners. Zoos and aquaria have been severely damaged during storms, with teams of employees remaining behind to care for these animals. Containment facilities have been compromised, allowing the escape of dangerous species. Isolated animal escapes also occur, potentially threatening the safety of employees and the general public. Jurisdictions can be expected to better protect the public and responders by managing animal issues effectively during emergency incidents.

Our society benefits from improved efficiency and health care in livestock production systems. Emergency management and other Federal and State departments have traditionally protected these benefits in disasters. Support for animal agriculture is warranted, as the U.S. animal agriculture industry generates nearly $90 billion each year. Because agriculture now depends on fewer people to produce our nation's food supply, emergency management systems are of high priority.

In addition to livestock production, society recognizes other benefits from animals. One benefit is the improved quality of life that animal owners and care providers get from living and working with animals that are considered companions, confidants, health facilitators and status symbols. This is partly reflected by an increase in the revenue the pet industry generates. In the mid-1990s, this industry was estimated to generate between $20 and $30 billion per year.

Using the US 2012 census, the American Veterinary Medical Association (AVMA) reported an estimated percent and number of households with dogs, cats, birds and horses, provided in the table below:

Census Statistical Data	Dogs	Cats	Birds	Horses
Percent of households owning	36.5%	30.4%	3.1%	1.5%
Number of households owning	43,346,000	36,117,000	3,671,000	1,780,000
Average number owned per household	1.6	2.1	2.3	2.7
Total number on the United States	69,926,000	74,059,000	8,300,000	4,856,000

4.5.1 Household Pets

For the purpose of this JRA and in accordance with FEMA Disaster Assistance Policy (DAP) 9523.19, household pets are defined as a domesticated animal, such as a dog, cat, bird, rabbit, rodent or turtle that is traditionally kept in the home for pleasure rather than commercial purposes, can travel in commercial carriers, and be housed in temporary facilities. Household pets do not include reptiles (except turtles), amphibians, fish, insects, arachnids, farm animals (including horses), and animals kept for racing purposes (these are defined in additional categories below). This definition is used by FEMA only to determine federal assistance and reimbursement in a disaster and is not meant to limit the kinds of pets that local jurisdictions can shelter during a disaster.

In times of disaster, survivors and responders are all under tremendous physical and mental stress. The loss of pets or other animals can be a serious source of grief and anxiety. The safety and survival of animals may positively support the mental health of both survivors and responders. In many cases, allowing evacuees in an emergency shelter to have some access to their animals and help care for them can have very positive mental health benefits.

Using the AVMA Pet Ownership Calculator, https://www.avma.org/resources-tools/reports-statistics/us-pet-ownership-statistics, see the following table for the State of Oklahoma regarding Household Pet Populations.

Type of Household Pet	Number of Pet Owning Households	Pet Population
Dogs	553,548	885,676
Cats	461,037	967,571
Birds	47,014	107,676

5.2 Livestock and Poultry

Livestock play a key role in our nation's supply of food and fiber. Livestock agriculture is a key component of our national economy, comprising approximately 13% of the U.S. gross domestic product. Many rural communities rely on agriculture as a critical element of their local economy. Appropriate jurisdictional plans and response capabilities pertaining to livestock agriculture, including foreign animal disease response, should be a key element of emergency response plans for many jurisdictions.

Commercial livestock include: cattle, sheep, goats and other domestic animals ordinarily thought of being raised or used on a farm for commercial purposes. Increasingly, however, animals previously considered "farm" animals are also being kept as companion animals or pets. Poultry include chickens or other domesticated fowl. As with livestock, poultry are often kept by owners as pets rather than as strictly commercial farm animals. The table below highlights the commodity of livestock and poultry in the State of Oklahoma.

Livestock and Poultry	2017	2018
Cattle		
Dairy Cows	46,369	42,000
Beef Cows	2,129,403	2,088,000
Hogs & Pigs	2,165,552	2,200,000
Sheep	69,094	54,000
Goats		
Goat Meat	83,706	82,000
Goat Milk	12,042	7,000
Poultry		
Broiler (Meat)	204,500,000	196,800,000
Layer (Egg)	4,286,000	4,476,000
Llamas/Alpacas	2,291	2,439
Cervidae (Deer & Elk)	3,740	3,800

Reference the United States Department of Agriculture (USDA) National Agricultural Statistics Service database for County Specific Statistics regarding Agriculture and Livestock, https://www.nass.usda.gov/Statistics_by_State/Oklahoma/Publications/County_Estimates/index.php.

