



# Utah Public Health

*Jurisdictional*

# Risk Assessment

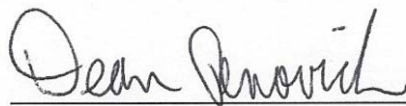


IN PARTNERSHIP WITH  
**UTAH'S PUBLIC HEALTH**  
DEPARTMENTS

# Signature Page

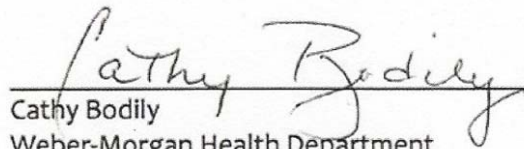
The Jurisdictional Risk Assessment (JRA) is a public health focused approach to understanding all hazards Utah may face and prioritizing which would cause the biggest impact to our population and health infrastructure. This Statewide Report is a summary and analysis of local JRA's completed within each of Utah's 13 health districts. JRA reports are conducted once every five years and updated as needed.

In this and all preparedness planning documents, the state of Utah is committed to an inclusive approach to ensuring all stakeholders have the tools necessary to prepare for and respond to any emergency that affects the health and well-being of our citizens.



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# Jurisdictional Risk Assessment Statewide Report

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# Introduction

The Jurisdictional Risk Assessment (JRA) is a public health focused approach to understanding all hazards Utah may face and prioritizing which would cause the biggest risk to our population and health infrastructure. Highest risk is a combination of many factors, including jurisdictional characteristics and vulnerabilities, hazard probability and impact scores, as well as mitigation efforts already in place. Public health preparedness and response teams and partners will benefit from using the outcomes of this tool on a regular basis to ensure those hazards that pose the most risk are better understood and planned for. This JRA Statewide Report is meant to be used to identify existing gaps and help determine future hazard-specific planning, training, and exercise activities that should be conducted with public health preparedness partners.



# Background

Through better understanding the state characteristics and health infrastructure in Utah, analysis of all hazards that may pose a threat to our population can be more thorough and accurate.

## State Characteristics & Vulnerabilities

### Geography

Utah is approximately 84, 917 square miles and is the thirteenth largest state. Three major land areas characterize the geography of Utah: the central Rocky Mountains, the Basin and Ridge Region of the northwest, and the Colorado Plateau in the south and southeast. Running down the middle of the state is the Wasatch Fault, from the Utah-Idaho border to central Utah. About 67% of the land is federally owned, including five national parks and five national forests. There are several lakes and rivers in Utah, the largest of which is the Great Salt Lake, covering more than one million acres of northern Utah.

**Elevation.** Utah is the third highest state in the nation, with a mean elevation over 6,000 feet. Cities range from 2,000 to 9,800 feet above sea level. Figure 1 gives an indication of the mountainous regions dominating much of the state (FAA, 2019).

**Climate.** Temperatures range widely throughout the state, due to its three climate regions and large geographic area. Although extremes can and do occur at both ends, winter lows typically average between 20-30 degrees Fahrenheit, and summer highs between 90-100 degrees Fahrenheit. Utah tends to be a dry state, but prone to both flooding and drought. Average annual precipitation can range from just 4 inches in the western basin areas to more than 44 inches in lake and mountain regions in the northeast (U.S. Climate Data, 2019).

**Earthquake Fault.** The Wasatch Fault, located in Utah and the southern Idaho border, is the longest continuous, active normal fault in the United States and represents a major earthquake risk since 80% of Utah's residents reside along it (Machette, 1991). About 500 earthquakes are located in this fault zone each year and 60% of the 3.0 or larger earthquakes occur in this region (University of Utah, 2019).

FIGURE 1. UTAH TOPOGRAPHICAL MAP, FAA 2019.



**FIGURE 2. UTAH INTERSTATES / HAZMAT ROUTES, ARCGIS 2019.**



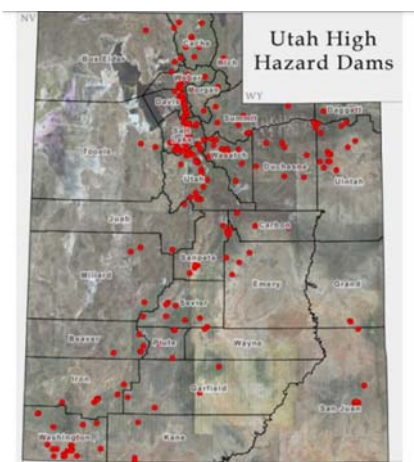
**Transportation Infrastructure.** Four interstate highways travel through the state, namely I-15, I-70, I-80, and I-84. In addition to being highly trafficked with passenger vehicles, all are designated as non-radioactive hazardous materials routes, and frequently carry trucks laden with potentially dangerous liquids or gases (FMCSA, 2019). Figure 2 highlights these major roads. Much of Utah's population resides near and frequents one or more of these interstates, and relies on goods and supplies being carried into the state along these routes. Railways are also a major mode of transportation for goods, supplies and hazardous materials, and are utilized in many areas in the state. Additionally, there are more than 30 airports in the state, the largest of which is the Salt Lake City International Airport (Airport Authority, 2019).

**Dams.** There are more than 900 dams in the state, with 252 classified as high-hazard. This classification means dam failure would likely result in loss of life and possibly cause significant economic losses. Figure 3 shows approximate locations of these high hazard dams. The ages of the dams, earthquake potential, and population growth near dam breach zones are all risk factors of Utah dams (ASCE, 2015).

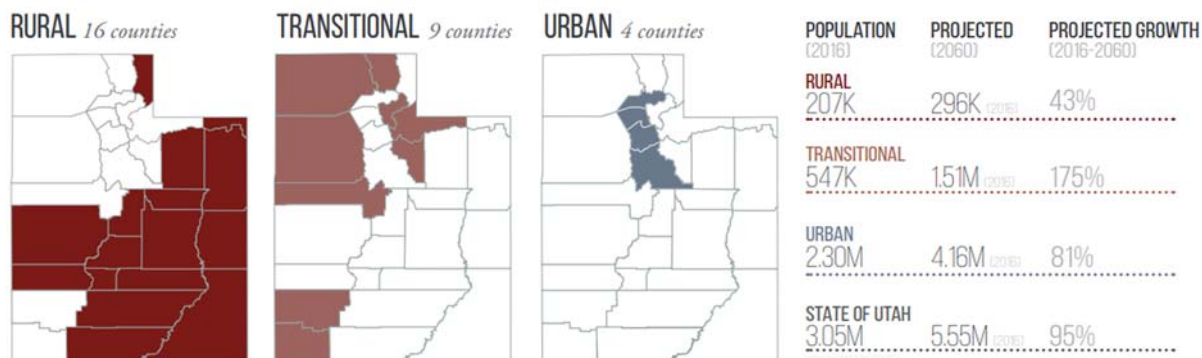
## Demography

As of July 2018, the population of Utah was more than 3.16 million and steadily rising (U.S. Census Bureau, 2018). The majority of the population resides in Utah's four urban counties along the Wasatch Front, shown in Figure 4 (SORU, 2017). Utah is one of the nation's top states for current and projected population growth, estimated at 95% by 2060 (SORU, 2017).