4.5.3 Equines
Throughout the state's history, horses have been closely linked with the livelihood and quality of life of Oklahomans. Those involved with horses have broad ranges of interests and diverse levels of involvement. The current horse industry is represented by individual horse owners, producers (such as breeders and trainers), businesses that support owners and producers, equine event managers and even the tourism industry. Because of this diversity, general descriptions of the Oklahoma horse industry are difficult to provide. Nonetheless, several demographic and economic indicators provide evidence that the industry has a major impact on the state economy and the quality of life of many Oklahomans.

The number of horses in Oklahoma has varied over time, with links to the health to the U.S. economy. The American Horse Council (AHC) estimated Oklahoma horse numbers at about 225,000, 278,000 and 326,000 head in 1986, 1996 and 2005, respectively. Recent numbers from the AHC indicate the number of horses in Oklahoma have dropped again in 2017 to 251,000. Alternatively, USDA census data of all equine on farms in Oklahoma has varied tremendously with estimates of a high of 150,000 in 2002, down to 36,000 in 2007 followed by a large increase to 159,000 in 2012. The growth of the racing industry in Oklahoma may also have helped contribute to the rise in the USDA data in 2012. These data only include horses on farms with reported taxable income, which may exclude many recreational horse owners. The most current, comprehensive source of demographics of the Oklahoma horse industry lists horse numbers in the state at approximately 252,704 head. This has decreased from the AHC study in 2005, which estimated Oklahoma horse numbers at 326,000 head. Currently, Oklahoma is fifth in total horse numbers behind Texas, California, Florida and Ohio.

In addition to the number of horses in Oklahoma due to industry, there are number of households who own horses as pets. In Oklahoma there are 22,749 horse owning households with a total of 62,179 horses owned as pets.

4.5.4 Wildlife

The impact of a disaster on native wildlife, critical environments, or threatened/endangered species may be significant. Management of wildlife during disasters is challenging, but also a source of intense media and public interest. Displaced wildlife seeking food and shelter may encounter humans in unusual and potentially dangerous circumstances, such as when snakes seeking higher ground end up in houses.

In addition, animal diseases in wild populations can impact domestic livestock or people. Examples include:

- Brucellosis (Yellowstone National Park) impact on cattle herds
- Foot and Mouth Disease (ability to be spread by wildlife)
- West Nile Virus (presence in wild bird populations)
- Avian Influenza (presence in migratory birds)

Below is a list of animal facilities within the state with nontraditional species that may need special resources and expertise in order to adequately plan and respond to all hazards incidents.

Association of Zoos and Aquariums Accredited Facilities:

- Oklahoma City Zoo and Botanical Garden
- Tulsa Zoo

Non Accredited Zoos, Aquariums and Animal Sanctuaries:

- Arbuckle Wilderness (Davis, OK)
- Coble Highland Ranch & Zoo (Henryetta, OK)
- Endangered Ark Foundation (Hugo, OK)
- G.W. Exotic Animal Park (Wynnewood, OK)
- Hochatown Petting Zoo (Hochatown, OK)
- Lost Creek Safari (Stillwater, OK)
- Oakhill Center for Rare & Endangered Species (Luther, OK)
- Oklahoma Aquarium (Jenks, OK)
- Peek-A-Boo Petting Zoo (Gore, OK)
- Safari Joe's Exotic Wildlife Sanctuary (Adair, OK)
- The Menagerie (Alva, OK)
- Tiger Safari (Tuttle, OK)
- Safari's Sanctuary (Broken Arrow, OK)

5.0 Risk Assessment

Risk assessment is the process to identify potential hazards and analyze what could happen if a hazard occurs.

Disaster can strike the county at any given time on a number of fronts and in varying magnitudes. The impact of any disaster depends greatly on the success of mitigation planning implemented by the governing bodies, and the resilience of the community to work through the process of recovery.

While disasters can occur in many forms, they fall into only a few broad event categories: natural, technological, and man-made – intentional or accidental. Each of these categories contains interrelated events with numerical values of probability and severity assigned for the purposes of assessing a percentage of relative threat.

The following discussion addresses each of these broad categories using this accepted mathematical model developed for assessing relative risk.