**FIGURE 3. UTAH HIGH HAZARD DAMS, ASCE 2015**



**FIGURE 4. COUNTY CLASSIFICATIONS AND PROJECTED POPULATION GROWTH OF UTAH, SORU 2017.**

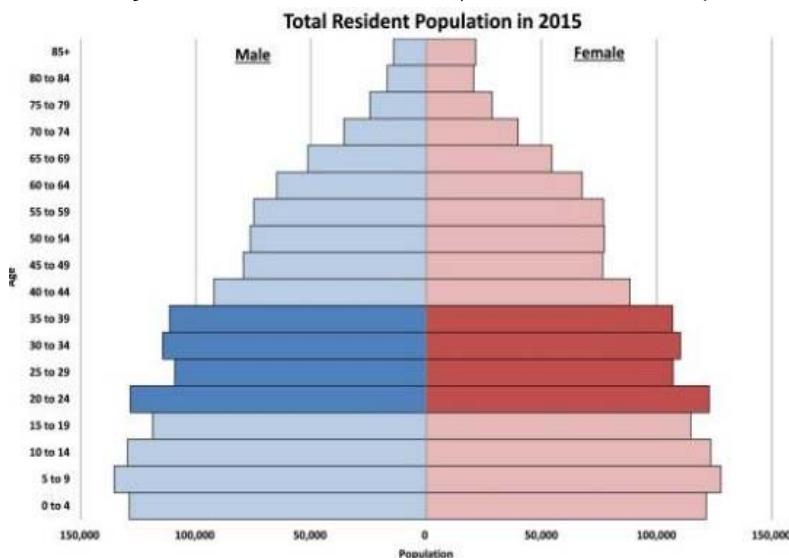


**Household Economics.** There are nearly one million households in Utah, with an average of three people per home. The median household income is \$65,000, and approximately 10% have an income below the national poverty line.

**Race.** The estimated race breakdown is as follows: 78% White/non-Hispanic, 14% Hispanic or Latino, 2.5% Asian, 1.5% American Indian or Alaska Native, 1.5% Black or African American, and 1% Pacific Islander. For 15% of the population, a language other than English is spoken at home (U.S. Census Bureau, 2018).

**Age & Sex.** Utah has a large number of children younger than age 18, at roughly 30% of the population, and leads the nation in number of births for the population (12% compared with 10% for the national average) (U.S. Census Bureau, 2017). One of the reasons for this may be its larger than normal group of 20-40 year olds, as shown in the Population Pyramid in Figure 5 (U.S. Census Bureau, 2017). Sex remains even, with roughly 50% female and 50% male.

**FIGURE 5. UTAH POPULATION PYRAMID, US CENSUS BUREAU 2017.**



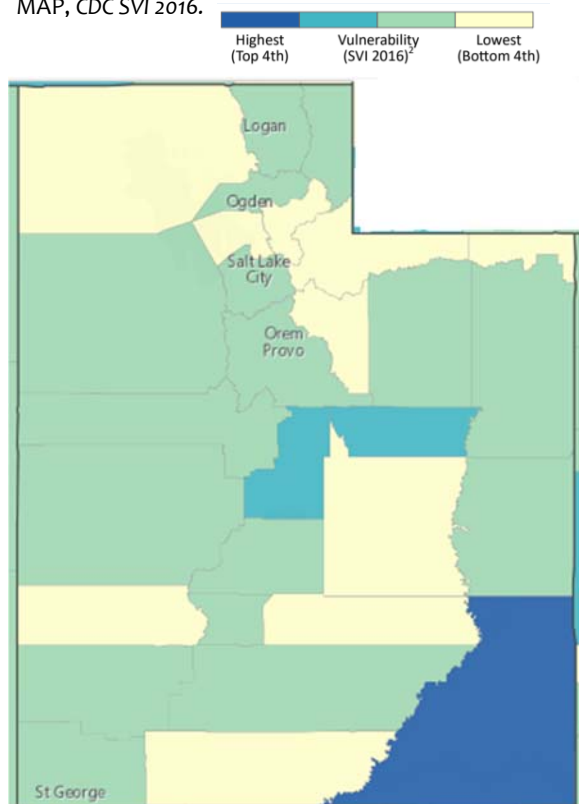
**Refugees.** There are approximately 25,000-50,000 refugees living in the state of Utah, with more than 1,100 new refugees coming each year. Beginning in 2009, the majority of refugees have originated from Iraq, Somalia, Bhutan, Thailand/Burma, Democratic Republic of Congo, and China; however, refugees from several other nations also now call Utah home (Utah Refugee Mental Health Subcommittee, 2015). It is estimated there are more than 40 languages spoken by Utah refugees, and that more than 99% live in Salt Lake County (UDOH, 2018).

**Utahns with Disabilities.** As of 2017, nearly one in five Utah residents (18%) reported that they lived with a disability of some kind. The most common disabilities include mobility-related disabilities (9%), cognitive disabilities (9%), disabilities which impact independent living (5%), vision-related disabilities (3%), and disabilities which impact self-care (2%) (Utah Department of Health, 2017). Women were more likely than men to report having a disability (21% versus 17%), and persons who are Native Americans were significantly more likely to have a disability than all other races combined (30% versus 18%) (Utah Department of Health, 2017). Support services provided for those with a disability may include community living, day services, supported employment services, housing support, healthcare services, and support coordinators (Utah Department of Human Services, 2019).

**Residents without Immunizations.** Utah maintains an immunization rate slightly lower than the national average, due, in part, to residents opposed to vaccinations. Utah is ranked 23rd in the United States for the number of two-year-olds who were fully immunized, with 87% of children aged 19 and younger having at least two immunizations and 70% of adults aged 19 and older with at least one immunization (McClellan, 2018). As of 2017, Utah's coverage rate for immunization was approximately 67.9%, while the United States coverage rate was around 70.4% (Utah Department of Health, 2018).