5.1 Hazard Identification

The first step in developing the JRA was to review the identified hazards in the eight public health/homeland security regions within Oklahoma. This was done by reviewing each region's Health Care Coalition's HVAs. The HVAs identifies risk by calculating the probability of the event occurring and multiplying by the potential severity, which includes impact and preparedness. The table below demonstrates the hazards identified in the HVA based on the level of risk, with higher risk percentages in the major category and lower risk percentages through moderate and minor categories.

The Regions utilizes the Kaiser Permanente Hazard Vulnerability Assessment (HVA) Tool to identify potential hazards. The tool produces a Risk value based on the following formula:

Risk = Probability*Severity (Magnitude-Mitigation)

Region 1

Rank	Event	Relative Threat
1	**Wild Fire**	**72%**
2	**HazMat Incident**	**71%**
3	**Active Shooter**	**67%**
4	**Emerging Infectious Disease**	**63%**
5	**Severe Winter Weather - Blizzard, Ice Storm, Snow Fall**	**60%**
6	**Tornado**	**60%**
7	**Severe Thunderstorm**	**57%**
8	**Epidemic**	**47%**

| 9 | Mass Casualty | 43% |
| 10 | Electrical Failure | 36% |

Region 2

Rank	Event	Relative Threat
1	Tornado	72%
2	Ice Storm	72%
3	Severe Thunderstorm	67%
4	Small Casualty Hazmat Incident *(From historic events at your MC with < 5 victims)*	61%
5	Earthquake	56%
6	Flood, External	56%
7	Information Systems Failure	50%
8	Chemical Exposure, External	50%
9	Radiologic Exposure, Internal	50%
10	Temperature Extremes	44%

Region 3

Rank	Event	Relative Threat
1	Ice Storm	71%
2	Wild Fire Forcing a Medical Facility EVAC	59%
3	Emerging Infectious Disease	49%
4	Active Shooter	48%
5	Tornado Strike on Medical Facility or City	44%
6	Extended Water System Failure	43%
7	Blizzard	42%
8	Hazmat Release/Explosion (fixed site)	39%
9	Earthquake	38%
10	Power Outage	38%

Region 4

Rank	Event	Relative Threat
1	Tornado	72%
2	Ice Storm	72%
3	Flood, External	67%
4	Wild Fire	67%
5	Severe Thunderstorm	56%
6	Earthquake	56%
7	Water Failure	56%
8	Small Casualty Hazmat Incident (historic events with < 5 victims)	56%
9	Epidemic	56%
10	Information Systems Failure	50%

Region 5 (Only provided 5 Events)

Rank	EVENT	Relative Threat
1	Ice Storms	68%
2	Supply Disruption	59%
3	Major Communication Disruption	53%
4	Extended Water System Failure	52%
5	Tornado Strike on Medical Facility or City	52%

Region 6/8

Rank	Event	*Relative Risk*
1	Tornado	38%
2	Inclement Weather	31%
3	Seasonal Influenza	26%
4	IT System Outage	26%
5	Communication / Telephony Failure	26%
6	Fire	24%
7	Earthquake	23%
8	Active Shooter	22%
9	Temperature Extremes	22%
10	Power Outage	21%

Region 7

Rank	Event	*Relative Risk*
1	Tornado	38%
2	Inclement Weather	31%
3	Seasonal Influenza	26%
4	IT System Outage	26%
5	Communication / Telephony Failure	26%
6	Fire	24%
7	Earthquake	23%
8	Active Shooter	22%
9	Temperature Extremes	22%
10	Power Outage	21%

In 2018, the risk factors from identified Infectious Diseases were incorporated into the HVA to expand upon the hazards facing the residents of Oklahoma. The risk factors from the identified Infectious Diseases are provided below.

COMMUNICABLE DISEASE	PROBABILITY	HUMAN IMPACT	RISK
	Likelihood to occur	*Potential Impact on Population*	*Relative threat*
Rating	10-12=Likely 7-9=Probable 4-6=Occassional 0-3=Unlikely	10-12=Catastrophic 7-9=Critical 4-6=Moderate 0-3=Minor	0-100%
Category A Pathogens			
Anthrax	3	11	**58%**
Botulism	7	10	**71%**
Plague	8	10	**75%**
Smallpox	3	12	**63%**
Tularemia	8	10	**75%**
Viral Hemorrhagic Fever	9	12	**88%**
Category B Pathogens			
Brucellosis	7	6	**54%**
C. Perfringens	6	6	**50%**
Glanders	6	8	**58%**
Meliodosis	7	8	**63%**
Q Fever	7	6	**54%**
Psittacosis	6	6	**50%**
Ricin Toxin	6	9	**63%**
Staph Entero B	6	6	**50%**
Emerging Pathogens			
Novel Flu	9	12	**88%**
Novel Coronavirus	9	12	**88%**
Arboviral			
West Nile Virus	10	5	**63%**
Enteric Pathogens			
E. coli	9	5	**58%**
Salmonella	9	5	**58%**
Shigella	9	5	**58%**
Vibrio Cholerae	5	5	**42%**
Vaccine Preventable Diseases			
Hepatitis A	5	2	**29%**
Measles	8	2	**42%**
Meningococcal	7	6	**54%**
Mumps	8	2	**42%**
Typhoid Fever	8	5	**54%**
Influenza (seasonal)	10	8	**75%**

5.2 Hazard Impacts

Disasters can have a life-altering impact on the individuals and families fortunate enough to survive them. However, the effect of natural disasters can be felt at the community, city, and county level, or many times can affect the entire state. How well the impact of a disaster event is absorbed has much to do with the intensity of the impact and the level of preparedness and resilience of the affected individuals.

The impact to the public health and medical systems infrastructure in the wake of a disaster can range from insignificant, short-term effects to complete loss of system response capability and long-term recovery.

Given that any disaster can produce varying degrees of primary and secondary impacts to the system and its resources, it therefore seems prudent to develop risk analysis based on all hazards, worst-case scenarios. The table below highlights the potential impacts to the health and medical system and the effects of the identified impacts on the State of Oklahoma and its residents.

Health and Medical System Impacts	Effects on Region & Populations
Facility Evacuations	• Medical Surge • Loss of Healthcare services • Loss of Income • Longer commutes for family members
Health surveillance	• Decrease in Disease • Reactive approach versus a proactive planning approach • Minimal effect as we have very little ongoing surveillance at this point
Medical surge	• Overwhelmed Medical System • Regions have shown an ability to expand to meet an influx of patients to individual or isolated incidents through past experience. • Limited ability to treat specialized patients and a whole system surge across all counties.
Health/medical/veterinary equipment and supplies	• Patient Care • Regions have some supplies capability, and expertise
Patient movement/ Transportation Shortage	• Level of Patient Care Provided • Regional Health Care Coalition • Catastrophic Powers Act and support from state level organizations.
Patient care	• Level of Patient Care Provided • Regional Health Care Coalition • Partnerships with LTC's to increase bed availability

Safety and security of drugs, biologics, and medical devices	• Patient and Public Health • Each medical facility has security and drug policies in place and contingency plans to ramp up security as required.
Utility Failure – Electrical	• Facility's ability to provide provisions • Due to the weather in OK, many facilities experience power outages on a regular basis throughout the year. They have learned to adapt and have well developed plans to support under those conditions. • Some LTC's that do not have on site generators
Utility Failure – Water & Sewer	• Facility's ability to provide provisions • Some majority of facilities within the state have a water conservation plan in place and can adapt to a loss of water for up to 72 hours. After 72 hours a few facilities will require support and assistance.
Food safety and defense	• Patient and Public Heath Safety • Most of the facilities have policies and plans in place for the safe handling of food and have at least 72-96 hours of subsistence on board.
Infrastructure Damage (Transportation/ Communications)	• Facility's ability to provide provisions
Mental & Behavioral healthcare	• Patient and Public Health
Supply Shortage	• Level of Patient Care Provided
Staff Shortage	• Level of Patient Care Provided
Loss of primary & secondary services	• Level of Patient Care Provided
Mass Casualty Incident	• Loss of services • Loss of income • Overwhelmed Medical System • Regions have shown an ability to expand to meet an influx of patients to individual or isolated incidents through past experience. • Limited ability to treat specialized patients and a whole system surge across all Region 2/4 counties
Mass fatality management, victim identification, and mitigating health hazards from contaminated remains	• Overwhelmed Medical System • Regions have shown an ability to expand to meet an influx of patients to individual or isolated incidents through past experience. • Limited ability to treat specialized patients and a whole system surge across all the State's Regions
Veterinary medical support	• Patient and Public Health

6.0 Risk-Mitigation Strategies

Risk mitigation strategies are a county's plan for how it will address its identified risks. Effective mitigation strategies provide documentation of valuable local knowledge on the most efficient and effective ways to reduce losses from hazard events. For example, a strategy may articulate specific actions to develop medical system evacuation plans during a community-wide power failure. Creating and implementing hazard mitigation strategies is one of the most effective ways to protect the county's health and medical system and is nearly always more cost effective than repairing the damage after a disaster.