**Tourists.** More than 19 million tourists visit Utah annually, which is approximately 6.2 tourists per permanent resident (OmniTrak, 2018). Winter and summer tend to be the most popular travel seasons, though tourists come all year. Popular travel locations include 14 ski resorts, five national parks, 11 national monuments, 43 state parks, one national historic site, two national recreation areas and festivities such as the Sundance Film Festival and the Utah Shakespeare Festival (Leaver, 2018).

**FIGURE 6. UTAH'S SOCIAL VULNERABILITY INDEX MAP, CDC SVI 2016.**



**Social Vulnerability.** Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events. Factors include economic data, education, family characteristics, ethnicity, housing, language ability, and transportation availability. The Social Vulnerability Index Map, Figure 6, indicates low to mild vulnerability in much of the state, but significant vulnerability in central and south-eastern portions of the state (CDC, 2016).

**emPOWER Data.** The U.S. Department of Health and Human Services' (HHS) emPOWER Program reports numbers of individuals with electricity-dependent medical and assistive equipment for planning purposes. As of June 2019, there are 352,029 Medicare beneficiaries in Utah. 34,375 residents utilize electricity-dependent devices and durable medical equipment, with the vast majority being oxygen concentrators. Additionally, there are reportedly 9,168 participating in home health services and 1,806 utilizing at-home hospice services (HHS, 2019).



# Utah's Health Infrastructure

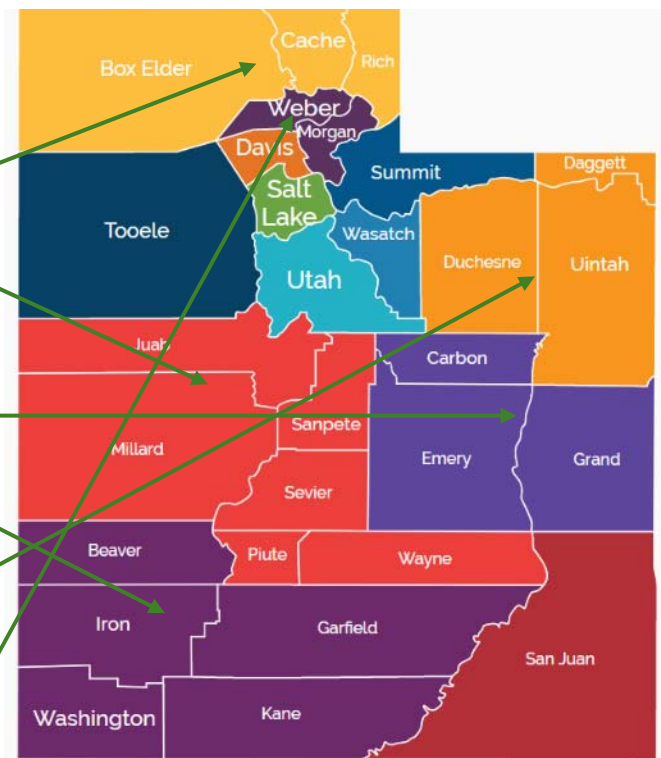
## Public Health System

The Utah public health system is comprised of 13 local health departments and one state health department. Local public health is responsible for providing vital services to Utah citizens, including: environmental safety, epidemiological surveillance, health education, food safety regulation, preventive services, and disaster management. Public health is also the designated lead for Emergency Support Function 8 – Health and Medical, and as such, has a responsibility to coordinate and provide leadership to supportive health entities during a disaster.

Figure 7 shows the jurisdictional boundaries of each of the local health departments, comprising one or more counties (see line from LHD name to map for those with multiple counties). The 13 local health departments are designated as follows:

- Bear River Health Department
- Central Utah Health Department
- Davis County Health Department
- Salt Lake County Health Department
- San Juan Public Health Department
- Southeast Utah Health Department
- Southwest Utah Public Health Department
- Summit County Health Department
- Tooele County Health Department
- TriCounty Health Department
- Utah County Health Department
- Wasatch County Health Department
- Weber-Morgan Health Department

**FIGURE 7. LOCAL HEALTH DEPARTMENTS, UALHD 2019.**

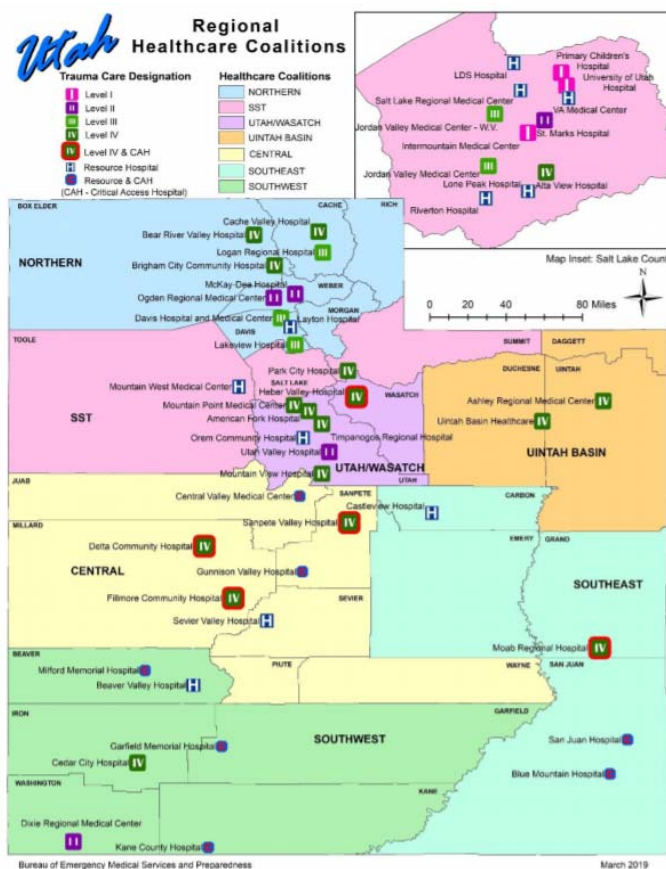


The Utah Department of Health (UDOH) is the overarching state agency responsible for public health in Utah and works together with local public health departments. The Utah Association of Local Health Departments (UALHD), the Utah Association of Local Health Officers (UAHLO), and the Utah Public Health Association (UPHA) all contribute to a healthier Utah through advocacy, education, and collaboration. At the federal level, Utah public health is supported by the United States Department of Health and Human Services (HHS) Region VIII based in Denver, CO.

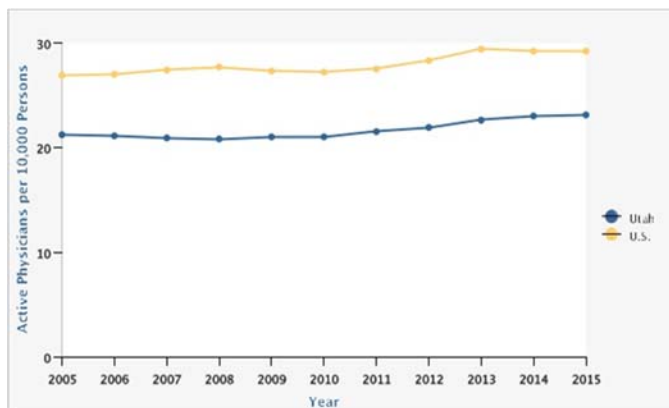
## Health Care System

Utah hospitals report more than 7.8 million outpatient visits and more than 236,000 inpatient admissions annually (UHA, 2019). As of 2018, there were 4,588 staffed beds at non-federal, short-term, acute care hospitals (American Hospital Directory, 2018). There are ten health systems operating facilities in Utah, including hospitals, nursing homes, home health agencies, and clinics. The University of Utah holds the only burn center and is located in Salt Lake City. Primary Children's Hospital provides the highest level of care for pediatric patients, and is also located in Salt Lake City. Several associations represent the various facilities in the state, including the Utah Hospital Association (UHA), the Utah Health Care Association (UHCA), and the Association for Utah Community Health (AUCH). Healthcare facilities in Utah according to Healthcare Coalition Region and trauma care designation are shown in Figure 8 (UDOH Bureau of EMS & Preparedness, 2019).

**FIGURE 8. UTAH REGIONAL HEALTHCARE COALITIONS, UDOH BEMSP 2019.**



**FIGURE 9. ACTIVE PHYSICIANS PER 10,000 CIVILIAN POPULATION, UTAH AND U.S., 2005-2015, UDOH 2018.**

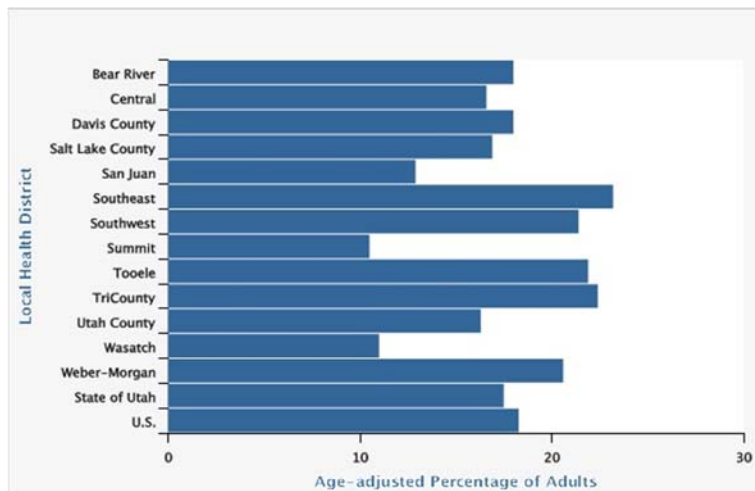


**Physician Rates.** Utah's active physician rates for the population is considerably lower than the nationwide average. In 2015, there were 23.1 physicians per 10,000 people, compared with the nation's 29.2 physicians per 10,000 people (UDOH, 2018). A similar trend is found in all years of reporting, as shown in the chart in Figure 10. The ratio of primary care physicians to population is also lower in Utah, 5.65 per 10,000 compared with 7.54 per 10,000 in the U.S. (UDOH, 2018)

## Mental Health System

An estimated 5% of adults living in Utah have a mental illness (Lipari et al., 2017). Approximately 18% of adults experienced seven or more days of poor mental health in a month's time. These levels were exacerbated for those with a lower education and income level (UDOH, 2018). Figure 10 shows percentages of poor mental health days by local health district. Of those living with a mental illness, fewer than half of Utah adults receive any form of treatment (SAMHSA, 2015).

**FIGURE 10.** SEVEN OR MORE DAYS OF POOR MENTAL HEALTH IN THE PAST 30 DAYS BY LOCAL HEALTH DISTRICT, UDOH 2018.



Utah's primary state agency responsible for mental health services is the Department of Human Services Division of Substance Abuse and Mental Health (DSAMH). County mental health authorities, Medicaid services and the National Alliance on Mental Illness-Utah, as well as a broad range of private mental and behavioral practices and services, are also valuable resources. Treatment is available for a wide range of mental illnesses and substance abuse issues, ranging from early intervention to residential treatment, including eating disorders, cognitive behavioral therapy, family counseling, child services, substance abuse, psychiatric medicines, and suicide prevention (UDHS-DSAMH, 2019).

Mental health professionals are limited in the state, however. As of 2015, there were only 7,425 licensed mental health professionals licensed in the state. This amounts to 209 providers per 100,000 people, compared with the 311 providers per 100,000 people nationally (Christensen, 2016). Although much of Utah is rural, all but two of the 29 Utah counties report having a mental health provider, the exceptions being Dagget and Piute counties (Christensen, 2016).

# Methods

This section describes the tool used to identify and analyze hazards, the process for collecting risk assessment data at the local level, and the statewide aggregation of local data to produce statewide results.

## Utah Modified hHAP Tool

### Origins

A small workgroup of Utah Department of Health (UDOH) Preparedness staff and local health department emergency response coordinators (ERCs) chose and modified an Excel-based tool for use in each of Utah's 13 local health districts. The original tool was developed by the Los Angeles County Department of Public Health with permission granted by its creators to modify it to be more useful to Utah. The Utah Modified Health Hazard Assessment and Prioritization (Utah hHAP) tool differs from the original in the number and description of some of the hazards analyzed, inclusion of an optional Public Health Emergency Preparedness Capabilities Self Evaluation, a new *JRA Instructions and Scoring Guide*, and a proposed agenda to be used for tool completion.

### Local Use

The Utah hHAP Tool is designed to be used at the local level within each local health district. Following step-by-step information in the *JRA Instructions and Scoring Guide*, local health department ERCs gathered their local health and response partners to jointly analyze the risks posed by the 53 hazards included in the tool (shown by hazard type in Figure 11). Local teams first reviewed jurisdictional characteristics and demographics, including access and functional needs data, then determined and input scores into the Utah hHAP tool for various risk components for each of the 53 hazards. Risk components analyzed included hazard probability, health severity, impacts (to the local community, public health system, medical system and mental health system), and local health department and support partner mitigation efforts and resources. Relative Risk Scores and rankings for each hazard were then automatically calculated by the tool, revealing the local jurisdiction's Top Ten priority threats. Relative Risk Scores were calculated using the following formula:

$$\text{Relative Risk Score} = \text{Probability} \times \text{Health Severity} \times \text{Impacts} \times \text{Mitigation Efforts}.$$

### Risk Components

**Probability.** Probability of each hazard is scored based on the likelihood of occurrence over the next 25 years. This is the only component with a possibility of a 0.0 score, meaning the likelihood of occurrence is zero. Scores range from there to the highest score of 4.0, meaning the hazard is likely to occur cyclically or annually over the next 25 years.