6.1 Identification and Prioritization

Health and Medical System Impacts	Mitigation Strategies
Facility Evacuations	• Implement facility EOP • Coordinate with MERC and local EOC • Regional Evacuation Plan is in place • Coalition Surge Test has been performed
Health surveillance	• ICP's are in place • Reporting processes and platforms are utilized • Identification and Isolation procedures are in place • Regional Infectious Disease Plan is in place
Medical surge	• Facility Surge plans are being developed • Regional Surge plan exists • Coalition Surge Test have been performed • Coalition Workshop is planned • Pediatric Surge TTX is planned • Pediatric Surge FSE is planned
Health/medical/veterinary equipment and supplies	• Cached Medical Supplies/ ERPs • Development of regional support
Patient movement/ Transportation Shortage	• Individual agency Trauma Plans exist • Contact local EOC for mutual aid support • Contact Regional MERC for additional support • Contact state for augmentation
Patient care	• Individual agency Trauma Plans exist • An external location is identified, equipped and staffed to support incident • State or Federal support is requested • Patients are moved to another jurisdiction
Safety and security of drugs, biologics, and medical devices	• Facility EOP's • CHEMPAK Sustainment Plan • Plans and polices are reviewed and updated as required
Utility Failure – Electrical	• Facility EOP's • Plans and policies are reviewed and updated as needed • Annual training occurs within agency • Periodic drilling of internal processes allows for continuous familiarization

	• Backup generators at facilities and LTCs
Utility Failure – Water & Sewer	• Facility EOP's • Plans and policies are reviewed and updated as needed • Annual training occurs within agency • Periodic drilling of internal processes allows for continuous familiarization
Food safety and defense	• County Health ERP's
Infrastructure Damage (Transportation/ Communications)	• Facility EOP's • Request local radio support • Request regional caches • Request assistance from Regional Response system • Request assistance from federal partners
Mental & Behavioral healthcare	• Utilize local mental health crisis teams • Request MRC crisis team • Request support from state and federal partners
Supply Shortage	• Utilize internal MOU;s with vendors • Request assistance from coalition members • Request resources from within coalition caches • Request Resources from other RMRS coalitions • Request resources from state • Request SNS resource or other federal assistance
Staff Shortage	• Use local Labor pools and staffing agencies • Request support from MRC • Use JIT to support operations with staff from other HCC members or partner agencies.
Loss of primary & secondary services	• Facility Trauma Plan • Health Care Coalition ERP

Mass Casualty Incident	• Implement local MCI Plans
	• Activate MERC as needed
	   o Implement Regional MCI plans
	   o Manage resources as required

Mass fatality management, victim identification, and mitigating health hazards from contaminated remains	• Coordinate and assist Medical Examiner's Office as needed
Veterinary medical support	• County EOP's/County Health ERP's

Additional Resources

- USDA Sheep and Goat livestock report.
https://www.nass.usda.gov/Statistics_by_State/Oklahoma/Publications/Oklahoma_Livestock_Reports/2019/ok-sheep-goat-2019.pdf

- Poultry Federation facts and figures by state.
 https://www.thepoultryfederation.com/resources/facts-figures

- USDA 2017 Poultry livestock report.
https://www.nass.usda.gov/Statistics_by_State/Oklahoma/Publications/Oklahoma_Livestock_Reports/2017/ok_poultry_review_2017.pdf

- Alpaca Owners Association registered by state.
http://www.alpacainfo.com/about/statistics/alpacas-us

- International Llama Registry worldwide statistics.
https://secure.lamaregistry.com/registry-services/lama-statistics-owners.php

- Medical Surge Capacity and Capability Handbook.
https://www.phe.gov/preparedness/planning/mscc/handbook/documents/mscc080626.pdf

- Association of Zoos and Aquariums accredited facilities.
https://www.aza.org/current-accreditation-list