**FIGURE 11. UTAH HHAP TOOL'S 53 HAZARDS BY HAZARD TYPE**

Natural	Biological	Chemical/Radiological	Technological
Active Shooter	Aerosolized Anthrax	Blister Agent	Communications Failure
Avalanche	Agroterrorism	Factory Chemical Spill	Cyber Attack
Civil Disorder	Botulism	Industrial Plant Explosion	Electrical Failure
Climate Change	Communicable Disease Outbreak	Mass Casualty Hazardous Materials Accident	Information Systems Failure
Dam Failure	Emergent Disease	Nerve Agent	Improvised Explosive Device
Drought	Food Supply Contamination	Nuclear Explosion – 10 Kiloton	Oil Spill
Earthquake – Major	Intentional Food Contamination	Radiological Dispersal Device	Sewer Failure
Earthquake – Moderate	Intentional Water Contamination	Radiological Incident – Fixed Facility	Supply Shortage
Extreme Heat Event	Pandemic Influenza	Ricin	Transportation Infrastructure Failure
Fire: Large-Scale Urban	Pneumonic Plague	Train/Truck Accident – Chemical Release	Water Supply Contamination
Flood	Smallpox		Water Supply Disruption
Landslide	Tularemia		
Population Displacement	Vector-Borne Disease		
Severe Winter Storm			
Thunderstorm, Lightning			
Tornado			
Volcano			
Wildfire			
Windstorm			

**Health Severity.** The health severity risk component measures the potential for injury, illness, and death. The scenarios of each hazard provided some insight for how they should be scored on this component; however, differences between rural and urban areas, numbers of medically compromised individuals, limited ability to share information about the emergency due to language differences, and other factors all contribute to some variation of scores among health departments.

**Health System Impacts.** The Utah hHAP tool examines each hazard according to the impact on the community, as well as the public health, medical, and mental health systems in the local community. It asks users to rate how the hazard would affect the local agencies' and companies' ability to continue delivering health services in the community. Would activation of the entities' Continuity of Operations Plan be needed, shifting personnel from less essential activities to only those more critical? Would altered standards of care need to be implemented? Would required supplies be available? Rating scores between 0.5 and 2.0 refer to no or limited disruptions to service delivery. Scores between 3.0, "critical," or 4.0, "catastrophic," require deferment of all non-essential services, additional supplies and staffing needed, and the likelihood of a local and state declaration of emergency. The 4.0 rating adds the likelihood of a nationally-declared emergency, as well as the inability to meet supplies and staffing requirements (presumably without external or federal assistance).

**Mitigation Efforts.** The last two risk components in the Utah hHAP Tool are the mitigation efforts done by both public health and local ESF-8 partners to reduce the worst effects of any given hazard. This could include resources, plans, training, and exercises specific or relevant to the hazard. These two risk components differ from the others in that a higher score is desirable, meaning more mitigation efforts have been accomplished. A score of 4.0 means an “extreme” level of mitigation, including approved and updated plans specific to the hazard as well as Continuity of Operations Plans, drills, exercises, trainings, and other events with local partners specific to the hazard, stockpiled supplies, or available resources on hand to meet the needs, among other things. A score of 1.0 by contrast is a “low” level of mitigation, meaning no or outdated response plans, few if any resources, etc.

### Capability Self-Evaluation

Included as part of the new Utah Modified hHAP Tool is an optional section entitled “PHEP Capability Self-Evaluation.” This section gives local health department emergency response coordinators (ERCs) a chance to review preparedness efforts specific to the top five identified hazards for their area across public health emergency preparedness and response capabilities. ERCs were asked to review the functions and tasks associated with each capability, and provide a rating from one to four indicating to what extent that capability is in effect for each top hazard. A score of 1 is a mark of “limited capability” while a score of 4 marks “full capability.”

## Statewide Aggregation

For the purposes of understanding statewide trends and top hazards, the Utah Department of Health Preparedness Program reviewed and aggregated the results of all 13 local health department hHAP tools. Of the 53 hazards analyzed by local health departments, the top 20 hazards whose assessment revealed the most risk overall were identified. This was accomplished by identifying and analyzing those hazards most commonly occurring in the Top 10 lists of the 13 local JRAs. An average score for each risk component of each identified hazard from every local health department was calculated and entered in to the Utah hHAP tool. These averaged scores represented statewide values for probability, health severity, community and health systems impacts, and health department and support partner mitigation efforts. The statewide values were then entered into the tool where they were weighted and calculated to determine Relative Risk Scores in the same manner as the local JRA hazard scores were determined, using the following formula:

$$\text{Aggregated Relative Risk Score} = \text{Average Probability} \times \text{Average Health Severity} \times \text{Average Impacts} \times \text{Average Mitigation Efforts}.$$

An analysis of the results of this aggregation of scores is provided in the following section.

# Results

Although all health districts used the same tool and analyzed the same 53 hazards, a wide range of top hazards and relative risk scores resulted. This is due to differences in the local communities such as demography, geography, local health infrastructure, and local mitigation strategies in place, though some statewide trends are evident. This section identifies the top health threats for each local health department, as well as the top hazards for the state as determined by analysis of local jurisdictional risk assessments and statewide characteristics.

## Local Health Districts' Top Hazards

Each local health department's completed Utah hHAP tool produced a rank-ordered list of top hazards based on relative risk scores. The map in Figure 12 shows the number one hazard identified for each health district, and the tables in Figure 13 show the top five hazards.

**FIGURE 12. LOCAL HEALTH DISTRICT # 1 HAZARDS**

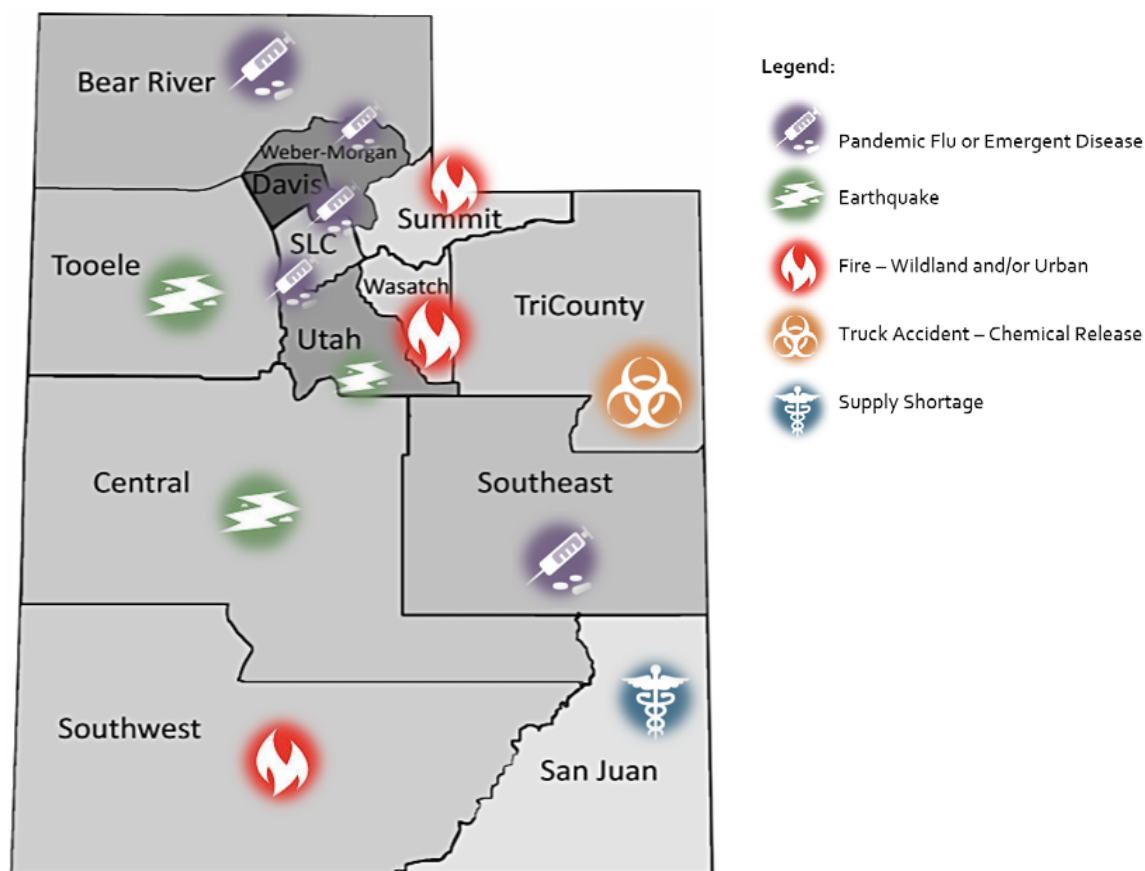


FIGURE 13. LOCAL HEALTH DISTRICT TOP 5 HAZARDS.

Top 5 Hazards	
Bear River	Central
1. Pandemic Flu	1. Earthquake – Major
2. Nuclear Explosion	2. Earthquake – Moderate
3. Communicable Disease Outbreak	3. Nuclear Explosion
4. Intentional Water Contamination	4. Radiological Dispersal Device
5. Earthquake – Major	5. Water Supply Contamination
Davis	Salt Lake County
1. Pandemic Flu	1. Emergent Disease
2. Earthquake – Major	2. Pandemic Flu
3. Nuclear Explosion	3. Aerosolized Anthrax
4. Communicable Disease Outbreak	4. Sewer Failure
5. Water Supply Contamination	5. Mass Casualty Hazmat Incident
San Juan	Southeast
1. Supply Shortage	1. Pandemic Flu
2. Drought	2. Supply Shortage
3. Mass Casualty Hazmat Incident	3. Water Supply Disruption
4. Radiological Dispersal Device	4. Wildfire
5. Radiological Incident – Fixed Facility	5. Flood
Southwest	Summit
1. Wildfire	1. Wildfire
2. Flood	2. Pandemic Flu
3. Pandemic Flu	3. Fire – Largescale Urban
4. Industrial Plant Explosion	4. Emergent Disease
5. Factory Chemical Spill	5. Communicable Disease Outbreak
Tooele	TriCounty
1. Earthquake – Major	1. Truck/Train – Chemical Release
2. Pandemic Flu	3. Oil Spill
4. Nuclear Explosion	5. Wildfire
6. Communicable Disease Outbreak	7. Communicable Disease Outbreak
8. Wildfire	9. Mass Casualty Hazmat Incident
Utah County	Wasatch
1. Earthquake – Moderate	1. Fire – Largescale Urban
2. Communicable Disease Outbreak	2. Dam Failure
3. Smallpox	3. Earthquake – Major
4. Aerosolized Anthrax	4. Pandemic Flu
5. Earthquake – Major	5. Communicable Disease Outbreak
Weber-Morgan	
1. Pandemic Flu	
2. Earthquake – Moderate	
3. Drought	
4. Communicable Disease Outbreak	
5. Earthquake – Major	



# Utah's Top 20 Health Hazards

## Aggregated Relative Risk Scores

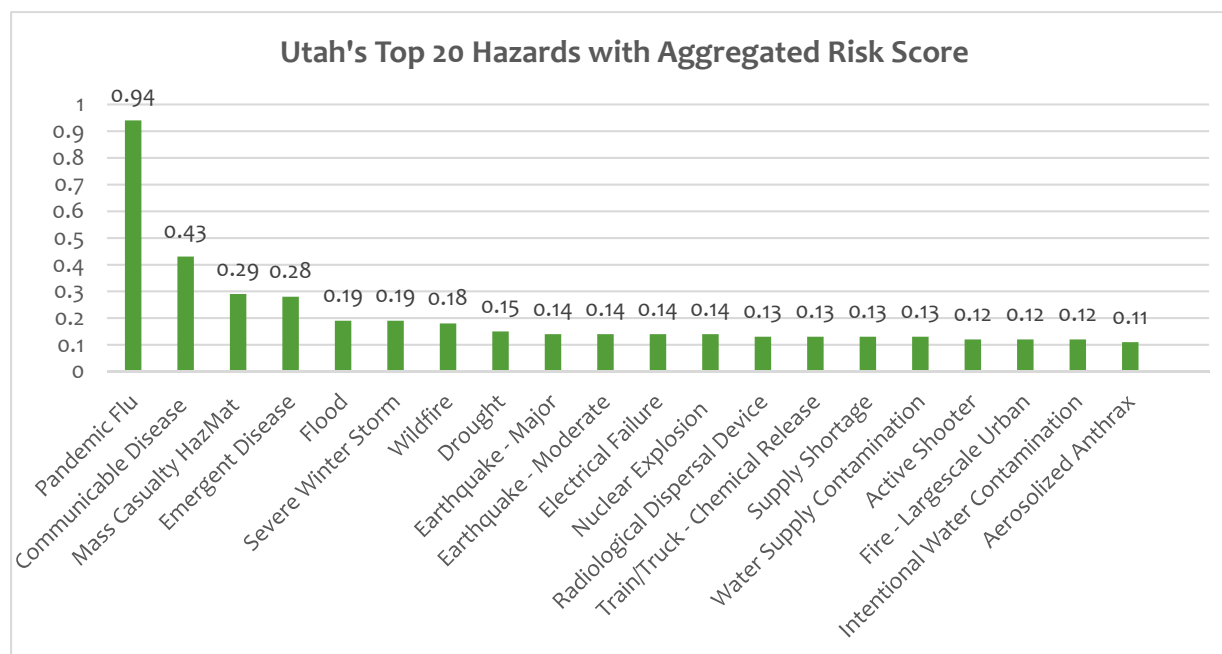
As noted in the “Methods” section above, average risk component scores of all 13 locally completed tools produced Aggregated Relative Risk Scores for Utah’s Top 20 hazards. The table in Figure 14 shows these scores.

**FIGURE 14. UTAH MODIFIED HHAP TOOL VALUES FOR TOP IDENTIFIED HAZARDS**

HAZARD	PROBA-BILITY	HEALTH SEVERITY	IMPACT				MITIGATION		RELATIVE RISK SCORE
			COMM-UNITY	PUBLIC HEALTH	HEALTH CARE	MENTAL HEALTH	LHD	ESF8	
Active Shooter	1.69	2.12	2.38	1.67	2.29	2.96	1.94	2.40	0.12
Aerosolized Anthrax	0.92	2.79	2.38	2.73	2.62	2.96	3.06	2.60	0.11
Communicable Disease Outbreak	2.73	2.87	2.87	3.17	3.02	2.50	3.24	3.07	0.43
Drought	3.02	1.77	2.12	1.54	1.63	1.00	1.62	1.88	0.15
Earthquake - Major	1.42	2.94	2.85	2.94	3.08	3.04	2.56	2.44	0.14
Earthquake - Moderate	2.02	2.23	2.21	2.38	2.31	2.31	2.35	2.41	0.14
Electrical Failure	2.37	2.23	2.98	2.01	2.72	1.92	1.93	2.15	0.14
Emergent Disease	2.00	2.52	2.56	2.85	2.83	2.27	2.83	2.37	0.28
Fire - Largescale Urban	1.52	2.44	2.44	2.02	2.40	2.31	2.13	2.54	0.12
Flood	2.67	2.33	2.40	2.02	1.92	1.85	2.33	2.48	0.19
Intentional Water Contamination	1.15	2.50	2.31	2.60	2.54	2.02	2.21	2.25	0.12
Mass Casualty HazMat Incident	1.81	3.08	2.87	2.67	2.86	2.24	2.46	3.08	0.29
Nuclear Explosion – 10 Kiloton	0.64	2.92	2.65	2.51	2.55	2.51	1.78	1.72	0.14
Pandemic Flu	2.21	3.54	3.19	3.56	3.63	2.83	3.33	3.19	0.94
Radiological Dispersal Device	0.96	2.58	2.44	2.19	2.31	2.23	1.47	1.83	0.13
Severe Winter Storm	2.94	2.20	2.47	1.91	2.23	1.56	2.17	2.48	0.19
Supply Shortage	1.71	2.31	2.59	1.74	2.67	1.92	1.83	2.14	0.13
Train Accident – Chemical Release	2.01	2.42	2.41	2.12	2.45	1.58	2.12	2.47	0.13
Water Supply Contamination	1.90	2.08	2.38	2.12	2.47	1.87	2.32	2.20	0.13
Wildfire	3.31	2.42	2.67	2.13	2.16	1.63	2.10	2.63	0.18

The graph in Figure 15 includes the Aggregated Relative Risk Score for each of Utah's Top 20 Health Hazards, in order from highest concern. Note that the top four hazards (and particularly the number one threat), have significantly higher Aggregated Relative Risk Scores than the remaining 16 hazards. It is also interesting to note that three of the top four hazards are from the biological hazard category, and more specifically, relate to disease spread.

**FIGURE 15.** UTAH'S TOP 20 HEALTH HAZARDS BY AGGREGATED RELATIVE RISK SCORE.



## Severity & Health System Impacts

A brief analysis of the scores for the risk components of these identified top hazards is helpful in understanding better the challenge they pose to our preparedness and response efforts.

**Health Severity.** Pandemic Influenza and Mass Casualty Hazmat Incident have the highest aggregated rating scores for health severity, 3.54 and 3.08 respectively, placing them between “critical” and “catastrophic” levels. Even with inherent local differences, all health departments gave these two hazards very high scores. A quick review of the health severity scores for the remaining 18 hazards from the Top 20 list shows scores predominantly between 2.0, “limited,” and 3.0, “critical.” Utah has a limited number of health professionals and hospital beds for the population, therefore even slightly elevated rates of hospitalizations and deaths are enough to greatly impact the health system of local communities.

## Health System Impacts.

- **Public Health.** Those hazards predicted to bring the most disruption to the delivery of public health services are: Pandemic Influenza (3.56 rating), Communicable Disease Outbreak (3.17 rating), Major Earthquake (2.94 rating), and Emergent Disease (2.85 rating). Some considerations for these scores include public health being the lead response agency for the three disease-related hazards, requiring shifting other duties to answer this call, as well as the extensive focus needed on epidemiological, laboratory, and mass fatality activities. A major earthquake provides additional complexities through damage or destruction to facilities and equipment, in addition to water, sanitation, and mass fatality issues.
- **Health Care.** Hazards thought most likely to overwhelm the medical system in Utah are similar to those that would overwhelm public health services the most. Aggregated rating scores are as follows: Pandemic Influenza (3.63), Major Earthquake (3.08), Communicable Disease (3.02), Mass Casualty Hazardous Materials Accident (2.86), and Emergent Disease (2.83). The exponentially increased rates of hospitalization, extensive reduction in needed medical supplies and equipment, and high likelihood of implementing altered standards of care characteristic of each of the hazards all contribute to these high scores. Other considerations include high staff absenteeism, difficulty obtaining additional medical supplies and equipment due to either nationwide shortages (in a pandemic) or supply routes being impassable (following an earthquake).
- **Mental Health.** The highest rates of mental health system disruption belong to Major Earthquake (3.04), Aerosolized Anthrax (2.96), Active Shooter (2.96) and Pandemic Influenza (2.83). In the case of a major earthquake, anthrax or active shooter, widespread post-traumatic stress or other mental health issues could be caused or exacerbated due to witnessing mass harm to self or others from a relatively short but very intense event. In a pandemic influenza, high rates of mental illness might be more likely due to long-term anxiety that self or loved ones may become ill or die, or stress from caring for those who are sick and grieving for those who have passed over the months of waves of severe illness. Utah's already limited number of health professionals would be taxed by high absenteeism rates and/or lack of facilities and medication to assist those already in their care and the influx of new patients.

## Local Mitigation Efforts

Examining the lowest scores for mitigation among the top hazards is helpful in identifying gaps in our preparedness activities. The hazards with the lowest local health department mitigation scores, between a 1.0 and 2.0, are: Radiological Dispersal Device (1.47), Drought (1.62), Nuclear Explosion (1.78), Supply Shortage (1.83), Electrical Failure (1.93) and Active Shooter (1.94).

One of these hazards, Nuclear Explosion, also had the lowest probability score of 0.64. This score falls between “improbable” and “remote” probability levels, which likely explains why little work has been directed toward this hazard despite its high impact and severity scores. Drought and Electrical Failure are much more likely to occur (3.02 and 2.37 respectively), though their health severity scores are a bit lower (1.77 and 2.23) than most of the Top 20 Hazards. However, even lower health severity scores can still greatly disrupt day to day health operations.

Supply Shortage, Active Shooter and Radiological Dispersal Device risk component scores varied greatly between health departments, with some ranking one or more as a top hazard and others regarding one or more as a negligible concern. Any of the three hazards could cause considerable harm, as well as disruption to regular delivery of health services.

### Preparedness Capability Self-Assessments

Six of 13 local health departments completed the PHEP Capability Self-Evaluation. While specifics are confidential, some benefit can be gained by looking at trends across the capabilities. Some capabilities received relatively high or relatively low marks, regardless of the hazard, by most or all of the LHDs completing this evaluation. The table in Figure 16 shows these hazards. Those capabilities receiving the lowest ratings for most hazards and most LHDs should be noted for further consideration.

FIGURE 16. PHEP CAPABILITY SELF-EVALUATION RATINGS.

PHEP Capability Self-Evaluation Ratings	
LOW Ratings for Most Hazards/LHDs	HIGH Ratings for Most Hazards/LHDs
Fatality Management	Information Sharing
Mass Care	Emergency Public Information & Warning
Volunteer Management	Surveillance and Epi Investigation
	Medical Countermeasures
	Medical Materiel



# Recommendations

This section further analyzes and summarizes information from the “Results” section above, and outlines priorities for preparedness funding and activities for the next five years.

## State Preparedness Priorities, 2019-2024

### The “Big 5” Priority Hazards

Of the Top 20, there were four hazards whose significantly higher Aggregated Relative Risk Scores, high potential for injury, illness and death, and severe impact to the health systems within the state warrants special consideration. A fifth hazard, Major Earthquake, had a moderate Aggregated Relative Risk Score due to its lower probability, but the high scores for health severity and health system impact definitely suggest a need for further attention. The five hazards, or the “Big 5,” are:

1. Pandemic Influenza
2. Mass Casualty Hazmat Incident
3. Communicable Disease Outbreak
4. Emergent Disease
5. Earthquake – Major

As applicable to local areas, and certainly for the state, these five hazards should be considered major priorities as public health preparedness programs determine funding allocations, plan updates, training events, and exercises.

### Local Health Department #1 Hazards

The number one hazard for each local health jurisdiction, regardless of how that hazard scored in other areas, should be considered a top priority threat. Some number one hazards are already listed in the “Big 5” section above, namely Pandemic Influenza, Earthquake, and Emergent Disease. Four other hazards were a number one threat for at least one health district, including:

1. Wildfire
2. Train/Truck Accident – Chemical Release
3. Fire – Largescale Urban
4. Supply Shortage

### Other Considerations

**High Mental Health Impact Scores.** Two hazards had high impact scores for the mental health system, but were not part of the “Big 5” due to relatively moderate scores in other categories. These hazards, Aerosolized Anthrax and Active Shooter, may warrant additional preparedness

efforts with partners in the mental service profession, given the large impact they are expected to have in this area.

**Low LHD Mitigation Scores.** Hazards that had a relatively low aggregated level of local health department mitigation efforts, even with impact scores indicating some disruption to health systems, should be given some consideration. Given that most local health departments reported spending little effort preparing for them, it is recommended that these hazards be given more priority in the near future: Drought, Radiological Dispersal Device, and Electrical Failure.

**PHEP Capability Ratings.** In addition to the specific hazards recommended for future preparedness activities, three of the Public Health Preparedness Capabilities also stood out as those with gaps for those local health departments who completed the PHEP Capability Self-Assessment optional section of the Utah hHAP Tool. It is recommended that the following three capabilities be given priority as possible and reasonable in state and local efforts in the next five years: Fatality Management, Mass Care, and Volunteer Management.

## Overall Recommendations

This Utah Statewide Jurisdictional Risk Assessment Report examined and aggregated scores from the completed Utah Modified hHAP Tools of all 13 local health departments. Though scores on some hazards varied greatly due to differences in local geography, demography, and preparedness efforts, there were some trends statewide that suggested a more determined focus is necessary to ensure we are better prepared for particular hazards and across certain capabilities.

Local health departments are encouraged to use their local Jurisdictional Risk Assessment and accompanying PHEP Capability Assessment findings as a primary source of information for directing local preparedness activities over the next five years. They are also encouraged to use this Statewide Report to be informed of statewide trends that may provide further insight into specific hazards and capabilities that warrant attention. For example, it is helpful to know if much of the rest of the state is ill-prepared for a particular hazard or has spent little time on a particular capability, or has better preparation efforts in place, so knowledge may be exchanged and activities shared across local boundaries for the benefit of the state as a whole.

Recommendations for the state health department are to ensure a focus on the “Big 5” hazards, as well as the number one hazards for each local health district, over the next five years. It is also important to take note of the hazards with high mental health impact, low mitigation scores, and low PHEP Capability self-assessment ratings to see what assistance and/or planning activities can be offered in these areas. Targeted planning, training, and exercising activities, focused on the specific hazards and capabilities noted in this report, should do much to close the gaps in these areas over the next several years.

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